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Contents

Intellectual Property Rights	2
Foreword.....	2
Foreword.....	9
1 Scope	10
2 References	10
3 Definitions and abbreviations.....	11
3.1 Definitions	11
3.2 Abbreviations	12
4 General	13
4.1 Procedure Specification Principles.....	13
4.2 Forwards and Backwards Compatibility	13
4.3 Specification Notations	13
5 PCAP Services	14
6 Services Expected from Signalling Transport.....	15
7 Functions of PCAP	15
8 PCAP Procedures	15
8.1 Elementary Procedures.....	15
8.2 Position Calculation	16
8.2.1 General.....	16
8.2.2 Successful Operation	16
8.2.3 Unsuccessful Operation	18
8.2.4 Abnormal Conditions.....	18
8.3 Information Exchange Initiation.....	19
8.3.1 General.....	19
8.3.2 Successful Operation	19
8.3.3 Unsuccessful Operation	23
8.3.4 Abnormal Conditions.....	24
8.4 Information Reporting	24
8.4.1 General.....	24
8.4.2 Successful Operation	25
8.4.3 Abnormal Conditions.....	26
8.5 Information Exchange Termination	26
8.5.1 General.....	26
8.5.2 Successful Operation	26
8.5.3 Abnormal Conditions.....	26
8.6 Information Exchange Failure.....	26
8.6.1 General.....	26
8.6.2 Successful Operation	27
8.7 Error Indication	27
8.7.1 General.....	27
8.7.2 Successful Operation	27
8.7.3 Abnormal Conditions.....	28
8.8 Position Initiation	28
8.8.1 General.....	28
8.8.2 Successful Operation	28
8.8.3 Unsuccessful Operation	29
8.8.4 Abnormal Conditions.....	29
8.9 Position Activation	30
8.9.1 General.....	30
8.9.2 Successful Operation	30
8.9.3 Unsuccessful Operation	32

8.9.4	Abnormal Conditions.....	32
8.10	Position Parameter Modification.....	32
8.10.1	General.....	32
8.10.2	Successful Operation	33
8.10.3	Abnormal Conditions.....	33
8.11	Abort	33
8.11.1	General.....	33
8.11.2	Successful Operation	33
8.11.3	Abnormal Conditions.....	34
8.12	Position Periodic Report.....	34
8.12.1	General.....	34
8.12.2	Successful Operation	34
8.12.3	Abnormal Conditions.....	35
8.13	Position Periodic Result	35
8.13.1	General.....	35
8.13.2	Successful Operation	35
8.13.3	Abnormal Conditions.....	36
8.14	Position Periodic Termination.....	36
8.14.1	General.....	36
8.14.2	Successful Operation	36
8.14.3	Abnormal Conditions.....	37
9	Elements for PCAP Communication.....	37
9.1	Message Functional Definition and Content	37
9.1.1	General.....	37
9.1.2	Message Contents	37
9.1.2.1	Presence	37
9.1.2.2	Criticality	38
9.1.2.3	Range	38
9.1.2.4	Assigned Criticality.....	38
9.1.3	POSITION CALCULATION REQUEST	39
9.1.4	POSITION CALCULATION RESPONSE.....	40
9.1.5	POSITION CALCULATION FAILURE	40
9.1.6	INFORMATION EXCHANGE INITIATION REQUEST	41
9.1.7	INFORMATION EXCHANGE INITIATION RESPONSE	42
9.1.8	INFORMATION EXCHANGE INITIATION FAILURE	42
9.1.9	INFORMATION REPORT	42
9.1.10	INFORMATION EXCHANGE TERMINATION REQUEST	42
9.1.11	INFORMATION EXCHANGE FAILURE INDICATION	43
9.1.12	ERROR INDICATION.....	43
9.1.13	POSITION INITIATION REQUEST.....	43
9.1.14	POSITION INITIATION RESPONSE.....	43
9.1.15	POSITION INITIATION FAILURE.....	44
9.1.16	POSITION ACTIVATION REQUEST.....	45
9.1.17	POSITION ACTIVATION RESPONSE.....	46
9.1.18	POSITION ACTIVATION FAILURE.....	47
9.1.19	POSITION PARAMETER MODIFICATION.....	47
9.1.20	ABORT.....	47
9.1.21	POSITION PERIODIC REPORT.....	48
9.1.22	POSITION PERIODIC RESULT.....	49
9.1.23	POSITION PERIODIC TERMINATION	49
9.2	Information Element Functional Definitions and Contents.....	49
9.2.1	General.....	49
9.2.2	Radio Network Layer Related IEs	50
9.2.2.1	Almanac and Satellite Health SIB.....	50
9.2.2.2	Altitude and direction.....	50
9.2.2.3	Cause.....	50
9.2.2.4	Criticality Diagnostics.....	54
9.2.2.5	DGPS Corrections.....	56
9.2.2.6	Geographical Area	57
9.2.2.7	Geographical Coordinates	59
9.2.2.8	GPS Acquisition Assistance.....	59

9.2.2.9	GPS Almanac and Satellite Health.....	61
9.2.2.10	GPS Clock and Ephemeris Parameters	61
9.2.2.11	GPS Ionospheric Model	63
9.2.2.12	GPS Measured Results.....	64
9.2.2.13	GPS Navigation Model	65
9.2.2.14	GPS Real Time Integrity	66
9.2.2.15	GPS Reference Time.....	67
9.2.2.16	GPS Transmission TOW	68
9.2.2.17	GPS UTC Model.....	68
9.2.2.18	GPS-UTRAN Time Relationship Uncertainty	68
9.2.2.19	Information Exchange ID.....	68
9.2.2.20	Information Exchange Object Type	69
9.2.2.21	Information Report Characteristics	69
9.2.2.22	Information Type	70
9.2.2.23	Message Structure	74
9.2.2.24	Message Type	75
9.2.2.25	Method Type.....	75
9.2.2.26	Requested Data Value	76
9.2.2.27	Requested Data Value Information	77
9.2.2.28	Transaction ID.....	77
9.2.2.29	Transmission TOW Indicator.....	78
9.2.2.30	Uncertainty Ellipse.....	78
9.2.2.31	Cell-ID Measured Results Info List	78
9.2.2.32	OTDOA Measured Results Info List	81
9.2.2.33	OTDOA Neighbour Cell Info	84
9.2.2.34	OTDOA Reference Cell Info	86
9.2.2.35	UE Positioning Measurement Quality.....	89
9.2.2.36	UTRAN Access Point Position with Altitude	90
9.2.2.37	UTRAN Cell Identifier (UC-ID).....	90
9.2.2.37A	Extended RNC-ID.....	91
9.2.2.38	Horizontal Accuracy Code.....	91
9.2.2.39	Vertical Accuracy Code	91
9.2.2.40	Accuracy Fulfilment Indicator	92
9.2.2.41	Uplink DPCH information	92
9.2.2.42	Frequency information.....	92
9.2.2.43	PRACH parameters	93
9.2.2.44	Compressed Mode Assistance Data	93
9.2.2.45	C-RNTI	94
9.2.2.46	Primary Scrambling Code	94
9.2.2.47	PRACH information.....	94
9.2.2.48	TFS.....	95
9.2.2.49	CTFC.....	95
9.2.2.50	Request Type.....	96
9.2.2.51	UE Positioning Capability.....	97
9.2.2.52	Response Time	99
9.2.2.53	Positioning Priority	99
9.2.2.54	Client Type.....	100
9.2.2.55	Positioning Method	100
9.2.2.56	U-TDOA Bit Count.....	101
9.2.2.57	U-TDOA Time Interval.....	102
9.2.2.58	Additional Method Type	102
9.2.2.59	UE Positioning OTDOA Assistance Data	102
9.2.2.60	UL TrCH information	105
9.2.2.61	Semi-static Transport Format Information.....	105
9.2.2.62	Environment Characterisation.....	106
9.2.2.63	Chip Offset	106
9.2.2.64	Frame Offset	106
9.2.2.65	Position Data	106
9.2.2.66	Transmission Gap Pattern Sequence Information	109
9.2.2.67	Active Pattern Sequence Information.....	110
9.2.2.68	CFN.....	111
9.2.2.69	Positioning Response Time.....	111

9.2.2.70	Reference Cell Position.....	112
9.2.2.71	UE Positioning IPDL Parameters.....	112
9.2.2.72	Burst Mode Parameters	112
9.2.2.73	SFN-SFN Relative Time Difference	112
9.2.2.74	UTDOA Group	113
9.2.2.75	Maximum Set of E-DPDCHs	113
9.2.2.76	Puncture Limit.....	114
9.2.2.77	E-DCH Transport Format Combination Set Information (E-TFCS Information).....	114
9.2.2.78	Reference E-TFCI Power Offset	114
9.2.2.79	E-TTI.....	115
9.2.2.80	E-DPCCH Power Offset	115
9.2.2.81	Cell Parameter ID.....	115
9.2.2.82	TFCI Coding	115
9.2.2.83	Repetition Length.....	116
9.2.2.84	Repetition Period.....	116
9.2.2.85	TDD DPCH Offset.....	116
9.2.2.86	UL Timeslot Information	116
9.2.2.87	Time Slot.....	117
9.2.2.88	Midamble Shift And Burst Type.....	117
9.2.2.89	TFCI Presence.....	118
9.2.2.90	TDD UL Code Information.....	118
9.2.2.91	TDD Channelisation Code	119
9.2.2.92	Special Burst Scheduling	119
9.2.2.93	Max PRACH Midamble Shift	119
9.2.2.94	PRACH Midamble	119
9.2.2.95	USCH Parameters	120
9.2.2.96	USCH Scheduling Offset	120
9.2.2.97	Include Velocity	120
9.2.2.98	Velocity Estimate	121
9.2.2.99	Horizontal Speed and Bearing.....	122
9.2.2.100	Vertical Velocity	123
9.2.2.101	GPS Positioning Instructions	123
9.2.2.102	UE Position Estimate Info.....	124
9.2.2.103	UTRAN-GPS Reference Time.....	125
9.2.2.104	UTRAN-GPS Reference Time Result.....	126
9.2.2.105	$T_{\text{UTRAN-GPS}}$ Drift Rate.....	126
9.2.2.106	Periodic Position Calculation Info	126
9.2.2.107	Periodic Location Info.....	127
9.2.2.108	Amount of Reporting	127
9.2.2.109	Measurement Instructions Used.....	127
9.2.2.110	RRC State Change	127
9.2.2.111	Periodic Position Termination Cause	127
9.2.2.112	Requested Cell-ID Measurements.....	128
9.2.2.113	DGANSS Corrections	129
9.2.2.114	GANSS Almanac and Satellite Health.....	131
9.2.2.115	GANSS Clock Model.....	134
9.2.2.115A	GANSS Additional Clock Models	135
9.2.2.116	GANSS Ionospheric Model	137
9.2.2.116A	GANSS Additional Ionospheric Model	137
9.2.2.117	GANSS Measured Results	138
9.2.2.118	GANSS Navigation Model	140
9.2.2.118A	GANSS Additional Navigation Models.....	141
9.2.2.119	GANSS Orbit Model.....	141
9.2.2.119A	GANSS Additional Orbit Models	142
9.2.2.120	GANSS Positioning Instructions.....	146
9.2.2.121	GANSS-UTRAN Time Relationship Uncertainty	147
9.2.2.122	GANSS Real Time Integrity	147
9.2.2.123	GANSS Reference Measurement Information.....	147
9.2.2.124	GANSS Reference Time	148
9.2.2.125	GANSS Time Model.....	149
9.2.2.125A	GANSS Additional Time Models	149
9.2.2.126	GANSS UTC Model	150

9.2.2.126A	GANSS Additional UTC Models.....	150
9.2.2.127	GANSS Time Indicator.....	152
9.2.2.127A	GANSS Data Bit Assistance	152
9.2.2.128	Additional GPS Assistance Data Required	153
9.2.2.129	Additional GANSS Assistance Data Required.....	154
9.2.2.130	GANSS ID	156
9.2.2.131	GANSS Signal ID	156
9.2.2.131a	GANSS Signal IDs.....	156
9.2.2.132	GPS Reference Time Uncertainty	157
9.2.2.133	GANSS Earth Orientation Parameters	158
9.2.2.134	SBAS ID	158
9.2.2.135	GANSS Auxiliary Information	158
9.2.2.136	UTRAN-GANSS Reference Time Result	159
9.2.2.137	GANSS Additional Ionospheric Model Request.....	160
9.2.2.138	GANSS Earth Orientation Parameters Request	160
9.2.2.139	Support for Non-Native Assistance Choices Indication.....	160
9.2.2.140	Position Data UE-Based.....	160
9.2.2.141	GANSS Code Phase Ambiguity Extension.....	160
9.2.2.142	GANSS Integer Code Phase Extension.....	161
9.2.2.143	GANSS Carrier-Phase Measurement Requested.....	161
9.2.2.144	GANSS Multi-frequency Measurement Requested	161
9.2.2.145	GANSS Additional Ionospheric Model Required	162
9.2.2.146	GANSS Earth Orientation Parameters Required.....	162
9.2.2.147	GANSS Additional Navigation Models Required	162
9.2.2.148	GANSS Additional UTC Models Required	162
9.2.2.149	GANSS Auxiliary Information Required.....	162
9.2.2.150	SBAS IDs.....	162
9.2.2.151	GANSS Additional Assistance Data Choices	163
9.2.2.152	Cell-ID Measured Results Sets	163
9.2.2.153	OTDOA Reference Cell Info SAS-centric mode	163
9.2.2.154	DGNSS Validity Period	163
9.3	Message and Information Element Abstract Syntax (with ASN.1).....	165
9.3.0	General.....	165
9.3.1	Usage of private message mechanism for non-standard use.....	165
9.3.2	Elementary Procedure Definitions	165
9.3.3	PDU Definitions	171
9.3.4	Information Element Definitions	185
9.3.5	Common Definitions.....	273
9.3.6	Constant Definitions	274
9.3.7	Container Definitions.....	278
9.4	Message Transfer Syntax	281
10	Handling of Unknown, Unforeseen and Erroneous Protocol Data	281
10.1	General	281
10.2	Transfer Syntax Error.....	282
10.3	Abstract Syntax Error.....	282
10.3.1	General.....	282
10.3.2	Criticality Information	283
10.3.3	Presence Information	284
10.3.4	Not comprehended IE/IE group	284
10.3.4.1	Procedure Code	284
10.3.4.1A	Type of Message	285
10.3.4.2	IEs other than the Procedure Code and Type of Message.....	285
10.3.5	Missing IE or IE group	286
10.3.6	IEs or IE groups received in wrong order or with too many occurrences or erroneously present	287
10.4	Logical Error	288
10.5	Exceptions	288
Annex A (informative):	Guidelines for Usage of the Criticality Diagnostics IE	289
A.1	EXAMPLE MESSAGE Layout	289
A.2	Example on a Received EXAMPLE MESSAGE.....	290

A.3	Content of Criticality Diagnostics	292
A.3.1	Example 1	292
A.3.2	Example 2	294
A.3.3	Example 3	296
A.3.4	Example 4	298
A.3.5	Example 5	300
A.4	ASN.1 of EXAMPLE MESSAGE	301
Annex B (informative):	Change History	305
History		306

Foreword

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1 Scope

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

2 References

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

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

- [21] 3GPP TS 25.102: "UE radio transmission and reception (TDD)".
- [22] Galileo OS Signal in Space ICD (OS SIS ICD), Draft 0, Galileo Joint Undertaking, May 23rd, 2006.
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- [24] IS-GPS-705, Navstar GPS Space Segment/User Segment L5 Interfaces, September 22, 2005.
- [25] IS-GPS-800, Navstar GPS Space Segment/User Segment L1C Interfaces, March 31, 2008.
- [26] Specification for the Wide Area Augmentation System (WAAS), US Department of Transportation, Federal Aviation Administration, DTFA01-96-C-00025, 2001.
- [27] IS-QZSS, Quasi Zenith Satellite System Navigation Service Interface Specifications for QZSS, Ver.1.0, June 17, 2008.
- [28] Global Navigation Satellite System GLONASS Interface Control Document, Version 5, 2002.

3 Definitions and abbreviations

3.1 Definitions

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

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

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

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

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

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

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

Successful:

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

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.

Class 2 EPs are considered always successful.

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

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

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

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

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

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

3.2 Abbreviations

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

A-GANSS	Assisted GANSS
A-GPS	Assisted GPS
ASN.1	Abstract Syntax Notation One
CN	Core Network
CRNC	Controlling RNC
DGANSS	Differential GANSS
DGPS	Differential GPS
ECEF	Earth-Centered, Earth-Fixed
ECI	Earth-Centered-Inertial
EGNOS	European Geostationary Navigation Overlay Service
EP	Elementary Procedure
FDD	Frequency Division Duplex
GAGAN	GPS Aided Geo Augmented Navigation
GANSS	Galileo and Additional Navigation Satellite Systems
GLONASS	GLObal'naya NAVigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICD	Interface Control Document
MSAS	Multi-functional Satellite Augmentation System
MSC	Mobile services Switching Center
OTDOA	Observed Time Difference Of Arrival
PCAP	Positioning Calculation Application Part
PRC	Pseudorange Correction
PRN	Pseudo-Random Noise
QZSS	Quasi-Zenith Satellite System
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RRC	Radio Resource Control
SAS	Stand-Alone SMLC
SBAS	Satellite Based Augmentation System
SCCP	Signalling Connection Control Part
SIB	System Information Block
SMLC	Serving Mobile Location Center
SRNC	Serving RNC
SRNS	Serving RNS
SV	Space Vehicle
TDD	Time Division Duplex
TOD	Time of Day
TOW	Time of Week
UE	User Equipment
UTC	Universal Coordinated Time
U-TDOA	Uplink Time Difference Of Arrival
UTRAN	Universal Terrestrial Radio Access Network
WAAS	Wide Area Augmentation System
WGS-84	World Geodetic System 1984

4 General

4.1 Procedure Specification Principles

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

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

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

4.2 Forwards and Backwards Compatibility

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

4.3 Specification Notations

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

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

[7.68Mcps TDD]	This tagging of a word indicates that the word preceding the tag "[7.68Mcps TDD]" applies only to 7.68Mcps TDD. This tagging of a heading indicates that the heading preceding the tag "[7.68Mcps TDD]" and the section following the heading applies only to 7.68Mcps TDD.
[FDD - ...]	This tagging indicates that the enclosed text following the "[FDD - " applies only to FDD. Multiple sequential paragraphs applying only to FDD are enclosed separately to enable insertion of TDD specific (or common) paragraphs between the FDD specific paragraphs.
[TDD - ...]	This tagging indicates that the enclosed text following the "[TDD - " applies only to TDD, including 7.68 Mcps TDD, 3.84Mcps TDD, 7.68Mcps TDD and 1.28Mcps TDD. Multiple sequential paragraphs applying only to TDD are enclosed separately to enable insertion of FDD specific (or common) paragraphs between the TDD specific paragraphs.
[3.84Mcps TDD - ...]	This tagging indicates that the enclosed text following the "[3.84Mcps TDD - " applies only to 3.84Mcps TDD. Multiple sequential paragraphs applying only to 3.84Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 3.84Mcps TDD specific paragraphs.
[1.28Mcps TDD - ...]	This tagging indicates that the enclosed text following the "[1.28Mcps TDD - " applies only to 1.28Mcps TDD. Multiple sequential paragraphs applying only to 1.28Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 1.28Mcps TDD specific paragraphs.
[7.68Mcps TDD - ...]	This tagging indicates that the enclosed text following the "[7.68Mcps TDD - " applies only to 7.68Mcps TDD. Multiple sequential paragraphs applying only to 7.68Mcps TDD are enclosed separately to enable insertion of FDD and TDD specific (or common) paragraphs between the 7.68Mcps TDD specific paragraphs.
Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Position Calculation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. POSITION CALCULATION REQUEST message.
IE	When referring to an information element (IE) in the specification the <i>Information Element Name</i> is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. <i>Request Type</i> IE.
Value of an IE	When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in clause 9.2 enclosed by quotation marks, e.g. "Abstract Syntax Error (Reject)" or "Geographical Coordinates".

5 PCAP Services

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

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

6 Services Expected from Signalling Transport

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

1. Connection oriented data transfer service. This service is supported by a signalling connection between the RNC and the SAS. It shall be possible to dynamically establish and release signalling connections based on the need. Each point-to-point operation shall have its own signalling connection. The signalling connection shall provide in sequence delivery of PCAP messages. PCAP shall be notified if the signalling connection breaks.
2. Connectionless data transfer service. PCAP shall be notified in case a PCAP message did not reach the intended peer PCAP entity.

7 Functions of PCAP

PCAP has the following functions:

- Position Calculation. This function enables the SRNC to interact with an SAS in the process of performing a position estimate of a UE.
- Information Exchange. This function enables the RNC to obtain GPS or GANSS related data from an SAS.
- Reporting of General Error Situations. This function allows reporting of general error situations for which function specific error messages have not been defined.
- SAS Centric Position. This function enables the SRNC to interact with an SAS in the process of performing a position estimate of a UE.

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

Table 1: Mapping between functions and PCAP elementary procedures

Function	Elementary Procedure(s)
Position Calculation	a) Position Calculation b) Position Parameter Modification c) Abort
Information Exchange	a) Information Exchange Initiation b) Information Reporting c) Information Exchange Termination d) Information Exchange Failure
Reporting of General Error Situations	a) Error Indication
SAS Centric Position	a) Position Initiation b) Position Activation c) Position Parameter Modification d) Abort e) Position Periodic Report f) Position Periodic Result g) Position Periodic Termination

8 PCAP Procedures

8.1 Elementary Procedures

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

Table 2: Class 1

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

Table 3: Class 2

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

8.2 Position Calculation

8.2.1 General

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

8.2.2 Successful Operation

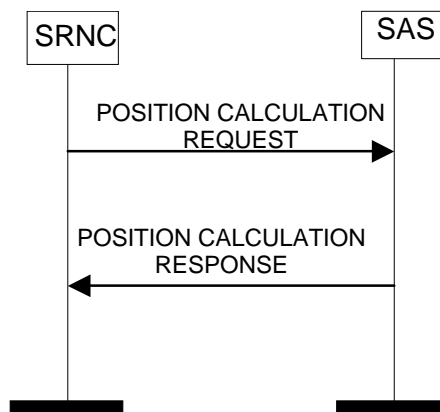


Figure 1: Position Calculation procedure, Successful Operation

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

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

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

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

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

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

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

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

- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS ID* IE, the SAS shall assume that the associated GANSS is "Galileo".
- If a *GANSS Generic Measurement Information* IE associated with a particular GANSS does not contain the *GANSS Signal ID* IE, the SAS shall assume the default value as defined in [4], clause 10.3.3.45a.
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE and the *GANSS Code Phase Ambiguity Extension* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* IE and the *GANSS Integer Code Phase Extension* IE associated to a given satellite (identified by the *Sat ID* IE value) is not present within the *GANSS Measurement Parameters* IE, the SAS shall use the default "1" (ms) for the *GANSS Code Phase Ambiguity* value in order to compute the value of the Total Code Phase (as defined in [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

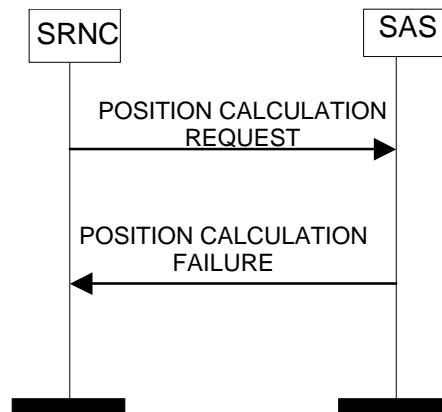


Figure 2: Position Calculation procedure, Unsuccessful Operation

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, Galileo, GLONASS or GANSS measured results;
- Initial UE Position Estimate missing;
- Processing Overload;
- Hardware Failure;
- O&M Intervention;
- Invalid U-TDOA measured results;
- U-TDOA positioning method not supported;
- U-TDOA positioning method not supported in specified UTRAN cell;
- SAS unable to perform U-TDOA positioning within Response Time.

8.2.4 Abnormal Conditions

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

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

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

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

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

8.3 Information Exchange Initiation

8.3.1 General

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

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

8.3.2 Successful Operation

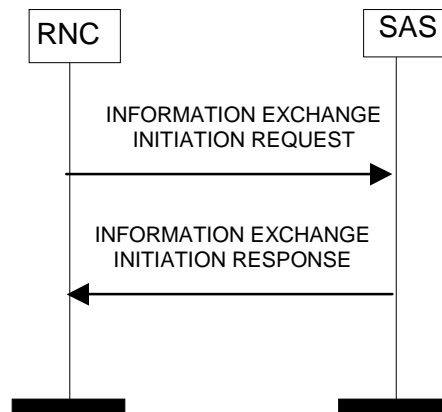


Figure 3: Information Exchange Initiation procedure, Successful Operation

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

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

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

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

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

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

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

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

Information Report Characteristics:

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

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

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

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

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Almanac and Satellite Health", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{oa} or WN_a parameter has occurred in almanac/health information for at least one visible satellite.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "UTC Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{ot} or WN_t parameter has occurred in the GPS UTC model.
 - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Ionospheric Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GPS ionospheric model.
 - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Navigation Model", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the clock/ephemeris information for at least one visible satellite or in the list of visible satellites.
 - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "DGPS Corrections", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the quality of the DGPS corrections information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Reference Time", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the time-of-week assistance information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Acquisition Assistance", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in acquisition assistance information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Real Time Integrity", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the real-time integrity status of at least one visible satellite.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE includes "Almanac and Satellite Health SIB", the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in almanac/health information for at least one visible satellite.
 - If the *Transmission TOW Indicator* IE is set to "requested", then the SAS shall include the *GPS Transmission TOW* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Almanac and Satellite Health* IE, the SAS shall initiate the Information Reporting

procedure for this specific Explicit Information Type when a change in the T_{oa} , IOD_a , or Week Number parameter has occurred in almanac/health information for at least one visible satellite.

- If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS UTC Model* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{ot} or WN_i parameter has occurred in the GANSS UTC model.
- If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Additional UTC Models* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{ot} , WN_{ot} , WN_i , or N^A parameter has occurred in the GANSS Additional UTC model.
- If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Common Data" and includes the *GANSS Ionosphere Model* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GANSS ionospheric model.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Common Data" and includes the *GANSS Additional Ionospheric Model* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the GANSS additional ionospheric model.
- If the *Data ID* IE is set to value "11", then the SAS shall include the *GANSS Additional Ionospheric Model* IE for the area as defined in [27]. If the *Data ID* IE is set to value "00", then the SAS shall include the *GANSS Additional Ionospheric Model* IE applicable worldwide as defined in [27].
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Common Data" and includes the *GANSS Earth Orientation Parameters* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the t_{EOP} parameter has occurred in the GANSS Earth Orientation Parameters.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Navigation Model* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the ephemeris information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Additional Navigation Models* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the ephemeris information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Time Model GNSS-GNSS* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the time information.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *DGANSS Corrections* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the quality of the DGANSS corrections information for at least one visible satellite or in the list of visible satellites.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.

- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Common Data" and includes the *GANSS Reference Time* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the time-of-week assistance information for at least one visible satellite or in the list of visible satellites.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Reference Measurement Information* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in acquisition assistance information for at least one visible satellite or in the list of visible satellites.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Real Time Integrity* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change has occurred in the real-time integrity status of at least one visible satellite.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If the *Information Type* IE is set to "Explicit" and the *Explicit Information Item* IE is set to "GANSS Generic Data" and includes the *GANSS Auxiliary Information* IE, the SAS shall initiate the Information Reporting procedure for this specific Explicit Information Type when a change in the *Signals Available* or *Channel Number* IEs has occurred in the GANSS Auxiliary Information.
 - If the *GANSS Time Indicator* IE is set to "requested", then the SAS shall include the *GANSS Reference Time* IE in the INFORMATION REPORT message.
- If any of the above *Information Type* IEs becomes temporarily unavailable, the SAS shall initiate the Information Reporting procedure for this specific Information Item by indicating "Information Not Available" in the *Requested Data Value Information* IE. If the Information becomes available again, the SAS shall initiate the Information Reporting procedure for this specific Information.

Response message:

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

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

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

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

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

- If the *GANSS Generic Assistance Data* IE does not contain the *GANSS ID* IE, the corresponding GANSS is "Galileo".

- The *DGANSS Corrections* IE contains one or several *DGANSS Information* IE(s), each of them associated with a GANSS Signal. A *DGANSS Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22, 23, 24, 25, 26, 27, 28]).
- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.

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

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

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

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

8.3.3 Unsuccessful Operation

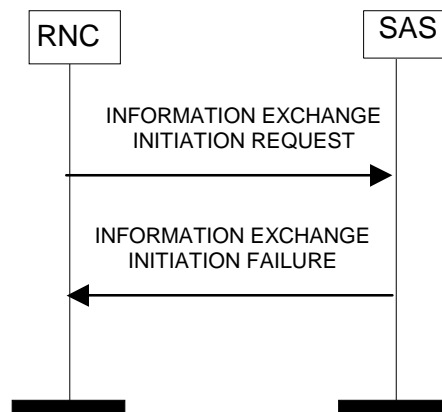


Figure 4: Information Exchange Initiation procedure, Unsuccessful Operation

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

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

Typical cause values are as follows:

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

8.3.4 Abnormal Conditions

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

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

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

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

8.4 Information Reporting

8.4.1 General

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

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

8.4.2 Successful Operation

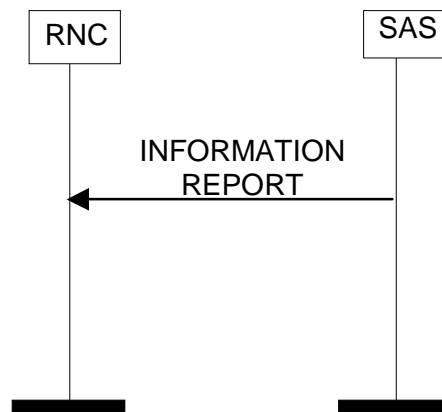


Figure 5: Information Reporting procedure, Successful Operation

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

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

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

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

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

- If the *GANSS Generic Assistance Data* IE does not contain the *GANSS ID* IE, the corresponding GANSS is "Galileo".
- The *DGANSS Corrections* IE contains one or several *DGANSS Information* IE(s), each of them associated with a GANSS Signal. A *DGANSS Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22, 23, 24, 25, 26, 27, 28]).
- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.

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

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

8.4.3 Abnormal Conditions

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8.5 Information Exchange Termination

8.5.1 General

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

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

8.5.2 Successful Operation

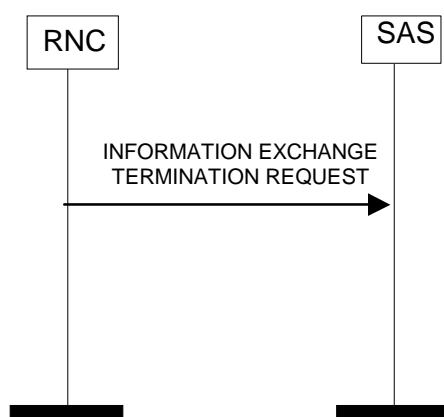


Figure 6: Information Exchange Termination procedure, Successful Operation

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

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

8.5.3 Abnormal Conditions

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8.6 Information Exchange Failure

8.6.1 General

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

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

8.6.2 Successful Operation

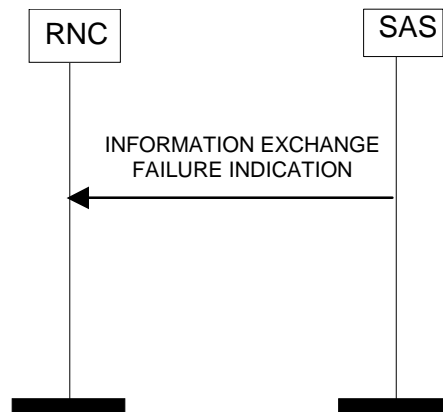


Figure 7: Information Exchange Failure procedure, Successful Operation

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

Typical cause values are as follows:

- Information temporarily not available.

8.7 Error Indication

8.7.1 General

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

8.7.2 Successful Operation

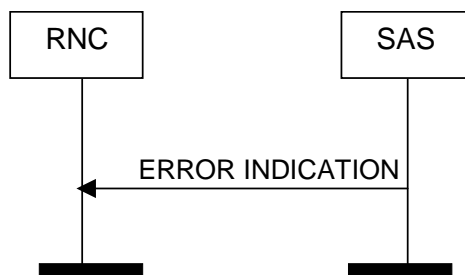


Figure 8: Error Indication procedure, SAS Originated, Successful Operation

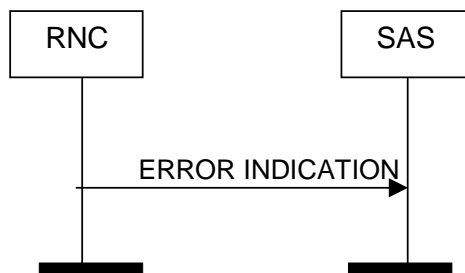


Figure 9: Error Indication procedure, RNC Originated, Successful Operation

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

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

Typical cause values are as follows:

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

8.7.3 Abnormal Conditions

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8.8 Position Initiation

8.8.1 General

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

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

8.8.2 Successful Operation

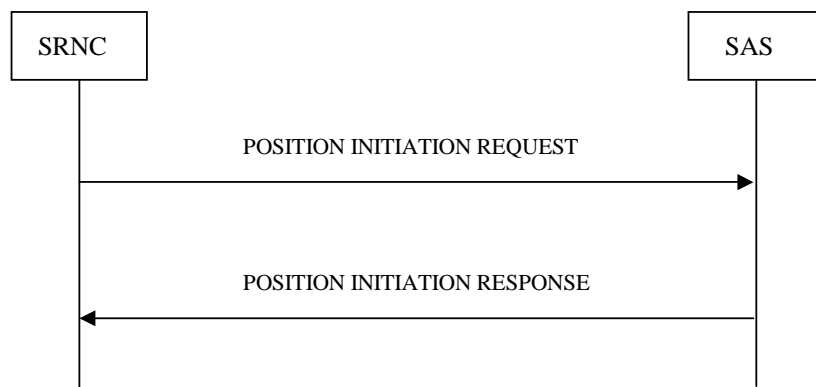


Figure 9a: Position Initiation procedure, Successful Operation

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

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

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

- If a *Network Assisted GANSS Support IE* corresponding to a particular GANSS does not contain the *GANSS Signal ID IE* and the *GANSS Signal IDs IE*, the SAS shall assume that the corresponding GANSS Signal is the default signal defined in [4], clause 10.3.3.45a.

Response Message:

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

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

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

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

8.8.3 Unsuccessful Operation

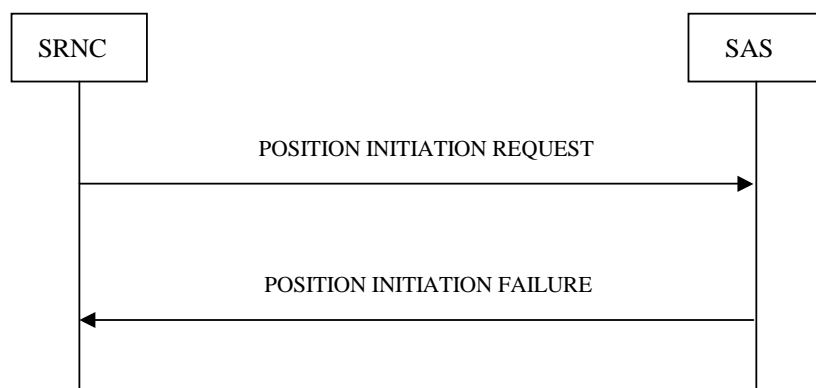


Figure 9b: Position Initiation procedure, Unsuccessful Operation

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

Typical cause values are:

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

8.8.4 Abnormal Conditions

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

8.9 Position Activation

8.9.1 General

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

8.9.2 Successful Operation

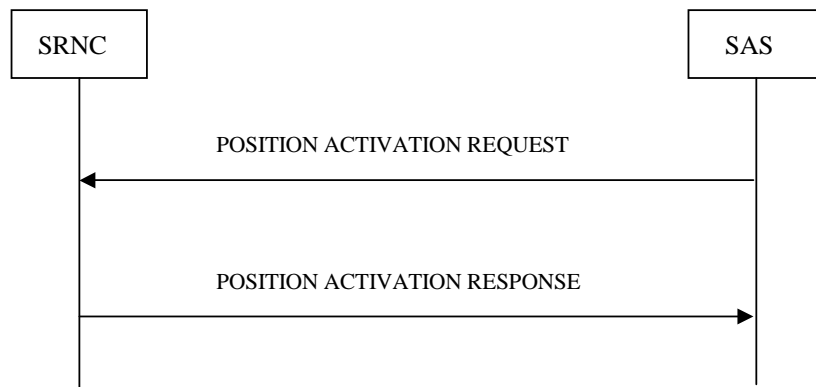


Figure 9c: Position Activation procedure, Successful Operation

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

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

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

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

If the 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 Data Value* IE, it shall contain a *GANSS Real Time Integrity*, *GANSS Data Bit Assistance*, *DGANSS Corrections*, *GANSS Almanac and Satellite Health*, *GANSS Reference Measurement Information*, *GANSS UTC Model*, *GANSS Time Model*, *GANSS Navigation Model*, *GANSS Additional Time Models*, *GANSS Additional Navigation Models*, *GANSS Additional UTC Models*, or *GANSS Auxiliary Information* IE.
- If the *GANSS Generic Assistance Data* IE does not contain the *GANSS ID* IE, the corresponding GANSS is "Galileo".
- The *DGANSS Corrections* IE contains one or several *DGANSS Information* IE(s), each of them associated with a GANSS Signal. A *DGANSS Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.
- The *GANSS Real Time Integrity* IE contains one or several *Satellite Information* IEs, each of them associated with a satellite and a GANSS Signal. A *Satellite Information* IE for a particular GANSS that does not contain the *Bad GANSS Signal ID* IE is by default associated with all the signals of the corresponding satellite (see [22, 23, 24, 25, 26, 27, 28]).
- The *GANSS Reference Measurement Information* IE is associated with a GANSS Signal. A *GANSS Reference Measurement Information* IE for a particular GANSS that does not contain the *GANSS Signal ID* IE is by default associated with the default signal defined in [4], clause 10.3.3.45a.

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

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

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

- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS ID* IE, the SAS shall assume that the associated GANSS is "Galileo".
- If a *GANSS Generic Measurement Information* IE associated with a particular GANSS does not contain the *GANSS Signal ID* IE, the SAS shall assume the default value as defined in [4], clause 10.3.3.45a.
- If a *GANSS Generic Measurement Information* IE does not contain the *GANSS Code Phase Ambiguity* IE and the *GANSS Code Phase Ambiguity Extension* IE, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase* IE and the *GANSS Integer Code Phase Extension* IE associated to a given satellite (identified by the *Sat ID* IE value) is not present within the *GANSS Measurement Parameters* IE, the SAS shall use the default "1" (ms) for the *GANSS Code Phase Ambiguity* value in order to compute the value of the Total Code Phase (as defined in [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity* IE.

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

8.9.3 Unsuccessful Operation

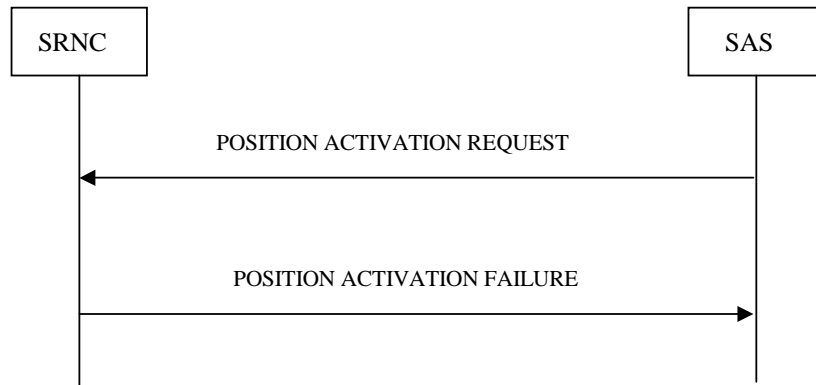


Figure 9d: Position Activation procedure, Unsuccessful Operation

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

Typical cause values are:

- Processing Overload;
- Hardware Failure;
- O&M Intervention;
- Positioning Method Not Supported;
- Location Measurement Failure.

8.9.4 Abnormal Conditions

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8.10 Position Parameter Modification

8.10.1 General

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

8.10.2 Successful Operation



Figure 9e: Position Parameter Modification procedure, Successful Operation

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

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

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

8.10.3 Abnormal Conditions

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8.11 Abort

8.11.1 General

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

8.11.2 Successful Operation

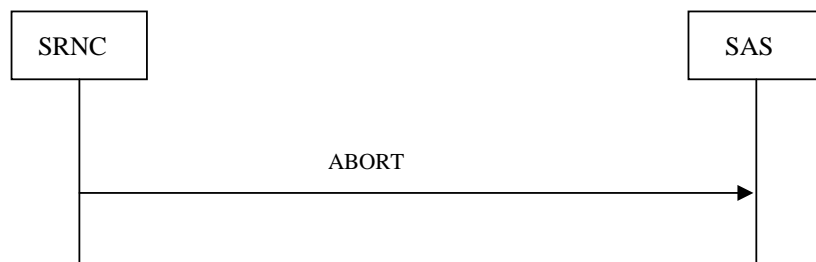


Figure 9f: Abort procedure, Successful Operation

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

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

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

Typical cause values are:

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

8.11.3 Abnormal Conditions

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8.12 Position Periodic Report

8.12.1 General

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

8.12.2 Successful Operation

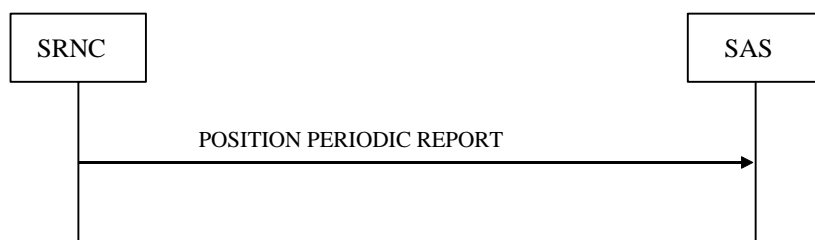


Figure 9g: Position Periodic Report procedure, Successful Operation

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

The SRNC should send the first POSITION PERIODIC REPORT message one reporting interval after the POSITION ACTIVATION RESPONSE message, and should continue to send further POSITION PERIODIC REPORT messages one reporting interval after the previous POSITION PERIODIC REPORT message based on the available measurements. If the RNC can not deliver measurement information when a POSITION PERIODIC REPORT is triggered, the *Cause* IE should be included in the POSITION PERIODIC REPORT message, indicating the reason for measurement failure, e.g. "UE Positioning Error: Not enough OTDOA cells", "UE Positioning Error: Not enough GPS

Satellites", "UE Positioning Error: Not Accomplished GPS Timing of Cell Frames" or "UE Positioning Error: Undefined Error". If the *Cause IE* is included in a POSITION PERIODIC REPORT message, the *UE Position Estimate Info IE*, *Velocity Estimate IE*, *GPS Measurement Results IE*, *GANSS Measurement Results IE*, *Cell-ID Measured Results Sets IE*, and *OTDOA Measured Results Sets IE* should not be included. If and only if the *Cause IE* indicates the error reason "UE Positioning Error: Assistance Data Missing" the SRNC may include the *Required GPS Assistance Data IE* and/or the *Required GANSS Assistance Data IE* in the POSITION PERIODIC REPORT message.

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

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

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

- If a *GANSS Generic Measurement Information IE* does not contain the *GANSS ID IE*, the SAS shall assume that the associated GANSS is "Galileo".
- If a *GANSS Generic Measurement Information IE* associated with a particular GANSS does not contain the *GANSS Signal ID IE*, the SAS shall assume the default value as defined in [4], clause 10.3.3.45a.
- If a *GANSS Generic Measurement Information IE* does not contain the *GANSS Code Phase Ambiguity IE* and the *GANSS Code Phase Ambiguity Extension IE*, the SAS shall assume the value "1" (ms).
- If the *GANSS Integer Code Phase IE* and the *GANSS Integer Code Phase Extension IE* associated to a given satellite (identified by the *Sat ID IE* value) is not present within the *GANSS Measurement Parameters IE*, the SAS shall use the default "1" (ms) for the GANSS Code Phase Ambiguity value in order to compute the value of the Total Code Phase (as defined in [4]) for the related satellite, whatever the value of the *GANSS Code Phase Ambiguity IE*.

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

8.12.3 Abnormal Conditions

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8.13 Position Periodic Result

8.13.1 General

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

8.13.2 Successful Operation

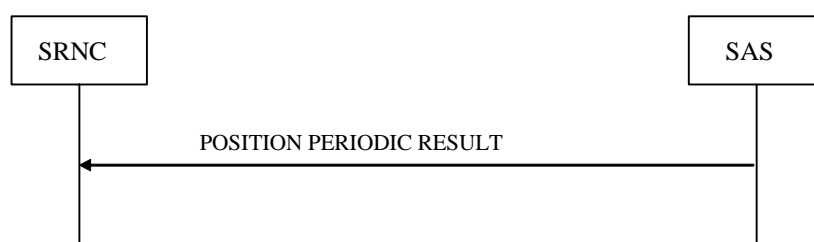


Figure 9h: Position Periodic Result procedure, Successful Operation

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

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

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

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

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

8.13.3 Abnormal Conditions

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8.14 Position Periodic Termination

8.14.1 General

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

8.14.2 Successful Operation

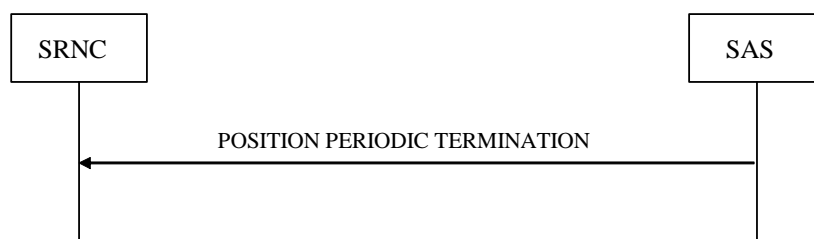


Figure 9i: Position Periodic Termination procedure, SAS Originated, Successful Operation

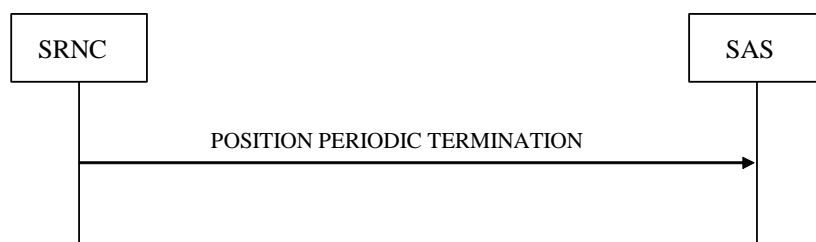


Figure 9k: Position Periodic Termination procedure, RNC Originated, Successful Operation

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

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

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

8.14.3 Abnormal Conditions

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9 Elements for PCAP Communication

9.1 Message Functional Definition and Content

9.1.1 General

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

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

9.1.2 Message Contents

9.1.2.1 Presence

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

Table 4: Meaning of abbreviations used in PCAP messages

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

9.1.2.2 Criticality

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

Table 5: Meaning of content within "Criticality" column

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

9.1.2.3 Range

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

9.1.2.4 Assigned Criticality

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

9.1.3 POSITION CALCULATION REQUEST

Table 6

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
Initial UE Position Estimate	O		Geographical Area 9.2.2.6		YES	reject
GPS Measured Results		<i>0..<maxNoOfSets ></i>			GLOBAL	reject
>GPS Measured Results	M		9.2.2.12		–	
Cell-ID Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	reject
>Cell-ID Measured Results Info List	M		9.2.2.31		–	
OTDOA Measurement Group		<i>0..1</i>			YES	reject
>OTDOA Reference Cell Info	M		9.2.2.34		–	
>OTDOA Neighbour Cell Info List		<i>1..<maxNoOfMeasNCell></i>			–	
>>OTDOA Neighbour Cell Info	M		9.2.2.33		–	
>OTDOA Measured Results Sets		<i>1..<maxNoOfMeasurements></i>			–	
>>OTDOA Measured Results Info List	M		9.2.2.32		–	
Horizontal Accuracy Code	O		9.2.2.38		YES	ignore
Vertical Accuracy Code	O		9.2.2.39		YES	ignore
UTDOA Group	O		9.2.2.74		YES	reject
SAS Response Time	O		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a SAS response for U-TDOA positioning.	YES	ignore
Include Velocity	O		9.2.2.97		YES	ignore
Periodic Position Calculation Info	O		9.2.2.106		YES	ignore
GANSS Measured Results		<i>0..<maxNoOfSets ></i>			GLOBAL	reject
>GANSS Measured Results	M		9.2.2.117		–	

Table 7

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

9.1.4 POSITION CALCULATION RESPONSE

Table 8

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
UE Position Estimate	M		Geographical Area 9.2.2.6		YES	ignore
Criticality Diagnostics	O		9.2.2.4		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore

9.1.5 POSITION CALCULATION FAILURE

Table 9

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

9.1.6 INFORMATION EXCHANGE INITIATION REQUEST

Table 10

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
Information Exchange ID	M		9.2.2.19		YES	reject
CHOICE <i>Information Exchange Object Type</i>	M				YES	reject
> <i>Reference Position</i>					–	
>>Reference Position Estimate/UE Initial Position	M		Geographical Area 9.2.2.6	For RNC-centric mode.	–	
> <i>Additional Information Exchange Object Types</i>						
>> <i>Reference Position UC-ID</i>						
>>>UTRAN Cell Identifier/UE Initial Position	M		UTRAN Cell Identifier 9.2.2.37	For SAS-centric mode.	YES	reject
>> <i>Cell-ID Measured Results Sets</i>						
>>> Cell-ID Measured Results Sets	M		9.2.2.152		YES	ignore
Information Type	M		9.2.2.22		YES	reject
Information Report Characteristics	M		9.2.2.21		YES	reject
GPS-UTRAN Time Relationship Uncertainty	C-GPS		9.2.2.18		YES	reject
GANSS-UTRAN Time Relationship Uncertainty	C-GANSS		9.2.2.121		YES	reject

Table 11

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

Table 11a

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

9.1.7 INFORMATION EXCHANGE INITIATION RESPONSE

Table 12

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

9.1.8 INFORMATION EXCHANGE INITIATION FAILURE

Table 13

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

9.1.9 INFORMATION REPORT

Table 14

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

9.1.10 INFORMATION EXCHANGE TERMINATION REQUEST

Table 15

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

9.1.11 INFORMATION EXCHANGE FAILURE INDICATION

Table 16

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

9.1.12 ERROR INDICATION

Table 17

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

9.1.13 POSITION INITIATION REQUEST

Table 17a

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
Request Type	M		9.2.2.50		YES	reject
UE Positioning Capability	M		9.2.2.51		YES	reject
UTRAN Cell Identifier	M		9.2.2.37		YES	reject
Vertical Accuracy Code	O		9.2.2.39		YES	ignore
Response Time	O		9.2.2.52		YES	ignore
Positioning Priority	O		9.2.2.53		YES	ignore
Client Type	O		9.2.2.54		YES	ignore
Include Velocity	O		9.2.2.97		YES	ignore
Periodic Location Info	O		9.2.2.107		YES	ignore

9.1.14 POSITION INITIATION RESPONSE

Table 17b

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
UE Position Estimate	M		Geographical Area 9.2.2.6		YES	reject
Position Data	M		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore

9.1.15 POSITION INITIATION FAILURE

Table 17c

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

9.1.16 POSITION ACTIVATION REQUEST

Table 17d

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
Positioning Method	M		9.2.2.55		YES	reject
RNC Response Time	M		Positioning Response Time 9.2.2.69	Indicates the interval allowed for a RNC response, or the periodic reporting interval if <i>Amount of Reporting</i> IE is present.	YES	ignore
Positioning Priority	O		9.2.2.53		YES	ignore
Environment Characterisation	O		9.2.2.62		YES	ignore
U-TDOA Positioning		0..1		Only present if Positioning Method is U-TDOA	YES	reject
>U-TDOA Bit Count	M		9.2.2.56	Used if UE is in CELL_FACH mode	–	
>U-TDOA Time Interval	M		9.2.2.57	Used if UE is in CELL_FACH mode	–	
GPS Positioning		0..1		Only present if Positioning Method is A-GPS	YES	reject
>GPS Positioning Instructions	M		9.2.2.101		–	
>Requested Data Value	O		9.2.2.26		–	
OTDOA Assistance Data		0..1		Only present if Positioning Method is OTDOA	YES	reject
>UE Positioning OTDOA Assistance data	M		9.2.2.59		–	
Include Velocity	O		9.2.2.97		YES	ignore
Amount of Reporting	O		9.2.2.108	Amount of reports for periodic reporting.	YES	ignore
Cell-ID Positioning		0..1		Only present if Positioning Method is Cell-ID	YES	ignore
>Requested Cell-ID Measurements	M		9.2.2.112		–	
GANSS Positioning		0..1		Only present if Positioning Method is GNSS	YES	reject
>GANSS Positioning Instructions	M		9.2.2.120		–	

>Requested Data Value	O		9.2.2.26		–	
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9.1.17 POSITION ACTIVATION RESPONSE

Table 17e

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	reject
Transaction ID	M		9.2.2.28		–	
UE Position Estimate Info	O		9.2.2.102	Position information for UE based positioning methods	YES	ignore
GPS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	reject
>GPS Measured Results	M		9.2.2.12		–	
Cell-ID Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	reject
>Cell-ID Measured Results Info List	M		9.2.2.31		–	
OTDOA Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	reject
>OTDOA Measured Results Info List	M		9.2.2.32		–	
UTDOA Group	O		9.2.2.74		YES	reject
Velocity Estimate	O		9.2.2.98		YES	ignore
Measurement Instructions Used	O		9.2.2.109		YES	ignore
GANSS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	reject
>GANSS Measured Results	M		9.2.2.117		–	
Required GPS Assistance Data	O		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	O		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore
OTDOA Reference Cell Info	O		OTDOA Reference Cell Info SAS-centric mode 9.2.2.153		YES	reject

Table 17f

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

9.1.18 POSITION ACTIVATION FAILURE

Table 17g

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

9.1.19 POSITION PARAMETER MODIFICATION

Table 17h

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
UTRAN Cell Identifier	O		9.2.2.37		YES	reject
UTDOA Group	O		9.2.2.74		YES	reject
RRC State Change	O		9.2.2.110		YES	ignore

9.1.20 ABORT

Table 17i

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

9.1.21 POSITION PERIODIC REPORT

Table 17.k

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
UE Position Estimate Info	O		9.2.2.102		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore
GPS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	ignore
>GPS Measured Results	M		9.2.2.12		–	
Cell-ID Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	ignore
>Cell-ID Measured Results Info List	M		9.2.2.31		–	
OTDOA Measured Results Sets		<i>0..<maxNoOfMeasurements></i>			GLOBAL	ignore
>OTDOA Measured Results Info List	M		9.2.2.32		–	
Cause	O		9.2.2.3		YES	ignore
GANSS Measured Results		<i>0..<maxNoOfSets></i>			GLOBAL	ignore
>GANSS Measured Results	M		9.2.2.117		–	
Required GPS Assistance Data	O		Additional GPS Assistance Data Required 9.2.2.128		YES	ignore
Required GANSS Assistance Data	O		Additional GANSS Assistance Data Required 9.2.2.129		YES	ignore
OTDOA Reference Cell Info	O		OTDOA Reference Cell Info SAS-centric mode 9.2.2.153		YES	reject

Table 17.l

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

9.1.22 POSITION PERIODIC RESULT

Table 17.m

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
UE Position Estimate	O		Geographical Area 9.2.2.6		YES	ignore
Velocity Estimate	O		9.2.2.98		YES	ignore
Position Data	O		9.2.2.65		YES	ignore
Accuracy Fulfilment Indicator	O		9.2.2.40		YES	ignore
Cause	O		9.2.2.3		YES	ignore

9.1.23 POSITION PERIODIC TERMINATION

Table 17.n

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.2.24		YES	ignore
Transaction ID	M		9.2.2.28		–	
Periodic Position Termination Cause	O		9.2.2.111		YES	ignore

9.2 Information Element Functional Definitions and Contents

9.2.1 General

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

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

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

9.2.2 Radio Network Layer Related IEs

9.2.2.1 Almanac and Satellite Health SIB

Table 18

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

9.2.2.2 Altitude and direction

Table 19

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

9.2.2.3 Cause

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

Table 20

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause Group				
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (invalid reference information, information temporarily not available, information provision not supported for the object, position calculation error: invalid GPS measured results, ..., position calculation error: invalid Cell- ID measured results, position calculation error: invalid OTDOA measured results, position calculation error: A-GPS positioning method not supported, position calculation error: Cell-ID positioning method not supported, position calculation error: OTDOA positioning method not supported, Initial UE Position Estimate missing, position calculation error: invalid U- TDOA measured results, position calculation error: U-TDOA positioning method not supported, position calculation error: U-TDOA positioning method not supported in specified UTRAN cell, positioning method not supported, loss of contact with UE, SAS unable to perform U-TDOA positioning within Response Time, Location measurement failure, UE Positioning Error: Not enough OTDOA cells, UE Positioning Error: Not enough GPS Satellites, UE Positioning Error: Reference Cell not serving cell, UE Positioning Error: Not Accomplished GPS Timing of Cell Frames, UE Positioning Error: Undefined Error, position calculation error: invalid Galileo measured results, position calculation error: A-Galileo positioning method not supported, UE Positioning Error: Not enough Galileo Satellites, UE Positioning Error: Not Accomplished Galileo Timing of Cell Frames, UE Positioning Error: Assistance Data Missing position calculation error: invalid GLONASS measured results, position calculation error: invalid GANSS measured results, position calculation error: A-GANSS positioning method not supported, UE Positioning Error: Not enough GANSS Satellites, UE Positioning Error: Not Accomplished GANSS Timing of Cell Frames)	
>Transport Layer				
>>Transport Layer Cause	M		ENUMERATED (Transport Resource Unavailable, Unspecified, ...)	
>Protocol				

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

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

Table 21

Radio Network Layer cause	Meaning
Invalid reference information	The reference information (GPS-UTRAN Time Relationship Uncertainty and/or Initial UE Position Estimate) provided by the RNC are invalid
Information temporarily not available	The information requested by RNC is temporarily not available
Information Provision not supported for the object	The SAS does not support provision of the requested information for the concerned object types
Position calculation error: invalid GPS measured results	The SAS cannot calculate position due to invalid GPS measured results
Position calculation error: invalid Cell-ID measured results	The SAS cannot calculate position due to invalid Cell-ID measured results
Position calculation error: invalid OTDOA measured results	The SAS cannot calculate position due to invalid OTDOA measured results
Position calculation error: A-GPS positioning method not supported	The SAS cannot calculate position because it does not support the A-GPS positioning method
Position calculation error: Cell-ID positioning method not supported	The SAS cannot calculate position because it does not support the Cell-ID positioning method
Position calculation error: OTDOA positioning method not supported	The SAS cannot calculate position because it does not support the OTDOA positioning method
Position calculation error: invalid U-TDOA measured results	The SAS cannot calculate position due to invalid U-TDOA measured results
Position calculation error: U-TDOA positioning method not supported	The SAS cannot calculate position because it does not support the U-TDOA positioning method
Position calculation error: U-TDOA positioning method not supported in specified UTRAN cell	The SAS cannot calculate position because it does not support the U-TDOA positioning method in the specified UTRAN cell
Positioning method not supported	The RNC does not support the requested positioning method
Loss of contact with UE	The RNC reports that it has lost contact with the UE
SAS unable to perform U-TDOA positioning within Response Time	The SAS did not send a U-TDOA position estimate within the interval defined by the Response Time IE
Location measurement failure	The SRNC cannot deliver the requested positioning measurement due to measurement failure.
UE Positioning Error: Not enough OTDOA cells	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough OTDOA cells".
UE Positioning Error: Not enough GPS Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough GPS Satellites".
UE Positioning Error: Reference Cell not serving cell	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Reference Cell not serving cell"
UE Positioning Error: Not Accomplished GPS Timing of Cell Frames	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Accomplished GPS Timing of Cell Frames"
UE Positioning Error: Undefined Error	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Undefined Error"
Position calculation error: invalid Galileo measured results	The SAS cannot calculate position due to invalid Galileo measured results
Position calculation error: A-Galileo positioning method not supported	The SAS cannot calculate position because it does not support the A-Galileo positioning method
UE Positioning Error: Not enough Galileo Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not enough Galileo Satellites".
UE Positioning Error: Not Accomplished Galileo Timing of Cell Frames	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Accomplished Galileo Timing of Cell Frames"
UE Positioning Error: Assistance Data Missing	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Assistance Data Missing"
Position calculation error: invalid GLONASS measured results	The SAS cannot calculate position due to invalid GLONASS measured results
Position calculation error: invalid GANSS measured results	The SAS cannot calculate position due to invalid GANSS measured results

Position calculation error: A-GANSS positioning method not supported	The SAS cannot calculate position because it does not support any A-GANSS positioning method
UE Positioning Error: Not enough GANSS Satellites	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Enough GANSS Satellites".
UE Positioning Error: Not Accomplished GANSS Timing of Cell Frames	The SRNC cannot deliver the requested positioning measurement due to UE positioning error reported by the UE with error reason "Not Accomplished GANSS Timing of Cell Frames"

Table 22

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

Table 23

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

Table 24

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

9.2.2.4 Criticality Diagnostics

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

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

Table 25

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	
Triggering Message	O		ENUMERATED (initiating message, successful outcome, unsuccessful outcome, outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication.
Procedure Criticality	O		ENUMERATED (reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
Transaction ID	O		9.2.2.28	
Information Element Criticality Diagnostics		<i>0..<maxnoof errors></i>		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value 'Ignore' shall never be used.
>IE Id	M		INTEGER (0..65535)	The IE Id of the not understood or missing IE as defined in the ASN.1 part of the specification.
>Repetition Number	O		INTEGER (0..255)	<p>The <i>Repetition Number</i> IE gives</p> <ul style="list-style-type: none"> - in case of a not understood IE: The number of occurrences of the reported IE up to and including the not understood occurrence - in case of a missing IE: The number of occurrences up to but not including the missing occurrence. <p>Note: All the counted occurrences of the reported IE must have the same top-down hierarchical message structure of IEs with assigned criticality above them.</p>
>Message Structure	O		9.2.2.23	The <i>Message Structure</i> IE describes the structure where the not understood or missing IE was detected. This IE is included if the not understood IE is not the top level of the message.
>Type of Error	M		ENUMERATED (not understood, missing, ...)	

Table 26

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

9.2.2.5 DGPS Corrections

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

Table 27

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS TOW sec	M		INTEGER (0..604799)	In seconds GPS time-of-week when the DGPS corrections were calculated	–	
Status/Health	M		ENUMERATED (UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)		–	
DPGS information	C-Status/Health	1..<maxSat>			–	
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>IODE	M		INTEGER (0..255)		–	
>UDRE	M		ENUMERATED (UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.	–	
>PRC	M		INTEGER (-2047..2047.)	Scaling factor 0.32 Meters	–	
>Range Rate Correction	M		INTEGER (-127..127)	Scaling factor 0.032 meters/sec	–	
>DGNSS Validity Period	O		9.2.2.154		YES	ignore

Table 28

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

Table 29

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

9.2.2.6 Geographical Area

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

Table 30

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

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

Table 31

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

9.2.2.7 Geographical Coordinates

This IE contains the geographical coordinates.

Table 32

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

9.2.2.8 GPS Acquisition Assistance

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

Table 33

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).	–	
Satellite information		<i>1..<maxSat></i>			–	
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>Doppler (0 th order term)	M		INTEGER (-2048..2047)	Scaling factor 2.5Hz	–	
>Extra Doppler		<i>0..1</i>			–	
>>Doppler (1 st order term)	M		INTEGER (-42..21)	Scaling factor 1/42	–	
>>Doppler Uncertainty	M		ENUMERATED (12.5,25,50,100,200,...)	In Hz	–	
>Code Phase	M		INTEGER (0..1022)	In Chips, specifies the centre of the search window	–	
>Integer Code Phase	M		INTEGER (0..19)	Number of 1023 chip segments	–	
>GPS Bit number	M		INTEGER (0..3)	Specifies GPS bit number (20 1023 chip segments)	–	
>Code Phase Search Window	M		ENUMERATED (1023,1,2,3,4,6,8,12,16,24,32,48,64,96,128,192)	Specifies the width of the search window.	–	
>Azimuth and Elevation		<i>0..1</i>			–	
>>Azimuth	M		INTEGER (0..31)	Scaling factor 11.25 Degrees	–	
>>Elevation	M		INTEGER (0..7)	Scaling factor 11.25 Degrees	–	
UTRAN GPS Reference Time	O		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Reference Time Uncertainty	O		9.2.2.132	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

Table 34

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

9.2.2.9 GPS Almanac and Satellite Health

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

Table 35

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
WN _a	M		BIT STRING (8)	
Satellite information		<i>1..<maxSat Almanac></i>		
>DataID	M		BIT STRING (2)	See [10]
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>e	M		BIT STRING (16)	Eccentricity [10]
>t _{oa}	M		BIT STRING (8)	Reference Time of Almanac [10]
>δi	M		BIT STRING (16)	Correction to Inclination (semi-circles) [10]
>OMEGADOT	M		BIT STRING (16)	Rate of Right Ascension (semi-circles/sec) [10]
>SV Health	M		BIT STRING (8)	[10]
>A ^{1/2}	M		BIT STRING (24)	Semi-Major Axis (meters) ^{1/2} [10]
>OMEGA ₀	M		BIT STRING (24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [10]
>M ₀	M		BIT STRING (24)	Mean Anomaly at Reference Time (semi-circles) [10]
>ω	M		BIT STRING (24)	Argument of Perigee (semi-circles) [10]
>af ₀	M		BIT STRING (11)	apparent clock correction [10]
>af ₁	M		BIT STRING (11)	apparent clock correction [10]
SV Global Health	O		BIT STRING (364)	This enables GPS time recovery and possibly extended GPS correlation intervals

Table 36

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

9.2.2.10 GPS Clock and Ephemeris Parameters

The IE contains the GPS clock information and GPS Ephemeris.

Table 37

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

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

9.2.2.11 GPS Ionospheric Model

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

Table 38

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

9.2.2.12 GPS Measured Results

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

Table 39

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit). If the <i>UTRAN GPS reference time Result</i> is present, this IE shall be set to 0 by the transmitter and ignored by the receiver.	–	
Measurement Parameters		1..<maxSat>			–	
>Satellite ID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>C/N ₀	M		INTEGER (0..63)	The estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (Typical levels will be in the range of 20 – 50 dB-Hz).	–	
>Doppler	M		INTEGER (-32768..-32768)	Hz, scale factor 0.2.	–	
>Whole GPS Chips	M		INTEGER (0..1022)	Unit in GPS chips	–	
>Fractional GPS Chips	M		INTEGER (0..(2 ¹⁰ -1))	Scale factor 2 ⁻¹⁰	–	
>Multipath Indicator	M		ENUMERATED (NM, low, medium, high)	See NOTE 1	–	
>Pseudorange RMS Error	M		INTEGER (0..63)	See NOTE 2	–	
UTRAN GPS Reference Time Result	O		9.2.2.104	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Reference Time Uncertainty	O		9.2.2.132		YES	ignore

NOTE 1: Table 41 gives the mapping of the multipath indicator field.

NOTE 2: Table 42 gives the bitmapping of the Pseudorange RMS Error field.

Table 40

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

Table 41

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

Table 42

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

9.2.2.13 GPS Navigation Model

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

Table 43

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Satellite information		<i>1..<maxSat></i>		
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>Satellite Status	M		ENUMERATED (NS_NN, ES_SN, ES_NN, REVD)	See NOTE
>GPS Clock and Ephemeris parameters	<i>C-Satellite status</i>		9.2.2.10	

NOTE: The UE shall interpret enumerated symbols as follows.

Table 44

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

Table 45

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

Table 46

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

9.2.2.14 GPS Real Time Integrity

Table 47

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

Table 48

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

9.2.2.15 GPS Reference Time

Table 49

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS Week	M		INTEGER (0..1023)		–	
GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1)	GPS Time of Week in milliseconds (rounded down to the nearest millisecond unit).	–	
GPS TOW Assist		0.. <maxSat>			–	
>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>TLM Message	M		BIT STRING (14)		–	
>Anti-Spoof	M		BOOLEAN		–	
>Alert	M		BOOLEAN		–	
>TLM Reserved	M		BIT STRING (2)		–	
UTRAN GPS Reference Time	O		9.2.2.103	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
SFN-TOW Uncertainty	O		GPS-UTRAN Time Relationship Uncertainty 9.2.2.18	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
T _{UTRAN-GPS} Drift Rate	O		9.2.2.105	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GPS Reference Time Uncertainty	O		9.2.2.132	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore

Table 50

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

9.2.2.16 GPS Transmission TOW

Table 51

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

9.2.2.17 GPS UTC Model

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

Table 52

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

9.2.2.18 GPS-UTRAN Time Relationship Uncertainty

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

Table 53

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

9.2.2.19 Information Exchange ID

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

Table 54

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

9.2.2.20 Information Exchange Object Type

Void.

9.2.2.21 Information Report Characteristics

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

Table 56

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

Table 57

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

9.2.2.22 Information Type

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

Table 58

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE <i>Information Type</i>					–	
>Implicit					–	
>>Method Type	M		9.2.2.25		–	
>Explicit					–	
>>Explicit Information		1..<max noofExp Info>			–	
>>>CHOICE <i>Explicit Information Item</i>	M				–	
>>>>Almanac and Satellite Health			NULL		–	
>>>>UTC Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>>Ionospheric Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>>Navigation Model					–	
>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>>Nav. Model Additional Data		0..1			–	
>>>>>>GPS Week	M		INTEGER (0..1023)		–	
>>>>>>GPS_Toe	M		INTEGER (0..167)	GPS time of ephemeris in hours of the latest ephemeris set	–	
>>>>>>T-Toe limit	M		Integer (0..10)	ephemeris age tolerance in hours	–	
>>>>>>>Satellite related data		0..<max Sat>			–	
>>>>>>>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].	–	
>>>>>>>IODE	M		INTEGER (0..255)	Issue of Data Ephemeris for SatID	–	
>>>>>DGPS Corrections			NULL		–	
>>>>>Reference Time			NULL		–	
>>>>>Acquisition Assistance			NULL		–	
>>>>>Real Time Integrity			NULL		–	
>>>>>Almanac and Satellite Health SIB					–	
>>>>>>Transmission TOW Indicator	M		9.2.2.29		–	
>>>>>>Reference Location			NULL	This IE may only be present if SAS operates in	–	

				SAS-centric mode.		
>>>> GANSS Common Data					–	
>>>>>GANSS Reference Time	O		ENUMERATED(Requested, Not-Requested)		–	
>>>>>GANSS Ionosphere Model	O		ENUMERATED(Requested, Not-Requested)		–	
>>>>>GANSS Reference Location	O		ENUMERATED(Requested, Not-Requested)	This IE may only be present if SAS operates in SAS-centric mode.	–	
>>>>>GANSS Additional Ionospheric Model	O		GANSS Additional Ionospheric Model Request 9.2.2.137	Presence means requested.	YES	ignore
>>>>>GANSS Earth Orientation Parameters	O		GANSS Earth Orientation Parameters Request 9.2.2.138		YES	ignore
>>>>>GANSS Generic Data					–	
>>>>>GANSS Generic Data Item		1..<max GANSS >			–	
>>>>>>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>>>>>>GANSS Real Time Integrity		0..1			–	
>>>>>>>GANSS Time Indicator	O		9.2.2.127		–	
>>>>>>>GANSS Data Bits		0..1			–	
>>>>>>>GANSS TOD	M		INTEGER (0..86399)	The GANSS TOD for which the data bits are requested.	–	
>>>>>>>>Data Bit Assistance		1			–	
>>>>>>>>>GAN SS Signal ID	M		BIT STRING(8)	Coded as defined in [4]	–	
>>>>>>>>>GAN SS Data Bit Interval	M		INTEGER(0..15)	This field represents the time length for which the Data Bit Assistance is requested. The Data Bit Assistance shall be relative to the time interval (GANSS TOD, GANSS TOD + Data Bit Interval).	–	

				The Data Bit Interval r , expressed in seconds, is mapped to a binary number K with the following formula: $r = 0.1 * 2^K$ Value $K=15$ means that the time interval is not specified.		
>>>>>>>>>Satellite Information		0..<max GANSS Sat>			-	
>>>>>>>>>Sat ID	M		INTEGER (0..63)	Defined in [4].	-	
>>>>>>>>>DGANSS Corrections		0..1			-	
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127		-	
>>>>>>>>>DGANSS Signal	M		BIT STRING(8)	Coded as defined in [4]	-	
>>>>>>>>>GANSS Almanac and Satellite Health		0..1			-	
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127		-	
>>>>>>>>>GANSS Reference Measurement Information		0..1			-	
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127		-	
>>>>>>>>>GANSS UTC Model		0..1			-	
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127		-	
>>>>>>>>>GANSS Time Model GNSS-GNSS		0..1			-	
>>>>>>>>>GNSS-GNSS Time ext	M		BIT STRING(9)	Defines the time model required. Bit 1 is the MSB and bit 9 is the LSB (see clause 9.2.1). Bit 1 stands for GPS, Bit 2 stands for Galileo, Bit 3 stands for QZSS Bit 4 stands for GLONASS. Other bits are reserved.	-	
>>>>>>>>>GANSS Time Indicator	O		9.2.2.127		-	
>>>>>>>>>GANSS Navigation Model		0..1			-	

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

Table 59

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

Table 59A

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

9.2.2.23 Message Structure

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

Table 60

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

Table 61

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

9.2.2.24 Message Type

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

Table 62

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Procedure Code	M		INTEGER(0..255)	"1" = Position Calculation "2" = Information Exchange Initiation "3" = Information Reporting "4" = Information Exchange Termination, "5" = Information Exchange Failure "6" = Error Indication "7" = Private Message "8" = Position Parameter Modification "9" = Position Initiation "10" = Position Activation "11" = Abort "12" = Position Periodic Report "13" = Position Periodic Result "14" = Position Periodic Termination
Type of Message	M		ENUMERATED (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome)	

9.2.2.25 Method Type

Table 63

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

9.2.2.26 Requested Data Value

The Requested Data Value contains the relevant data concerning the ongoing information exchange, or positioning event.

Table 64

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
GPS Almanac and Satellite Health	O		9.2.2.9		–	
GPS UTC Model	O		9.2.2.17		–	
GPS Ionospheric Model	O		9.2.2.11		–	
GPS Navigation Model	O		9.2.2.13		–	
DGPS Corrections	O		9.2.2.5		–	
GPS Reference Time	O		9.2.2.15		–	
GPS Acquisition Assistance	O		9.2.2.8		–	
GPS Real Time Integrity	O		9.2.2.14		–	
Almanac and Satellite Health SIB	O		9.2.2.1		–	
GPS Transmission TOW	O		9.2.2.16		–	
GPS Reference Location	O		Geo-graphical Area 9.2.2.6	This IE may only be present if SAS operates in SAS-centric mode.	YES	ignore
GANSS Common Assistance Data		0..1			YES	ignore
>GANSS Reference Time	O		9.2.2.124		–	
>GANSS Ionospheric Model	O		9.2.2.116		–	
>GANSS Reference Location	O		Geo-graphical Area 9.2.2.6	This IE may only be present if SAS operates in SAS-centric mode.	–	
>GANSS Additional Ionospheric Model	O		9.2.2.116A		YES	ignore
>GANSS Earth Orientation Parameters	O		9.2.2.133		YES	ignore
GANSS Generic Assistance Data		0..<max GANSS >			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>GANSS Real Time Integrity	O		9.2.2.122		–	
>GANSS Data Bit Assistance	O		9.2.2.127A		–	
>DGANSS Corrections	O		9.2.2.113		–	
>GANSS Almanac and Satellite Health	O		9.2.2.114		–	
>GANSS Reference Measurement Information	O		9.2.2.123		–	
>GANSS UTC Model	O		9.2.2.126		–	
>GANSS Time Model	O		9.2.2.125		–	
>GANSS Navigation Model	O		9.2.2.118		–	
>GANSS Additional Time Models	O		9.2.2.125A		YES	ignore

>GANSS Additional Navigation Models	O		9.2.2.118A		YES	ignore
>GANSS Additional UTC Models	O		9.2.2.126A		YES	ignore
>GANSS Auxiliary Information	O		9.2.2.135		YES	ignore
>SBAS ID	C-GANSS-ID		9.2.2.134		YES	ignore

Table 64A

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

Table 64B

Condition	Explanation
GANSS-ID	This IE shall be present if the <i>GANSS ID</i> IE indicates 'SBAS'.

9.2.2.27 Requested Data Value Information

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

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

Table 65

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

9.2.2.28 Transaction ID

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

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

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

Table 66

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

9.2.2.29 Transmission TOW Indicator

Table 67

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

9.2.2.30 Uncertainty Ellipse

This IE contains the uncertainty ellipse of a geographical area.

Table 68

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

9.2.2.31 Cell-ID Measured Results Info List

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

Table 69

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

>>Timing Advance LCR	M		INTEGER (0..2047)	According to [4]. The content of this IE shall be ignored if the <i>Extended Timing Advance LCR</i> IE is present	–	
>>Extended Timing Advance LCR	O		INTEGER (2048..8191)	According to [4].	YES	ignore
>Pathloss	O		INTEGER (46..158)	Unit: dB downlink pathloss as defined in [4] subclause 10.3.7.3	–	
>Rx Timing Deviation 768Info		0..1		7.68Mcps TDD only	YES	reject
>>Rx Timing Deviation 7.68Mcps	M		INTEGER (0.. 65535)	According to mapping in [14].	–	
>>Timing Advance 7.68Mcps	M		INTEGER (0.. 511)	According to [4].	–	
>Rx Timing Deviation 384ext Info		0..1		3.84Mcps TDD only	YES	reject
>>Rx Timing Deviation	M		INTEGER (0.. 32767)	According to mapping in [14].	–	
>>Timing Advance	M		INTEGER (0.. 255)	According to [4].	–	
>Round Trip Time Info With Type 1		0..1		FDD only	YES	ignore
>>UE Rx-Tx Time Difference Type 1	M		INTEGER (768..1280)	According to mapping in [13].	–	
>>Round Trip Time	M		INTEGER (0..32766)	According to mapping in [13].	–	
>>Extended Round Trip Time	O		INTEGER (32767..103041)	Continuation of intervals as mapped in [13]. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the <i>Round Trip Time</i> IE	–	
>Additional UE Measurement Info		0..1		FDD only	YES	ignore
>>CPICH RSCP	O		INTEGER (-5..91)	According to CPICH_RSCP in [13].	–	
>>CPICH Ec/N0	O		INTEGER (0..49)	According to CPICH_Ec/No in [13].	–	
>Angle Of Arrival LCR		0..1		1.28Mcps TDD only	YES	ignore
>>AOA LCR	M		INTEGER (0..719)	According to mapping in [14]	–	
>>AOA LCR Accuracy Class	M		ENUMERATED (A, B, C, D, E, F, G, H,...)	According to mapping in [14]	–	

Table 70

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

9.2.2.32 OTDOA Measured Results Info List

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

Table 71

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

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

Table 72

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

9.2.2.33 OTDOA Neighbour Cell Info

Table 73

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

				at a lower frequency than GPS clock.
>>T _{UTRAN-GPS} Drift Rate Quality	O		INTEGER (0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GPS} drift rate measurements in 1/256 chip per second. $T_{UTRAN-GPS} \text{ Drift Rate Quality} = \sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GPS} Drift Rate, where x is the reported T _{UTRAN-GPS} Drift Rate and $\mu = E[x]$ is the expectation value of x.
>T _{UTRAN-GANSS} Measurement Value Information				
>>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.
>>SFN	M		INTEGER (0..4095)	SFN during which the T _{UTRAN-GANSS} measurement was performed
>>T _{UTRAN-GANSS}		1		Indicates the UTRAN GANSS Timing of Cell Frame for LCS.
>>>MS	M		INTEGER (0..16383)	Most significant part
>>>LS	M		INTEGER (0..4294967295)	Least significant part
>>T _{UTRAN-GANSS} Quality	O		INTEGER (0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} measurements in 1/16 chip. $T_{UTRAN-GANSS} \text{ Quality} = \sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Value, where x is the reported T _{UTRAN-GANSS} Value and $\mu = E[x]$ is the expectation value of x.
>>T _{UTRAN-GANSS} Drift Rate	M		INTEGER (-50..50)	Indicates the T _{UTRAN-GANSS} drift rate in 1/256 chip per second. A positive value indicates that the UTRAN clock is running at a lower frequency than GANSS clock.
>>T _{UTRAN-GANSS} Drift Rate Quality	O		INTEGER (0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} drift rate measurements in 1/256 chip per second. $T_{UTRAN-GANSS} \text{ Drift Rate Quality} = \sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Drift Rate, where x is the reported T _{UTRAN-GANSS} Drift Rate and $\mu = E[x]$ is the expectation value of x.

9.2.2.34 OTDOA Reference Cell Info

Table 74

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

				x.		
T_{UTRAN-GANSS} Measurement Value Information		0..1			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>SFN	M		INTEGER(0..4095)	SFN during which the T _{UTRAN-GANSS} measurement was performed	–	
>T _{UTRAN-GANSS}		1		Indicates the UTRAN GANSS Timing of Cell Frame for LCS.	–	
>>MS	M		INTEGER(0..16383)	Most significant part	–	
>>LS	M		INTEGER(0..4294967295)	Least significant part	–	
>T _{UTRAN-GANSS} Quality	O		INTEGER(0..255)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} measurements in 1/16 chip. T _{UTRAN-GANSS} Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Value, where x is the reported T _{UTRAN-GANSS} Value and $\mu = E[x]$ is the expectation value of x.	–	
>T _{UTRAN-GANSS} Drift Rate	M		INTEGER(-50..50)	Indicates the T _{UTRAN-GANSS} drift rate in 1/256 chip per second. A positive value indicates that the UTRAN clock is running at a lower frequency than GANSS clock.	–	
>T _{UTRAN-GANSS} Drift Rate Quality	O		INTEGER(0..50)	Indicates the standard deviation (std) of the T _{UTRAN-GANSS} drift rate measurements in 1/256 chip per second. T _{UTRAN-GANSS} Drift Rate Quality = $\sqrt{E[(x-\mu)^2]}$ = std of reported T _{UTRAN-GANSS} Drift Rate, where x is the reported T _{UTRAN-GANSS} Drift Rate and $\mu = E[x]$ is the expectation value of x.	–	
Additional Measurement Information LCR		0..1		1.28Mcps TDD only	YES	ignore
>Timing Advance LCR R7	M		INTEGER(0..8191)	According to [4].	–	
>Rx Timing Deviation LCR	M		INTEGER(0..511)	According to mapping in [14].	–	

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

9.2.2.35 UE Positioning Measurement Quality

Table 75

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

Std of Measurements	M		BIT STRING (5)	Std of Measurements field includes sample standard deviation of measurements (when number of measurements is reported in 'Number of Measurements' field) or standard deviation of the reported measurement value = $\sqrt{E[(x-\mu)^2]}$, where x is the reported value and $\mu = E[x]$ is the expectation value (i.e. the true value) of x (when '000' is given in 'Number of Measurements' field). Following linear 5 bit encoding is used: '00000' 0 - (R*1-1) meters '00001' R*1 - (R*2-1) meters '00010' R*2 - (R*3-1) meters ... '11111' R*31 meters or more where R is the resolution defined by Std Resolution field. E.g. R=20 m corresponds to 0-19 m, 20-39 m,...,620+ m.
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9.2.2.36 UTRAN Access Point Position with Altitude

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

Table 76

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

9.2.2.37 UTRAN Cell Identifier (UC-ID)

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

Table 77

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

9.2.2.37A Extended RNC-ID

This is the identifier of one RNC in UTRAN.

Table 77A

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

9.2.2.38 Horizontal Accuracy Code

Table 78

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

9.2.2.39 Vertical Accuracy Code

Table 79

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

9.2.2.40 Accuracy Fulfilment Indicator

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

Table 80

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

9.2.2.41 Uplink DPCH information

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

Table 81

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

9.2.2.42 Frequency information

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

Table 82

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

9.2.2.43 PRACH parameters

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

Table 83

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

Table 84

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

9.2.2.44 Compressed Mode Assistance Data

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

Table 85

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Downlink information		1		
>Primary Scrambling Code	M		9.2.2.46	
>Chip Offset	M		9.2.2.63	
>Frame Offset	M		9.2.2.64	
Uplink information		1		
>Transmission Gap Pattern Sequence Information	M		9.2.2.66	
>Active Pattern Sequence Information	M		9.2.2.67	
>CFN	M		9.2.2.68	

9.2.2.45 C-RNTI

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

Table 86

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

9.2.2.46 Primary Scrambling Code

This IE gives the DL scrambling code of a cell.

Table 87

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

9.2.2.47 PRACH information

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

Table 88

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

>>Time Slot	M		9.2.2.87	
>>TDD Channelisation Code	M		9.2.2.91	
>>Max PRACH Midamble Shifts	M		9.2.2.93	
>>PRACH Midamble	M		9.2.2.94	

9.2.2.48 TFS

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

Table 89

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

Table 90

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

Table 91

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

9.2.2.49 CTFC

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

Table 92

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<i>CHOICE CTFC Size</i>				
<i>>2 bit CTFC</i>				
>>CTFC information-2		1..<max TFC>		
>>>ctfc2Bit	M		INTEGER (0..3)	
<i>>4 bit CTFC</i>				
>>CTFC information-4		1..<max TFC>		
>>>ctfc4Bit	M		INTEGER (0..15)	
<i>>6 bit CTFC</i>				
>>CTFC information-6		1..<max TFC>		
>>>ctfc6Bit	M		INTEGER (0..63)	
<i>>8 bit CTFC</i>				
>>CTFC information-8		1..<max TFC>		
>>>ctfc8Bit	M		INTEGER (0..255)	
<i>>12 bit CTFC</i>				
>>CTFC information-12		1..<max TFC>		
>>>ctfc12Bit	M		INTEGER (0..4095)	
<i>>16 bit CTFC</i>				
>>CTFC information-16		1..<max TFC>		
>>>ctfc16Bit	M		INTEGER (0..65535)	
<i>>24 bit CTFC</i>				
>>CTFC information-24		1..<max TFC>		
>>>ctfc22Bit	M		INTEGER (0.. 1677215)	

Table 92A

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

9.2.2.50 Request Type

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

Table 93

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

9.2.2.51 UE Positioning Capability

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

Table 94

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Standalone location method(s) supported	M		BOOLEAN	Defines if a UE can measure its location by some means unrelated to UTRAN. TRUE means supported	–	
UE based OTDOA supported	M		BOOLEAN	TRUE means supported	–	
Network Assisted GPS support	M		ENUMERATED (Network based, UE based, Both, None,...)	Defines if the UE supports network based or UE based GPS methods.	–	
Support for GPS timing of cell frames measurement	M		BOOLEAN	Defines if a UE has the capability to perform the UE GPS timing of cell frames measurement [4]. TRUE means capable	–	
Support for IPDL	M		BOOLEAN	Defines if a UE has the capability to use IPDL to enhance its 'SFN-SFN observed time difference –type 2' measurement. TRUE means supported	–	
Support for Rx-Tx time difference type2 measurement	M		BOOLEAN	TRUE means supported	–	
Support for UE assisted GPS measurement validity in CELL_PCH and URA_PCH states	M		BOOLEAN	TRUE means supported	–	
Support for SFN-SFN observed time difference type 2 measurement	M		BOOLEAN	TRUE means supported	–	
Network Assisted GANSS Support		<i>0..<max GANSS></i>			GLOBAL	ignore
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>GANSS mode	M		ENUMERATED ('Network based', 'UE based', 'Both', 'None')	Defines if the UE supports network based or UE based GANSS methods	–	
>GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by	–	

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

Table 94A

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

Table 94B

Condition	Explanation
GANSS-ID	This IE shall be present if the <i>GANSS ID</i> IE indicates 'SBAS'.

9.2.2.52 Response Time

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

Table 95

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

9.2.2.53 Positioning Priority

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

Table 96

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

9.2.2.54 Client Type

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

Table 97

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

9.2.2.55 Positioning Method

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

Table 98

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Additional Method Type	M		9.2.2.58		–	
Selected Position Method	M		ENUMERATED(OTDOA, GPS, OTDOA or GPS, Cell ID, UTDOA, ..., GNSS, OTDOA or GNSS)		–	
GNSS Positioning Method	C-GNSS		BIT STRING(9)	<p>For each bit, if set to '1', indicates that respective GNSS is allowed.</p> <p>Bit 1 is the MSB and bit 9 is the LSB (see clause 9.2.1).</p> <p>bit 1: GPS bit 2: Galileo bit 3: SBAS</p> <p>(WAAS, EGNOS, MSAS, GAGAN)</p> <p>bit 4: Modernized GPS (L1C, L2C, L5) bit 5: QZSS bit 6: GLONASS</p> <p>bits 7-9: reserved for future GNSSes</p> <p>Note: Bit 1 cannot be the only one set to 1.</p>	YES	ignore

Table 98A

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

9.2.2.56 U-TDOA Bit Count

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

Table 99

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

9.2.2.57 U-TDOA Time Interval

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

Table 100

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

9.2.2.58 Additional Method Type

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

Table 101

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

9.2.2.59 UE Positioning OTDOA Assistance Data

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

Table 102

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
UE Positioning OTDOA Reference Cell Info	O				–	
>SFN	O		INTEGER (0..4095)	Time stamp (SFN of Reference Cell) of the SFN-SFN relative time differences and SFN-SFN drift rates. Included if any SFN-SFN drift value is included in IE <i>UE positioning OTDOA neighbour cell info</i> .	–	
>CHOICE mode					–	
>>Fdd					–	
>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>Tdd					–	
>>>Cell Parameter ID	M		9.2.2.81		–	
>Frequency Info	O		9.2.2.42	Default value is the existing value of frequency information. This IE shall always be set to default value	–	
>CHOICE positioning mode					–	
>>UE Based					–	
>>> Cell position	O		Reference Cell Position 9.2.2.70	The position of the antenna that defines the cell.	–	
>>> Round Trip Time	O		INTEGER (0..32766)	According to mapping in [13].	–	
>>UE Assisted					–	
>UE positioning IPDL parameters	O		9.2.2.71	If this element is not included there are no idle periods present	–	
>Extended Round Trip Time	O		INTEGER (32767..103041)	According to mapping in [13]. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the the <i>Round Trip Time</i> IE.	YES	ignore
>Timing Advance LCR R7	O		INTEGER (0..8191)	1.28Mcps TDD only. According to [4].	–	
>Rx Timing Deviation LCR	O		INTEGER (0..511)	1.28Mcps TDD only . According to mapping in [14].	–	
>Angle Of Arrival LCR		0..1		1.28Mcps TDD only	–	
>>AOA LCR	M		INTEGER (0..719)	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	O				–	
>UE positioing OTDOA Neighbour cell info		1..<maxCellMeas>			–	
>>CHOICE mode					–	
>>>FDD					–	
>>>>Primary CPICH Information	M		Primary scrambling code 9.2.2.46		–	
>>>>TDD					–	
>>>>Cell Parameter ID	M		9.2.2.81		–	
>>Frequency Info	O		9.2.2.42	Default value is the existing value of frequency information	–	
>>UE positioning IPDL parameters	O		9.2.2.71		–	
>>SFN-SFN Relative Time difference	M		9.2.2.73		–	
>>SFN Offset Validity	O		ENUMERATED (false)	Absence of this element means SFN offset is valid. False means SFN offset is not valid.	–	
>>SFN-SFN Drift	O		ENUMERATED (0,1,2,3,4,5,8,10,15,25,35,50,65,80,100,-1,-2,-3,-4,-5,-8,-10,-15,-25,-35,-50,-65,-80,-100,...)	Indicates the SFN-SFN drift rate in 1/256 chip per second.	–	
>>Search Window Size	M		ENUMERATED (c20, c40, c80, c160, c320, c640, c1280, moreThan1280, ...)	In chips. If the value is X then the expected SFN-SFN observed time difference is in the range [RTD-X, RTD+X] where RTD is the value of the field SFN-SFN relative time difference.	–	
>>CHOICE positioning mode					–	
>>>UE Based					–	
>>>>Relative North	O		INTEGER (-20000..20000)	Seconds of angle, scale factor 0.03. Relative position compared to reference cell.	–	
>>>>Relative East	O		INTEGER (-20000..20000)	Seconds of angle, scale factor 0.03. Relative position compared to reference cell.	–	
>>>>Relative Altitude	O		INTEGER (-4000..4000)	Relative altitude in meters compared to ref. cell.	–	
>>>>Fine SFN-SFN	O		INTEGER (0..15)	Gives finer resolution	–	
>>>>Round Trip Time	O		INTEGER (0..32766)	In chips. Included if cell is in active set	–	
>>> UE assisted					–	

>>Extended Round Trip Time	O		INTEGER (32767..103041)	In chips. Included if cell is in active set. Included only if the <i>Round Trip Time</i> IE above is included with its maximum value and if the actual value is outside the possible range for the the <i>Round Trip Time</i> IE.	YES	ignore
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Table 103

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

9.2.2.60 UL TrCH information

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

Table 104

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

9.2.2.61 Semi-static Transport Format Information

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

Table 105

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

Table 106

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

Table 107

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

9.2.2.62 Environment Characterisation

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

Table 108

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

9.2.2.63 Chip Offset

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

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

Table 109

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

9.2.2.64 Frame Offset

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

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

Table 110

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

9.2.2.65 Position Data

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

Table 111

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

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

>>GANSS Positioning Method and Usage		1.<maxGANS SSet>	OCTET STRING (1)	Coding of Method (Bits 8-7) : 00 : MS-Based 01 : MS-Assisted 10 : Conventional 11 : Reserved Coding of GANSS ID (Bits 6-4) : 000 : Galileo 001 : SBAS 010 : Modernized GPS 011 : QZSS 100 : GLONASS other values reserved Coding of usage (bits 3-1): 011 Attempted successfully: results used to generate location 100 Attempted successfully: case where MS supports multiple mobile based positioning methods and the actual method or methods used by the MS cannot be determined.	-	
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Table 112

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

Table 113

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

9.2.2.66 Transmission Gap Pattern Sequence Information

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

Table 114

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Transmission Gap Pattern Sequence Information		1..<maxTGPS>		
>TGPS Identifier	M		INTEGER (1..maxTGPS)	Transmission Gap Pattern Sequence Identifier: Establish a reference to the compressed mode pattern sequence. Up to <maxTGPS> simultaneous compressed mode pattern sequences can be used.
>TGSN	M		INTEGER (0..14)	Transmission Gap Starting Slot Number: The slot number of the first transmission gap slot within the TGCFN.
>TGL1	M		INTEGER (1..14)	The length of the first Transmission Gap within the transmission gap pattern expressed in number of slots.
>TGL2	O		INTEGER (1..14)	The length of the second Transmission Gap within the transmission gap pattern. If omitted, then TGL2=TGL1.
>TGD	M		INTEGER (0,15..269)	Transmission Gap Distance: indicates the number of slots between the starting slots of two consecutive transmission gaps within a transmission gap pattern. If there is only one transmission gap in the transmission gap pattern, this parameter shall be set to "0" ("0" =undefined).
>TGPL1	M		INTEGER (1..144, ...)	The duration of transmission gap pattern 1 in frames.
>Uplink Compressed Mode Method	M		ENUMERATED(SF/2, Higher Layer Scheduling, ...)	Method for generating uplink compressed mode gap.

Table 115

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

9.2.2.67 Active Pattern Sequence Information

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

Table 116

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

Table 117

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

9.2.2.68 CFN

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

Table 118

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

9.2.2.69 Positioning Response Time

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

Table 119

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

9.2.2.70 Reference Cell Position

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

Table 120

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

9.2.2.71 UE Positioning IPDL Parameters

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

Table 121

IE/Group Name	Presence	Range	IE type and reference	Semantics description
<i>CHOICE mode</i>				
> <i>FDD</i>				
>>IP Spacing	M		ENUMERATED(5,7,10,15,20,30,40,50,...)	See [4]
>>IP Length	M		ENUMERATED(5,10,...)	See [4]
>>IP Offset	M		INTEGER(0..9)	See [4]
>>Seed	M		INTEGER(0..63)	See [4]
> <i>TDD</i>				
Burst Mode Parameters	O		9.2.2.72	

9.2.2.72 Burst Mode Parameters

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

Table 122

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

9.2.2.73 SFN-SFN Relative Time Difference

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

Table 123

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

9.2.2.74 UTDOA Group

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

Table 124

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

Table 125

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

9.2.2.75 Maximum Set of E-DPDCHs

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

Table 126

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

9.2.2.76 Puncture Limit

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

Table 127

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

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

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

Table 128

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

Table 129

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

9.2.2.78 Reference E-TFCI Power Offset

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

Table 130

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

9.2.2.79 E-TTI

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

Table 131

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

9.2.2.80 E-DPCCH Power Offset

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

Table 132

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

9.2.2.81 Cell Parameter ID

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

Table 133

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

9.2.2.82 TFCI Coding

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

Table 134

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

9.2.2.83 Repetition Length

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

Table 135

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

9.2.2.84 Repetition Period

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

Table 136

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

9.2.2.85 TDD DPCH Offset

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

Table 137

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

9.2.2.86 UL Timeslot Information

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

Table 138

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

9.2.2.87 Time Slot

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

Table 139

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

9.2.2.88 Midamble Shift And Burst Type

This information element indicates burst type and midamble allocation.

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

Three different midamble allocation schemes exist:

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

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

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

Table 140

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

9.2.2.89 TFCI Presence

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

Table 141

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

9.2.2.90 TDD UL Code Information

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

Table 142

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

Table 143

Range Bound	Explanation
maxnoofDPCHs	Maximum number of DPCHs in one CCTrCH

9.2.2.91 TDD Channelisation Code

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

Table 144

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

9.2.2.92 Special Burst Scheduling

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

Table 145

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

9.2.2.93 Max PRACH Midamble Shift

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

Table 146

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

9.2.2.94 PRACH Midamble

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

Table 147

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

9.2.2.95 USCH Parameters

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

Table 148

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

Table 149

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

9.2.2.96 USCH Scheduling Offset

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

Table 150

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

9.2.2.97 Include Velocity

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

Table 151

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

9.2.2.98 Velocity Estimate

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

Table 152

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

9.2.2.99 Horizontal Speed and Bearing

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

Table 153

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

9.2.2.100 Vertical Velocity

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

Table 154

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

9.2.2.101 GPS Positioning Instructions

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

Table 155

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

9.2.2.102 UE Position Estimate Info

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

Table 156

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE <i>Reference Time</i>	M				–	
>UTRAN GPS <i>reference time Result</i>			9.2.2.104		–	
>GPS <i>reference time only</i>					–	
>>GPS TOW msec	M		INTEGER (0..6.048*10 ⁸ -1, ...)	GPS Time of Week in milliseconds.	–	
>Cell <i>timing</i>					–	
>>SFN	M		INTEGER (0..4095)	SFN during which the position was calculated.	–	
>>UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for SFN.	–	
>UTRAN GANSS <i>reference time result</i>					–	
>>UTRAN-GANSS Reference Time Result	M		9.2.2.136		YES	ignore
>GANSS <i>reference time only</i>					–	
>>GANSS <i>reference time only</i>	M				YES	ignore
>>>GANSS TOD msec	M		INTEGER(0..35 99999)	GANSS Time of Day in milliseconds.	–	
>>>GANSS time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
UE Position Estimate	M		Geographical Area 9.2.2.6		–	
GPS Reference Time Uncertainty	O		9.2.2.132		YES	ignore
Position Data	O		Position Data UE-Based 9.2.2.140		YES	ignore

9.2.2.103 UTRAN-GPS Reference Time

Table 157

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

9.2.2.104 UTRAN-GPS Reference Time Result

Table 158

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

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

Table 159

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

9.2.2.106 Periodic Position Calculation Info

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

Table 160

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

9.2.2.107 Periodic Location Info

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

Table 161

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

9.2.2.108 Amount of Reporting

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

Table 162

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

9.2.2.109 Measurement Instructions Used

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

Table 163

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

9.2.2.110 RRC State Change

Table 164

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

9.2.2.111 Periodic Position Termination Cause

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

Table 165

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

9.2.2.112 Requested Cell-ID Measurements

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

Table 166

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

9.2.2.113 DGANSS Corrections

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

Table 167

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
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IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
DGANSS Reference Time	M		INTEGER (0..3570 by step of 30)	Seconds. Time in GNSS system time (modulo 3600 s) when the DGANSS corrections were calculated	–	
DGANSS Information		1..<maxSgnType>			–	
>GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" [4].	–	
>Status/Health	M		ENUMERATED(UDRE scale 1.0, UDRE scale 0.75, UDRE scale 0.5, UDRE scale 0.3, UDRE scale 0.2, UDRE scale 0.1, no data, invalid data)		–	
>DGANSS Signal Information	C- <i>Status/Health</i>	1..<maxGANSSSat>			–	
>>Sat ID	M		INTEGER(0..63)	Defined in [4].	–	
>>IOD	M		BIT STRING(10)		–	
>>UDRE	M		ENUMERATED(UDRE ≤ 1.0 m, 1.0m < UDRE ≤ 4.0m, 4.0m < UDRE ≤ 8.0m, 8.0m < UDRE)	The value in this field shall be multiplied by the UDRE Scale Factor in the IE Status/Health to determine the final UDRE estimate for the particular satellite.	–	
>>PRC	M		INTEGER (-2047..2047)	Scaling factor 0.32 meters	–	
>>RRC	M		INTEGER (-127..127)	Scaling factor 0.032 meters/sec	–	
>>DGANSS Validity Period	O		9.2.2.154		YES	ignore

Table 167A

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

Table 167B

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

9.2.2.114 GANSS Almanac and Satellite Health

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

Table 168

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
Week Number	M		INTEGER(0..255)	Almanac reference week , number of weeks since the beginning of GANSS specific system time (mod 256)	–	
CHOICE <i>Almanac Model</i>	M				–	
> <i>Keplerian Parameters</i>				Model 1	–	
>>T _{oa}	M		INTEGER(0..255)	Scaling factor 2 ¹² s Reference time of almanac within week in GANSS TOD time base	–	
>>IOD _a	M		INTEGER(0..3)	Issue-Of –Data, common to all satellites	–	
>>>Satellite Information KP		1..<maxG ANSSS atAlmanac>		Almanacs are in the order of the SV IDs, the smallest ID first.	–	
>>>>Sat ID	M		INTEGER(0..63)	Defined in [4].	–	
>>>>e	M		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	M		BIT STRING(4)	dimensionless	–	
>>>>delta A ^{1/2}	M		BIT STRING(17)	Semi-Major Axis delta (meters) ^{1/2} [22]	–	
>>>>OMEGA ₀	M		BIT STRING(16)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]	–	
>>>>M ₀	M		BIT STRING(16)	Mean Anomaly at Reference Time (semi-circles) [22]	–	
>>>>ω	M		BIT STRING(16)	Argument of Perigee (semi-circles) [22]	–	
>>>>af ₀	M		BIT STRING(14)	Seconds [22]	–	
>>>>af ₁	M		BIT STRING(11)	sec/sec [22]	–	
>NAV <i>Keplerian Parameters</i>				Model 2		
>>Keplerian NAV Almanac	M				YES	ignore
>>>>T _{oa}	M		INTEGER(0..255)	Scaling factor 2 ¹² s Reference time of almanac within week in GANSS TOD time base	–	
>>>>>Satellite information NAV-KP		1..<maxG ANSSS atAlmanac>			–	
>>>>>>Sat ID	M		INTEGER (0..63)	Defined in [4].	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
>>>>e	M		BIT STRING(16)	Eccentricity, dimensionless [27]	–	
>>>> δ_i	M		BIT STRING (16)	Correction to inclination, semi-circles [27]	–	
>>>>OMEGADOT	M		BIT STRING (16)	Rate of right ascension, semi-circles/sec [27]	–	
>>>>SV Health	M		BIT STRING (8)	Satellite health [27]	–	
>>>> $A^{1/2}$	M		BIT STRING (24)	Square root of the semi-major axis, meters ^{1/2} [27]	–	
>>>>OMEGA ₀	M		BIT STRING (24)	Longitude of ascending node of orbit plane at weekly epoch, semi-circles [27]	–	
>>>> ω	M		BIT STRING (24)	Argument of perigee semi-circles [27]	–	
>>>>M ₀	M		BIT STRING (24)	Mean anomaly at reference time semi-circles [27]	–	
>>>>af ₀	M		BIT STRING (11)	Apparent satellite clock correction seconds [27]	–	
>>>>af ₁	M		BIT STRING (11)	Apparent satellite clock correction sec/sec [27]	–	
>Reduced Keplerian Parameters				Model 3		
>>Keplerian Reduced Almanac	M				YES	ignore
>>>T _{oa}	M		INTEGER(0..255)	Scaling factor 2 ¹² s Reference time of almanac within week in GANSS TOD time base	–	
>>>>Satellite information RED-KP		1..<maxG ANSSS atAlmanac>			–	
>>>>Sat ID	M		INTEGER (0..63)	Defined in [4].	–	
>>>> δ_A	M		BIT STRING(8)	meters [23,24,25,27]	–	
>>>> Ω_0	M		BIT STRING (7)	semi-circles [23,24,25,27]	–	
>>>> Φ_0	M		BIT STRING (7)	semi-circles [23,24,25,27]	–	
>>>>L1 Health	M		BIT STRING (1)	dimensionless [23,24,25,27]	–	
>>>>L2 Health	M		BIT STRING (1)	dimensionless [23,24,25,27]	–	
>>>>L5 Health	M		BIT STRING (1)	dimensionless [23,24,25,27]	–	
>Midi Keplerian Parameters				Model 4		
>>Keplerian Midi Almanac	M				YES	ignore
>>>T _{oa}	M		INTEGER(0..255)	Scaling factor 2 ¹² s Reference time of almanac within week in GANSS TOD time base	–	
>>>>Satellite information MIDI-KP		1..<maxG ANSSS atAlmanac>			–	
>>>>Sat ID	M		INTEGER	Defined in [4].	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
			(0..63)			
>>>>e	M		BIT STRING(11)	dimensionless [23,24,25,27]	-	
>>>> δ_i	M		BIT STRING (11)	semi-circles [23,24,25,27]	-	
>>>> Ω_{dot}	M		BIT STRING (11)	semi-circles/sec [23,24,25,27]	-	
>>>>sqrtA	M		BIT STRING (17)	meters ^{1/2} [23,24,25,27]	-	
>>>> Ω_0	M		BIT STRING (16)	semi-circles [23,24,25,27]	-	
>>>> ω	M		BIT STRING (16)	semi-circles [23,24,25,27]	-	
>>>> M_0	M		BIT STRING (16)	semi-circles [23,24,25,27]	-	
>>>> a_{f_0}	M		BIT STRING (11)	seconds [23,24,25,27]	-	
>>>> a_{f_1}	M		BIT STRING (10)	sec/sec [23,24,25,27]	-	
>>>>L1 Health	M		BIT STRING (1)	Dimensionless [23,24,25,27]	-	
>>>>L2 Health	M		BIT STRING (1)	dimensionless [23,24,25,27]	-	
>>>>L5 Health	M		BIT STRING (1)	dimensionless [23,24,25,27]	-	
>GLONASS Keplerian Parameters				Model 5		
>>Keplerian GLONASS	M				YES	ignore
>>>>Satellite information GLO-KP		1.. <maxG ANSSS atAlmanac>			-	
>>>> N^A	M		BIT STRING(11)	days [28]	-	
>>>> n^A	M		BIT STRING (5)	dimensionless [28]	-	
>>>> H_n^A	M		BIT STRING (5)	dimensionless [28]	-	
>>>> λ_n^A	M		BIT STRING (21)	semi-circles [28]	-	
>>>> $t_{\lambda_n}^A$	M		BIT STRING (21)	seconds [28]	-	
>>>> Δi_n^A	M		BIT STRING (18)	semi-circles [28]	-	
>>>> ΔT_n^A	M		BIT STRING (22)	sec/orbit period [28]	-	
>>>> $\Delta T_{DOT_n}^A$	M		BIT STRING (7)	sec/orbit period ² [28]	-	
>>>> ϵ_n^A	M		BIT STRING (15)	dimensionless [28]	-	
>>>> ω_n^A	M		BIT STRING (16)	semi-circles [28]	-	
>>>> τ_n^A	M		BIT STRING (10)	seconds [28]	-	
>>>> C_n^A	M		BIT STRING (1)	dimensionless [28]	-	
>>>> M_n^A	O		BIT STRING (2)	dimensionless [28]	-	
>SBAS ECEF Parameters				Model 6		
>>ECEF SBAS Almanac	M				YES	ignore
>>>>Satellite information SBAS-ECEF		1.. <maxG ANSSS atAlmanac>			-	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
		ac>				
>>>>Data ID	M		BIT STRING(2)	Dimensionless [26]	–	
>>>>SV ID	M		INTEGER (0..63)	Defined in [4].	–	
>>>>Health	M		BIT STRING (8)	Dimensionless [26]	–	
>>>>X _G	M		BIT STRING (15)	meters [26]	–	
>>>>Y _G	M		BIT STRING (15)	meters [26]	–	
>>>>Z _G	M		BIT STRING (9)	meters [26]	–	
>>>>X _G Rate-of-Change	M		BIT STRING (3)	meters/sec [26]	–	
>>>>Y _G Rate-of-Change	M		BIT STRING (3)	meters/sec [26]	–	
>>>>Z _G Rate-of-Change	M		BIT STRING (4)	meters/sec [26]	–	
>>>>t ₀	M		BIT STRING (11)	seconds [26]	–	

Table 168A

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

9.2.2.115 GANSS Clock Model

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

Table 169

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Satellite Clock Model		1..<maxGANSSClockMod>		Model-1. There may be more than one clock model included if defined in SIS ICD (e.g. two for Galileo)
>t _{oc}	M		BIT STRING(14)	defined in [22]
>a _{i2}	M		BIT STRING(12)	defined in [22]
>a _{i1}	M		BIT STRING(18)	defined in [22]
>a _{i0}	M		BIT STRING(28)	defined in [22]
>T _{GD}	O		BIT STRING(10)	defined in [22]
>Model ID	O		INTEGER(0..3)	Coded as defined in Table 169B.

Table 169A

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

Table 169B

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

9.2.2.115A GANSS Additional Clock Models

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

Table 169C

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
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IE/Group name	Presence	Range	IE Type and Reference	Semantics description
<i>CHOICE Additional Clock Models</i>				
<i>>NAV-Clock Model</i>				Model-2
>>t _{oc}	M		BIT STRING(16)	Time of clock (seconds) [27]
>>af ₂	M		BIT STRING (8)	Clock correction polynomial coefficient (sec/sec ²) [27]
>>af ₁	M		BIT STRING (16)	Clock correction polynomial coefficient (sec/sec) [27]
>>af ₀	M		BIT STRING (22)	Clock correction polynomial coefficient (seconds) [27]
>>T _{GD}	M		BIT STRING (8)	Group delay (seconds) [27]
<i>>CNAV/CNAV-2 Clock Model</i>				Model-3
>>t _{oc}	M		BIT STRING (11)	Clock data reference time of week (seconds) [23, 24, 25, 27]
>>t _{op}	M		BIT STRING (11)	Clock data predict time of week (seconds) [23, 24, 25, 27]
>>URA _{oc} Index	M		BIT STRING (5)	SV clock accuracy index (dimensionless) [23, 24, 25, 27]
>>URA _{oc1} Index	M		BIT STRING (3)	SV clock accuracy change index (dimensionless) [23, 24, 25, 27]
>>URA _{oc2} Index	M		BIT STRING (3)	SV clock accuracy change rate index (dimensionless) [23, 24, 25, 27]
>>a _{f2-n}	M		BIT STRING (10)	SV clock drift rate correction coefficient (sec/sec ²) [23, 24, 25, 27]
>>a _{f1-n}	M		BIT STRING (20)	SV clock drift correction coefficient (sec/sec) [23, 24, 25, 27]
>>a _{f0-n}	M		BIT STRING (26)	SV clock bias correction coefficient (seconds) [23, 24, 25, 27]
>>T _{GD}	M		BIT STRING (13)	Group delay correction (seconds) [23, 24, 25, 27]
>>ISC _{L1CP}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [25, 27]
>>ISC _{L1CD}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [25, 27]
>>ISC _{L1C/A}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [23, 24, 27]
>>ISC _{L2C}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [23, 24, 27]
>>ISC _{L5I5}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [24, 27]
>>ISC _{L5Q5}	O		BIT STRING (13)	Inter signal group delay correction (seconds) [24, 27]
<i>>GLONASS Satellite Clock Model</i>				Model-4

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
$>\tau_n(t_b)$	M		BIT STRING (22)	Satellite clock offset (seconds) [28]
$>\gamma_n(t_b)$	M		BIT STRING (11)	Relative frequency offset from nominal value (dimensionless) [28]
$>\Delta\tau_n$	O		BIT STRING (5)	Time difference between transmission in G2 and G1 (seconds) [28]
<i>>SBAS Satellite Clock Model</i>				Model-5
$>t_0$	M		BIT STRING (13)	(seconds) [26]
$>a_{Gf_0}$	M		BIT STRING (12)	(seconds) [26]
$>a_{Gf_1}$	M		BIT STRING (8)	(sec/sec) [26]

9.2.2.116 GANSS Ionospheric Model

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

Table 170

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
a_{i_0}	M		BIT STRING(12)	This parameter is used as defined in [22]
a_{i_1}	M		BIT STRING(12)	This parameter is used as defined in [22]
a_{i_2}	M		BIT STRING(12)	This parameter is used as defined in [22]
GANSS Ionosphere Regional Storm Flags		0..1		
$>$ Storm Flag 1	M		BOOLEAN	This parameter is used as defined in [22]
$>$ Storm Flag 2	M		BOOLEAN	This parameter is used as defined in [22]
$>$ Storm Flag 3	M		BOOLEAN	This parameter is used as defined in [22]
$>$ Storm Flag 4	M		BOOLEAN	This parameter is used as defined in [22]
$>$ Storm Flag 5	M		BOOLEAN	This parameter is used as defined in [22]

9.2.2.116A GANSS Additional Ionospheric Model

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

Table 170A

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

9.2.2.117 GANSS Measured Results

Table 171

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
CHOICE <i>Reference Time</i>	M				–	
>UTRAN <i>Reference Time</i>				This choice may only be present if SAS operates in SAS-centric mode.	–	
>>UE GANSS Timing of Cell Frames	M		INTEGER(0..863999999 by step of 250)	GANSS Time of Day (TOD) in ns	–	
>>GANSS Time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	Provides the accuracy of the relation between GANSS TOD and UTRAN time. Its coding is defined in [4].	–	
>>UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GANSS TOD-SFN relationship.	–	
>>Reference SFN	M		INTEGER(0..4095)	The SFN for which the location is valid. This IE indicates the SFN at which the UE timing of cell frames is captured.	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
>GANSS Reference Time Only					–	
>>GANSS TOD msec	M		INTEGER(0..3599999)	GANSS Time of Day (modulo 1 hour) in milliseconds (rounded down to the nearest millisecond unit).	–	
>>GANSS Time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.	–	
>>GANSS TOD Uncertainty	O		INTEGER(0..127)	Provides the accuracy of the GANSS TOD. Its coding is defined in [4].	–	
GANSS Generic Measurement Information		1..<max GANSS >			–	
>GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.	–	
>GANSS Signal Measurement Information	M	1..<max SgnType>			–	
>>GANSS Signal ID	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" [4].	–	
>>GANSS Code Phase Ambiguity	O		INTEGER(0..31)	In milliseconds. Defined in [4].	–	
>>GANSS Code Phase Ambiguity Extension	O		9.2.2.141		YES	ignore
>>GANSS Measurement Parameters	M	1..<maxGANSS at>			–	
>>>Sat ID	M		INTEGER(0..63)	Defined in [4].	–	
>>>C/N ₀	M		INTEGER(0..63)	the estimate of the carrier-to-noise ratio of the received signal from the particular satellite used in the measurement. It is given in units of dB-Hz (typical levels will be in the range of 20 – 50 dB-Hz).	–	
>>>Multipath Indicator	M		ENUMERATED(NM, low, medium, high)	Coding as in 9.2.2.12	–	
>>>Carrier Quality Indicaton	O		BIT STRING(2)	Coded as defined in [4].	–	
>>>GANSS Code Phase	M		INTEGER(0..63)	Defined in [4].	–	

IE/Group name	Presence	Range	IE Type and Reference	Semantics description	Criticality	Assigned Criticality
			.2 ²¹ -1)			
>>>GANSS Integer Code Phase	O		INTEGER(0..63)	Defined in [4].	–	
>>>GANSS Integer Code Phase Extension	O		9.2.2.142		YES	ignore
>>>Code Phase RMS Error	M		INTEGER (0..63)	Coding as Pseudorange RMS Error in section 9.2.2.12	–	
>>>Doppler	M		INTEGER(-32768..32767)	m/s, scale factor 0.04. Doppler measured by the UE for the particular satellite signal	–	
>>>ADR	O		INTEGER(0..33554431)	Meters, scale factor 2 ⁻¹⁰ ADR measurement measured by the UE for the particular satellite signal.	–	

Table 171A

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

9.2.2.118 GANSS Navigation Model

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

Table 172

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Non-Broadcast Indication	O		ENUMERATED(true)	If this IE is present, GANSS navigation model is not derived from satellite broadcast. See NOTE 1
Satellite Information		1..<maxGANSSSat>		
>Sat ID	M		INTEGER(0..63)	Defined in [4]
>SV Health	M		BIT STRING(5)	Coded as defined in [4].
>IOD	M		BIT STRING(10)	
>GANSS Clock Model	M		GANSS clock model 9.2.2.115	
>GANSS Orbit Model	M		GANSS orbit model 9.2.2.119	

Table 172A

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

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

9.2.2.118A GANSS Additional Navigation Models

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

Table 172B

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Non-Broadcast Indication	O		ENUMERATED(true)	If this IE is present, GANSS navigation model is not derived from satellite broadcast. See NOTE 1 in 9.2.2.118.
Satellite Information		1..<maxGANSSSat>		
>Sat ID	M		INTEGER(0..63)	Defined in [4].
>SV Health	M		BIT STRING(6)	Coded as defined in [4].
>IOD	M		BIT STRING(11)	Coded as defined in [4].
>GANSS Additional Clock Models	M		GANSS additional clock models 9.2.2.115A	
>GANSS Additional Orbit Models	M		GANSS additional orbit models 9.2.2.119A	

Table 172C

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

9.2.2.119 GANSS Orbit Model

This IE contains information for GANSS orbit model parameters.

Table 173

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
CHOICE <i>Orbit Model</i>	M			
> <i>Keplerian Parameters</i>				Model-1
>> <i>t_{oe}</i>	M		BIT STRING(14)	Time-of-Ephemeris in seconds, scale factor 60 [22]
>> <i>ω</i>	M		BIT STRING(32)	Argument of Perigee (semi-circles) [22]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>> Δn	M		BIT STRING(16)	Mean Motion Difference From Computed Value (semi-circles/sec) [22]
>> M_0	M		BIT STRING(32)	Mean Anomaly at Reference Time (semi-circles) [22]
>> $\text{OMEGA}_{\text{dot}}$	M		BIT STRING(24)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles/sec) [22]
>> e	M		BIT STRING(32)	Eccentricity, scale factor 2^{-33} [22]
>> ldot	M		BIT STRING(14)	Rate of Inclination Angle (semi-circles/sec) [22]
>> $\text{sqrt}A$	M		BIT STRING(32)	Semi-Major Axis in (meters) ^{1/2} , scale factor 2^{-19} [22]
>> i_0	M		BIT STRING(32)	Inclination Angle at Reference Time (semi-circles) [22]
>> OMEGA_0	M		BIT STRING(32)	Longitude of Ascending Node of Orbit Plane at Weekly Epoch (semi-circles) [22]
>> C_{rs}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term to the Orbit Radius (meters) [22]
>> C_{is}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>> C_{us}	M		BIT STRING(16)	Amplitude of the Sine Harmonic Correction Term To The Argument Of Latitude (radians) [22]
>> C_{rc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term to the Orbit Radius (meters) [22]
>> C_{ic}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Angle Of Inclination (radians) [22]
>> C_{uc}	M		BIT STRING(16)	Amplitude of the Cosine Harmonic Correction Term To The Argument Of Latitude (radians) [22]

9.2.2.119A GANSS Additional Orbit Models

This IE contains information for GANSS orbit model parameters.

Table 173A

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
<i>CHOICE Additional Orbit Models</i>				
<i>>NAV-Keplerian Parameters</i>				Model-2
>>URA Index	M		BIT STRING(4)	SV accuracy (dimensionless) [27]
>>Fit Interval Flag	M		BIT STRING (1)	Fit interval indication (dimensionless) [27]
>> t_{oe}	M		BIT STRING(16)	Time of ephemeris (seconds) [27]
>> ω	M		BIT STRING (32)	Argument of perigee (semi-circles) [27]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>> Δn	M		BIT STRING (16)	Mean motion difference from computed value (semi-circles/sec) [27]
>> M_0	M		BIT STRING (32)	Mean anomaly at reference time (semi-circles) [27]
>> $\text{OMEGA}\dot{\text{dot}}$	M		BIT STRING (24)	Rate of right ascension (semi-circles/sec) [27]
>> e	M		BIT STRING (32)	Eccentricity (dimensionless) [27]
>> $\dot{\text{I}}\text{dot}$	M		BIT STRING (14)	Rate of inclination angle (semi-circles/sec) [27]
>> $\text{sqrt}A$	M		BIT STRING (32)	Square root of semi-major axis (meters ^{1/2}) [27]
>> i_0	M		BIT STRING (32)	Inclination angle at reference time (semi-circles) [27]
>> OMEGA_0	M		BIT STRING (32)	Longitude of ascending node of orbit plane at weekly epoch (semi-circles) [27]
>> C_{rs}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the orbit radius (meters) [27]
>> C_{is}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the angle of inclination (radians) [27]
>> C_{us}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the argument of latitude (radians) [27]
>> C_{rc}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the orbit radius (meters) [27]
>> C_{ic}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the angle of inclination (radians) [27]
>> C_{uc}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the argument of latitude (radians) [27]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>CNAV/CNAV-2 Keplerian Parameters				Model-3
>>t _{op}	M		BIT STRING (11)	Data predict time of week (seconds) [23,24,25,27]
>>URA _{oe} Index	M		BIT STRING (5)	SV accuracy (dimensionless) [23,24,25,27]
>>ΔA	M		BIT STRING (26)	Semi-major axis difference at reference time (meters) [23,24,25,27]
>>A _{dot}	M		BIT STRING (25)	Change rate in semi-major axis (meters/sec) [23,24,25,27]
>>Δn ₀	M		BIT STRING (17)	Mean motion difference from computed value at reference time (semi-circles/sec) [23,24,25,27]
>>Δn _{0_dot}	M		BIT STRING (23)	Rate of mean motion difference from computed value (semi-circles/sec ²) [23,24,25,27]
>>M _{0-n}	M		Bit String(33)	Mean anomaly at reference time (semi-circles) [23,24,25,27]
>>e _n	M		BIT STRING (33)	Eccentricity (dimensionless) [23,24,25,27]
>>ω _n	M		Bit String(33)	Argument of perigee (semi-circles) [23,24,25,27]
>>Ω _{0-n}	M		BIT STRING (33)	Reference right ascension angle (semi-circles) [23,24,25,27]
>>ΔΩ _{dot}	M		BIT STRING (17)	Rate of right ascension difference (semi-circles/sec) [23,24,25,27]
>>i _{0-n}	M		BIT STRING (33)	Inclination angle at reference time (semi-circles) [23,24,25,27]
>>i _{0-n_dot}	M		BIT STRING (15)	Rate of inclination angle (semi-circles/sec) [23,24,25,27]
>>C _{is-n}	M		BIT STRING (16)	Amplitude of sine harmonic correction term to the angle of inclination (radians) [23,24,25,27]
>>C _{ic-n}	M		BIT STRING (16)	Amplitude of cosine harmonic correction term to the angle of inclination (radians) [23,24,25,27]
>>C _{rs-n}	M		BIT STRING (24)	Amplitude of sine harmonic correction term to the orbit radius (meters) [23,24,25,27]
>>C _{rc-n}	M		BIT STRING (24)	Amplitude of cosine harmonic correction term to the orbit radius (meters) [23,24,25,27]
>>C _{us-n}	M		BIT STRING (21)	Amplitude of sine harmonic correction term to the argument of latitude (radians) [23,24,25,27]
>>C _{uc-n}	M		BIT STRING (21)	Amplitude of cosine harmonic correction term to the argument of latitude (radians) [23,24,25,27]

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>GLONASS Earth-Centered, Earth-fixed Parameters				Model-4
>>E _n	M		BIT STRING (5)	Age of data (days) [28]
>>P1	M		BIT STRING (2)	Time interval between two adjacent values of t _b (minutes) [28]
>>P2	M		BIT STRING (1)	Change of t _b flag (dimensionless) [28]
>>M	O		BIT STRING (2)	Type of satellite (dimensionless) [28]
>> x _n (t _b)	M		BIT STRING (27)	x-coordinate of satellite at time t _b (kilometers) [28]
>> $\dot{x}_n(t_b)$	M		BIT STRING (24)	x-coordinate of satellite velocity at time t _b (kilometers/sec) [28]
>> $\ddot{x}_n(t_b)$	M		BIT STRING (5)	x-coordinate of satellite acceleration at time t _b (kilometers/sec ²) [28]
>> y _n (t _b)	M		BIT STRING (27)	y-coordinate of satellite at time t _b (kilometers) [28]
>> $\dot{y}_n(t_b)$	M		BIT STRING (24)	y-coordinate of satellite velocity at time t _b (kilometers/sec) [28]
>> $\ddot{y}_n(t_b)$	M		BIT STRING (5)	y-coordinate of satellite acceleration at time t _b (kilometers/sec ²) [28]
>> z _n (t _b)	M		BIT STRING (27)	z-coordinate of satellite at time t _b (kilometers) [28]
>> $\dot{z}_n(t_b)$	M		BIT STRING (24)	z-coordinate of satellite velocity at time t _b (kilometers/sec) [28]
>> $\ddot{z}_n(t_b)$	M		BIT STRING (5)	z-coordinate of satellite acceleration at time t _b (kilometers/sec ²) [28]
>SBAS Earth-Centered, Earth-fixed Parameters				Model-5
>>t ₀	C-ClockModel		BIT STRING (13)	Time of applicability (seconds) [26]
>>Accuracy	M		BIT STRING (4)	(dimensionless) [26]
>>X _G	M		BIT STRING (30)	(meters) [26]
>>Y _G	M		BIT STRING (30)	(meters) [26]
>>Z _G	M		BIT STRING (25)	(meters) [26]
>>X _G Rate-of-Change	M		BIT STRING (17)	(meters/sec) [26]
>>Y _G Rate-of-Change	M		BIT STRING (17)	(meters/sec) [26]
>>Z _G Rate-of-Change	M		BIT STRING (18)	(meters/sec) [26]
>>X _G Acceleration	M		BIT STRING (10)	(meters/sec ²) [26]
>>Y _G Acceleration	M		BIT STRING (10)	(meters/sec ²) [26]
>>Z _G Acceleration	M		BIT STRING (10)	(meters/sec ²) [26]

Table 173B

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

9.2.2.120 GANSS Positioning Instructions

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

Table 174

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

9.2.2.121 GANSS-UTRAN Time Relationship Uncertainty

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

Table 175

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS-UTRAN Time Relationship Uncertainty	M		ENUMERATED (50ns, 500ns, 1us, 10us, 1ms, 10ms, 100ms, unreliable,...)	RNC estimate of uncertainty in GANSS-UTRAN time relationship
GANSS ID	O		9.2.2.130	Absence of this IE means Galileo.

9.2.2.122 GANSS Real Time Integrity

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

Table 176

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
Satellite Information		1..<maxGANSSSat>		
>Bad GANSS Sat ID	M		INTEGER(0..63)	Defined in [4]
>Bad GANSS Signal ID	O		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	O		9.2.2.131	Absence of this field means the default value for the GANSS identified by "GANSS ID" [4].
Satellite Information		1..<maxGANSSSat>		
>Sat ID	M		INTEGER (0..63)	Defined in [4].
>Doppler (0 th order term)	M		INTEGER(-2048..2047)	Scaling factor 0.5 m/s Conversion between m/s and Hz shall be made by using the <i>nominal</i> wavelength of the assisted signal.
>Extra Doppler		0..1		
>>Doppler (1 st order term)	M		INTEGER (-42..21)	Scaling factor 1/210 m/s ²
>>Doppler Uncertainty	M		ENUMERAT	m/s.

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
			ED (40,20,10,5, 2.5)	The Doppler experienced by a stationary UE is in the range "Doppler – Doppler Uncertainty" to "Doppler + Doppler Uncertainty".
>Code Phase	M		INTEGER(0. .1023)	ms, scaling factor 2^{-10} <i>Nominal</i> chipping rate of the GNSS signal shall be used in conversion. Increasing binary values of the field signify increasing predicted pseudoranges.
>Integer Code Phase	M		INTEGER(0. .127)	ms. Integer code phase (expressed modulo 128 ms) currently being transmitted at the GANSS Reference Time, as seen by a receiver at the Reference Location
>Code Phase Search Window	M		INTEGER(0. .31)	Expected code-phase is in the range "Code Phase – Code Phase Search Window" to "Code Phase + Code Phase Search Window". Coded as defined in [4].
>Azimuth and Elevation		0..1		
>>Azimuth	M		INTEGER(0. .31)	Scaling factor 11.25 Degrees An angle of x degrees means the satellite azimuth a is in the range $x \leq a < x+11.25$ degrees.
>>Elevation	M		INTEGER(0. .7)	Scaling factor 11.25 Degrees An angle of y degrees means the satellite elevation e is in the range $y \leq e < y+11.25$ degrees except for $y=78.75$ where the range is extended to include 90 degrees.

Table 177A

Range bound	Explanation
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	O		INTEGER(0.. 8191)	The number of days from the beginning of GNSS system time (mod 8192)
GANSS TOD	M		INTEGER(0.. 86399)	GANSS Time of Day in seconds
GANSS TOD Uncertainty	O		INTEGER(0.. 127)	Provides the accuracy of the relation between GANSS TOD and UTRAN time if UTRAN GANSS timing of cell frames is provided. Its coding is defined in [4].

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
				This IE may only be present if SAS operates in SAS-centric mode.
GANSS Time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.
UTRAN GANSS Reference Time		0..1		This IE may only be present if SAS operates in SAS-centric mode.
>UTRAN GANSS Timing of Cell Frames	M		INTEGER(0..999999750 by step of 250)	UTRAN GANSS timing of cell frames in steps of 250 ns. Indicates sub-second part of <i>GANSS TOD IE</i> . See [4]
>UC-ID	O		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GANSS TOD-SFN relationship.
>SFN	M		Integer(0..4095)	The SFN which the UTRAN GANSS timing of cell frames time stamps.
T _{UTRAN-GANSS} Drift Rate	O		ENUMERATED (0, 1, 2, 5, 10, 15, 25, 50, -1, -2, -5, -10, -15, -25, -50,...)	in 1/256 chips per sec.

9.2.2.125 GANSS Time Model

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

Table 179

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
GANSS Time Model Reference Time	M		INTEGER (0..37799)	GANSS reference time (modulo 1 week) in seconds. Scale Factor 2 ⁴
T _{A0}	M		INTEGER(-2147483648..2147483647)	Seconds, scale factor 2 ⁻³⁵
T _{A1}	O		INTEGER(-8388608..8388607)	sec/sec, scale factor 2 ⁻⁵¹
T _{A2}	O		INTEGER (-64..63)	sec/sec ² , scale factor 2 ⁻⁶⁸
GANSS_TO_ID	M		ENUMERATED(GPS,..., Galileo, QZSS, GLONASS)	
Week Number	O		INTEGER (0..8191)	Reference week of GANSS Time Model

9.2.2.125A GANSS Additional Time Models

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

Table 179A

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

Table 179B

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

9.2.2.126 GNSS UTC Model

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

Table 180

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

9.2.2.126A GNSS Additional UTC Models

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

Table 180A

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

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
<i>CHOICE Additional UTC Models</i>				
<i>>Model Set 1</i>				
>A _{0-n}	M		BIT STRING(16)	Bias coefficient of GNSS time scale relative to UTC time scale (seconds) [23,24,25,27]
>A _{1-n}	M		BIT STRING (13)	Drift coefficient of GNSS time scale relative to UTC time scale (sec/sec) [23,24,25,27]
>A _{2-n}	M		BIT STRING (7)	Drift rate correction coefficient of GNSS time scale relative to UTC time scale (sec/sec ²) [23,24,25,27]
>Δt _{LS}	M		BIT STRING (8)	Current or past leap second count (seconds) [23,24,25,27]
>t _{ot}	M		BIT STRING (16)	Time data reference time of week (seconds) [23,24,25,27]
>WN _{ot}	M		BIT STRING (13)	Time data reference week number (weeks) [23,24,25,27]
>WN _{LSF}	M		BIT STRING (8)	Leap second reference week number (weeks) [23,24,25,27]
>DN	M		BIT STRING (4)	Leap second reference day number (days) [23,24,25,27]
>Δt _{LSF}	M		BIT STRING (8)	Current or future leap second count (seconds) [23,24,25,27]
<i>>Model Set 2</i>				
>N ^A	M		BIT STRING (11)	Callendar day number within four-year period beginning since the leap year (days) [28]
>τ _c	M		BIT STRING (32)	GLONASS time scale correction to UTC(SU) (seconds) [28]
>Delta UT1	O			
>>B1	M		BIT STRING (11)	Coefficient to determine ΔUT1 (seconds) [28]
>>B2	M		BIT STRING (10)	Coefficient to determine ΔUT1 (seconds/msd) [28]
>KP	O		BIT STRING (2)	Notification of expected leap second correction (dimensionless) [28]
<i>>Model Set 3</i>				
>A _{1WNT}	M		BIT STRING (24)	sec/sec ([26], Message Type 12)
>A _{0WNT}	M		BIT STRING (32)	seconds ([26], Message Type 12)
>t _{ot}	M		BIT STRING (8)	seconds ([26], Message Type 12)
>WN _t	M		BIT STRING (8)	weeks ([26], Message Type 12)
>Δt _{LS}	M		BIT STRING (8)	seconds ([26], Message Type 12)
>WN _{LSF}	M		BIT STRING (8)	weeks ([26], Message Type 12)
>DN	M		BIT STRING (8)	days ([26], Message Type 12)
>Δt _{LSF}	M		BIT STRING (8)	seconds ([26], Message Type 12)

IE/Group name	Presence	Range	IE Type and Reference	Semantics description
>UTC Standard ID	M		BIT STRING (3)	dimensionless Coded as defined in [4]

9.2.2.127 GANSS Time Indicator

Table 181

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

9.2.2.127A GANSS Data Bit Assistance

Table 181A

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

Table 181B

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

9.2.2.128 Additional GPS Assistance Data Required

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

Table 182

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Almanac	M		BOOLEAN	TRUE means requested
UTC Model	M		BOOLEAN	TRUE means requested
Ionospheric Model	M		BOOLEAN	TRUE means requested
Navigation Model	M		BOOLEAN	TRUE means requested
DGPS Corrections	M		BOOLEAN	TRUE means requested
Reference Location	M		BOOLEAN	TRUE means requested
Reference Time	M		BOOLEAN	TRUE means requested
Acquisition Assistance	M		BOOLEAN	TRUE means requested
Real-Time Integrity	M		BOOLEAN	TRUE means requested
Nav. Model Additional Data		0..1		
>GPS Week	M		INTEGER (0..1023)	GPS week number
>GPS_Toe	M		INTEGER (0..167)	GPS time of ephemeris in hours of the latest ephemeris set
>T-Toe limit	M		Integer (0..10)	ephemeris age tolerance in hours
>Satellites related data		0..<maxSat>		
>>SatID	M		INTEGER (0..63)	Identifies the satellite and is equal to (SV ID No - 1) where SV ID No is defined in [10].
>>IODE	M		INTEGER (0..255)	Issue of Data Ephemeris for SatID

Table 183

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

9.2.2.129 Additional GANSS Assistance Data Required

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

Table 184

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

>>>GANSS Signal ID	M		BIT STRING(8)	Coded as defined in [4]	–	
>>>GANSS Data Bit Interval	M		INTEGER(0..15)	This field represents the time length for which the Data Bit Assistance is requested. The Data Bit Assistance shall be relative to the time interval (GANSS TOD, GANSS TOD + Data Bit Interval). The Data Bit Interval r , expressed in seconds, is mapped to a binary number K with the following formula: $r = 0.1 * 2^K$ Value $K=15$ means that the time interval is not specified.	–	
>>>Satellite Information		0..<maxGANS SSat>			–	
>>>>Satellite ID	M		INTEGER(0..63)	Defined in [4].	–	
>GANSS UTC model	O		BOOLEAN	TRUE means requested	–	
>GANSS Navigation Model Additional data		0..1			–	
>>GANSS Week/Day	M		INTEGER(0..4095)	Defined in [4].	–	
>>GANSS_Toe	M		INTEGER(0..167)	Defined in [4].	–	
>>T-Toe limit	M		INTEGER(0..10)	Defined in [4].	–	
>>Satellites list related data	M	0..<maxGANSSSat>			–	
>>>Sat ID	M		INTEGER(0..63)	Defined in [4].	–	
>>>IOD	M		BIT STRING(10)	Defined in [4].	–	
>GANSS Additional Navigation Models	O		GANSS Additional Navigation Models Required 9.2.2.147		YES	ignore
>GANSS Additional UTC Models	O		GANSS Additional UTC Models Required 9.2.2.148		YES	ignore
>GANSS Auxiliary Information	O		GANSS Auxiliary		YES	ignore

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

Table 185

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

9.2.2.130 GANSS ID

This IE defines a particular GANSS.

Table 186

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS ID	M		INTEGER(0..7)	Defines the GANSS and is coded as defined in [4], subclause 10.3.7.90b.

9.2.2.131 GANSS Signal ID

This IE defines a specific signal within a particular GANSS.

Table 187

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Signal ID	M		INTEGER (0..3,...,4..7)	Defines the GANSS signal and is coded as defined in [4], subclause 10.3.3.45a.

9.2.2.131a GANSS Signal IDs

This IE defines multiple signals within a particular GANSS.

Table 187A

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

9.2.2.132 GPS Reference Time Uncertainty

Table 188

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

9.2.2.133 GANSS Earth Orientation Parameters

Table 189

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
t_{EOP}	M		BIT STRING(16)	EOP data reference time (seconds) [23]
PM_X	M		BIT STRING (21)	X-axis polar motion value at reference time (arc-seconds) [23]
PM_X_dot	M		BIT STRING (15)	X-axis polar motion drift at reference time (arc-seconds/day) [23]
PM_Y	M		BIT STRING (21)	Y-axis polar motion value at reference time (arc-seconds) [23]
PM_Y_dot	M		BIT STRING (15)	Y-axis polar motion drift at reference time (arc-seconds/day) [23]
$\Delta UT1$	M		BIT STRING (31)	UT1-UTC difference at reference time (seconds) [23]
$\Delta UT1_dot$	M		BIT STRING (19)	Rate of UT1-UTC difference at reference time (seconds/day) [23]

9.2.2.134 SBAS ID

This IE defines a specific SBAS.

Table 190

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

9.2.2.135 GANSS Auxiliary Information

Table 191

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

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

Table 192

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

9.2.2.136 UTRAN-GANSS Reference Time Result

Table 193

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UE GANSS timing of cell frames	M		INTEGER(0..34559999999,...)	GANSS Time of Day in steps of 250 ns [4].
GANSS time ID	O		GANSS ID 9.2.2.130	Absence of this IE means Galileo system time. The value '0' ('SBAS') shall not be used for GANSS Time ID.
GANSS TOD Uncertainty	O		INTEGER(0..127)	Coded as defined in [4].
UC-ID	M		UTRAN Cell Identifier 9.2.2.37	Identifies the reference cell for the GANSS TOD-SFN relationship.
SFN	M		INTEGER (0..4095)	This IE indicates the SFN at which the UE timing of cell frame is captured.

9.2.2.137 GANSS Additional Ionospheric Model Request

Table 194

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Data ID	M		BIT STRING(2)	Data ID for GANSS Additional Ionospheric Model as defined in [4], subclause 10.3.7.92b.

9.2.2.138 GANSS Earth Orientation Parameters Request

Table 195

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

9.2.2.139 Support for Non-Native Assistance Choices Indication

Table 196

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

9.2.2.140 Position Data UE-Based

Table 197

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Position Data UE-Based	M		Bit String(16)	For each bit, if set to '1' indicates that respective GNSS or position system was used by the UE for position calculation. Coded as defined in [4], subclause 10.3.7.109.

9.2.2.141 GANSS Code Phase Ambiguity Extension

Table 198

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Code Phase Ambiguity Extension	M		INTEGER(32..127)	In milliseconds. Defined in [4], subclause 10.3.7.93a.

9.2.2.142 GANSS Integer Code Phase Extension

Table 199

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Integer Code Phase Extension	M		INTEGER(64..127)	In milliseconds. Defined in [4], subclause 10.3.7.93a.

9.2.2.143 GANSS Carrier-Phase Measurement Requested

Table 200

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

9.2.2.144 GANSS Multi-frequency Measurement Requested

Table 201

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

9.2.2.145 GANSS Additional Ionospheric Model Required

Table 202

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Data ID	M		BIT STRING(2)	Data ID for GANSS Additional Ionospheric Model as defined in [4], clause 10.3.7.88c.

9.2.2.146 GANSS Earth Orientation Parameters Required

Table 203

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

9.2.2.147 GANSS Additional Navigation Models Required

Table 204

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

9.2.2.148 GANSS Additional UTC Models Required

Table 205

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

9.2.2.149 GANSS Auxiliary Information Required

Table 206

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

9.2.2.150 SBAS IDs

This IE defines multiple SBASs.

Table 207

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

9.2.2.151 GANSS Additional Assistance Data Choices

Table 208

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
GANSS Additional Assistance Data Choices		1		
>Orbit Model ID	O		INTEGER(0..7)	Coded as defined in [4], subclause 10.3.7.88c
>Clock Model ID	O		INTEGER(0..7)	Coded as defined in [4], subclause 10.3.7.88c
>UTC Model ID	O		INTEGER(0..7)	Coded as defined in [4], subclause 10.3.7.88c
>Almanac Model ID	O		INTEGER(0..7)	Coded as defined in [4], subclause 10.3.7.88c

9.2.2.152 Cell-ID Measured Results Sets

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

Table xx

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

9.2.2.153 OTDOA Reference Cell Info SAS-centric mode

Table Y

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

9.2.2.154 DGNSS Validity Period

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

Table x

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

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

9.3.0 General

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

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

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

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

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

9.3.1 Usage of private message mechanism for non-standard use

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

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

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

9.3.2 Elementary Procedure Definitions

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Criticality,
    ProcedureCode,
    TransactionID
FROM PCAP-CommonDataTypes

    PositionCalculationRequest,
    PositionCalculationResponse,
    PositionCalculationFailure,
    InformationExchangeInitiationRequest,
    InformationExchangeInitiationResponse,
    InformationExchangeInitiationFailure,
    InformationReport,
    InformationExchangeTerminationRequest,
    InformationExchangeFailureIndication,
    ErrorIndication,
    PrivateMessage,
    PositionInitiationRequest,
    PositionInitiationResponse,
    PositionInitiationFailure,
    PositionActivationRequest,
    PositionActivationResponse,
    PositionActivationFailure,
    PositionParameterModification,
    Abort,
    PositionPeriodicReport,
    PositionPeriodicResult,
    PositionPeriodicTermination

FROM PCAP-PDU-Contents

    id-PositionCalculation,
    id-InformationExchangeInitiation,
    id-InformationReporting,
    id-InformationExchangeTermination,
    id-InformationExchangeFailure,
    id-ErrorIndication,
```

```

    id-privateMessage,
    id-PositionInitiation,
    id-PositionActivation,
    id-PositionParameterModification,
    id-Abort,
    id-PositionPeriodicReport,
    id-PositionPeriodicResult,
    id-PositionPeriodicTermination

FROM PCAP-Constants;

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

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

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

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

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

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

```



```

    value          PCAP-ELEMENTARY-PROCEDURE.&InitiatingMessage  ({PCAP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

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

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

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

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

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

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

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

```

```

    abort
    positionPeriodicReport
    positionPeriodicResult
    positionPeriodicTermination
}

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

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

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

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

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

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

```

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

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

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

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

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

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

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

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

```
positionPeriodicTermination PCAP-ELEMENTARY-PROCEDURE ::= {  
  INITIATING MESSAGE      PositionPeriodicTermination  
  PROCEDURE CODE          id-PositionPeriodicTermination  
}
```

```

    CRITICALITY          ignore
}
END

```

9.3.3 PDU Definitions

```

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    Cause,
    CriticalityDiagnostics,
    GPS-UTRAN-TRU,
    InformationExchangeID,
    InformationReportCharacteristics,
    InformationType,
    MeasuredResultsList,
    RequestedDataValue,
    RequestedDataValueInformation,
    UE-PositionEstimate,
    CellId-MeasuredResultsSets,
    OTDOA-MeasurementGroup,
    AccuracyFulfilmentIndicator,
    HorizontalAccuracyCode,
    VerticalAccuracyCode,
    RequestType,
    UE-PositioningCapability,
    UC-ID,
    ResponseTime,
    PositioningPriority,
    ClientType,
    PositioningMethod,
    UTDOAPositioning,
    GPSPositioning,
    OTDOAAssistanceData,

```

UTDOA-Group,
Positioning-ResponseTime,
EnvironmentCharacterisation,
PositionData,
IncludeVelocity,
VelocityEstimate,
UE-PositionEstimateInfo,
OTDOA-MeasuredResultsSets,
PeriodicPosCalcInfo,
PeriodicLocationInfo,
AmountOfReporting,
MeasInstructionsUsed,
RRCstateChange,
PeriodicTerminationCause,
CellIDPositioning,
GANSS-MeasuredResultsList,
GANSSPositioning,
GANSS-UTRAN-TRU,
AdditionalGPSAssistDataRequired,
AdditionalGanssAssistDataRequired,
OTDOA-ReferenceCellInfosAS-centric

FROM PCAP-IEs

TransactionID

FROM PCAP-CommonDataTypes

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

FROM PCAP-Containers

id-Cause,
id-CriticalityDiagnostics,
id-GPS-UTRAN-TRU,
id-InformationExchangeID,
id-InformationExchangeObjectType-InfEx-Rprt,
id-InformationExchangeObjectType-InfEx-Rqst,
id-InformationExchangeObjectType-InfEx-Rsp,
id-InformationReportCharacteristics,
id-InformationType,
id-GPS-MeasuredResultsList,
id-RequestedDataValue,
id-RequestedDataValueInformation,
id-TransactionID,
id-UE-PositionEstimate,
id-CellId-MeasuredResultsSets,

```

id-OTDOA-MeasurementGroup,
id-AccuracyFulfilmentIndicator,
id-HorizontalAccuracyCode,
id-VerticalAccuracyCode,
id-RequestType,
id-UE-PositioningCapability,
id-UC-id,
id-ResponseTime,
id-PositioningPriority,
id-ClientType,
id-PositioningMethod,
id-UTDOAPositioning,
id-GPSPositioning,
id-OTDOAAssistanceData,
id-UTDOA-Group,
id-Positioning-ResponseTime,
id-EnvironmentCharacterisation,
id-PositionData,
id-IncludeVelocity,
id-VelocityEstimate,
id-UE-PositionEstimateInfo,
id-UC-ID-InfEx-Rqst,
id-OTDOA-MeasuredResultsSets,
id-PeriodicPosCalcInfo,
id-PeriodicLocationInfo,
id-AmountOfReporting,
id-MeasInstructionsUsed,
id-RRCstateChange,
id-PeriodicTerminationCause,
id-CellIDPositioning,
id-GANSS-MeasuredResultsList,
id-GANSSPositioning,
id-GANSS-UTRAN-TRU,
id-AdditionalGPSAssistDataRequired,
id-AdditionalGanssAssistDataRequired,
id-OTDOA-ReferenceCellInfo

FROM PCAP-Constants;

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

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

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

```

```

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

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

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

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

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

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

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

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

```

```

    { ID id-CriticalityDiagnostics      CRITICALITY ignore  TYPE CriticalityDiagnostics      PRESENCE optional },
    ...
}

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

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

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

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

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

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

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

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

```



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

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

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

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

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

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

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

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

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

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

```
RefPositionItem-InfEx-Rsp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
```

```

}
...
}

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

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

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

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

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

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

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

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

```

```

}

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

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

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

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

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

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

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

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

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

```

```

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

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

PositionActivationRequestExtensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-IncludeVelocity             CRITICALITY ignore EXTENSION IncludeVelocity             PRESENCE optional } |
    { ID id-AmountOfReporting          CRITICALITY ignore EXTENSION AmountOfReporting          PRESENCE optional } |
    { ID id-CellIDPositioning          CRITICALITY ignore EXTENSION CellIDPositioning          PRESENCE optional } |
    { ID id-GANSSPositioning           CRITICALITY reject EXTENSION GANSSPositioning           PRESENCE optional },
    ...
}

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

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

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

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

```

```

    { ID id-AdditionalGPSAssistDataRequired          CRITICALITY ignore EXTENSION AdditionalGPSAssistDataRequired PRESENCE optional } |
    { ID id-AdditionalGanssAssistDataRequired       CRITICALITY ignore EXTENSION AdditionalGanssAssistDataRequired PRESENCE optional } |
    { ID id-OTDOA-ReferenceCellInfo                CRITICALITY reject  EXTENSION OTDOA-ReferenceCellInfoSAS-centric PRESENCE optional },
    ...
}

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

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

```

```

    ...
}

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

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

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

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

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

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

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

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

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

-- *****

```

```

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

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

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

-- *****
--
-- ABORT
--
-- *****

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

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

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

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

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

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

```



```

    { ID id-OTDOA-MeasuredResultsSets      CRITICALITY ignore TYPE OTDOA-MeasuredResultsSets PRESENCE optional } |
    { ID id-Cause                          CRITICALITY ignore TYPE Cause PRESENCE optional } ,
    ...
}

PositionPeriodicReport-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-MeasuredResultsList      CRITICALITY ignore EXTENSION GANSS-MeasuredResultsList PRESENCE optional } |
    { ID id-AdditionalGPSAssistDataRequired CRITICALITY ignore EXTENSION AdditionalGPSAssistDataRequired PRESENCE optional } |
    { ID id-AdditionalGanssAssistDataRequired CRITICALITY ignore EXTENSION AdditionalGanssAssistDataRequired PRESENCE optional } |
    { ID id-OTDOA-ReferenceCellInfo        CRITICALITY reject EXTENSION OTDOA-ReferenceCellInfoSAS-centric PRESENCE optional },
    ...
}

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

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

PositionPeriodicResult-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-UE-PositionEstimate      CRITICALITY ignore TYPE UE-PositionEstimate PRESENCE optional } |
    { ID id-VelocityEstimate         CRITICALITY ignore TYPE VelocityEstimate PRESENCE optional } |
    { ID id-PositionData             CRITICALITY ignore TYPE PositionData PRESENCE optional } |
    { ID id-AccuracyFulfilmentIndicator CRITICALITY ignore TYPE AccuracyFulfilmentIndicator PRESENCE optional } |
    { ID id-Cause                    CRITICALITY ignore TYPE Cause PRESENCE optional },
    ...
}

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

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

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

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

```

```

PositionPeriodicTermination-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
END

```

9.3.4 Information Element Definitions

```

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

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

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    maxNrOfErrors,
    maxSat,
    maxSatAlmanac,
    maxNrOfLevels,
    maxNrOfMeasNCell,
    maxNrOfMeasurements,
    maxNrOfPoints,
    maxNrOfExpInfo,
    maxNrOfSets,
    maxRateMatching,
    maxNrOfTFs,
    maxTTI-count,
    maxTS-1,
    maxCCTrCH,
    maxTF,
    maxTFC,
    maxPRACH,
    maxTrCH,
    maxTGPS,
    maxNoOfMeasurements,
    maxCellMeas,
    maxNrOfEDPCCH-PO-QUANTSTEPS,
    maxNrOfRefETFCI-PO-QUANTSTEPS,
    maxNrOfRefETFCIs,
    maxSet,
    maxGANSS,
    maxGANSSSat,

```

maxGANSSSet,
maxSgnType,
maxGANSSSatAlmanac,
maxGANSSClockMod,
maxGANSS-1,

id-UTRAN-GPSReferenceTime,
id-UTRAN-GPSReferenceTimeResult,
id-GPS-UTRAN-TRU,
id-UTRAN-GPS-DriftRate,
id-OTDOA-AddMeasuredResultsInfo,
id-GPS-ReferenceLocation,
id-rxTimingDeviation768Info,
id-rxTimingDeviation384extInfo,
id-MeasurementValidity,
id-ExtendedRoundTripTime,
id-roundTripTimeInfoWithType1,
id-AddMeasurementInfo,
id-Extended-RNC-ID,
id-GANSS-CommonAssistanceData,
id-GANSS-GenericAssistanceDataList,
id-GANSS-PositioningDataSet,
id-GNSS-PositioningMethod,
id-NetworkAssistedGANSSSupport,
id-TUTRANGANSSMeasurementValueInfo,
id-angleOfArrivalLCR,
id-extendedTimingAdvanceLCR,
id-additionalMeasurementInforLCR,
id-timingAdvanceLCR-R7,
id-rxTimingDeviationLCR,
id-GPSReferenceTimeUncertainty,
id-GANSS-AddIonosphereModelReq,
id-GANSS-EarthOrientParaReq,
id-GANSS-Additional-Ionospheric-Model,
id-GANSS-Earth-Orientation-Parameters,
id-GANSS-Additional-Time-Models,
id-GANSS-Additional-Navigation-Models,
id-GANSS-Additional-UTC-Models,
id-GANSS-Auxiliary-Information,
id-GANSS-SBAS-ID,
id-GANSS-SBAS-IDs,
id-GANSS-Signal-IDs,
id-GANSS-alm-keplerianNAVALmanac,
id-GANSS-alm-keplerianReducedAlmanac,
id-GANSS-alm-keplerianMidiAlmanac,
id-GANSS-alm-keplerianGLONASS,
id-GANSS-alm-ecefSBASAlmanac,
id-UTRAN-GANSSReferenceTimeResult,
id-GANSS-Reference-Time-Only,
id-GANSS-AddADchoices,
id-supportGANSSNonNativeADchoices,
id-PositionDataUEbased,

```

id-ganssCodePhaseAmbiguityExt,
id-ganssIntegerCodePhaseExt,
id-GANSScarrierPhaseRequested,
id-GANSSMultiFreqMeasRequested,
id-ganssReq-AddIonosphericModel,
id-ganssReq-EarthOrientPara,
id-ganssAddNavigationModel-req,
id-ganssAddUTCModel-req,
id-ganssAuxInfo-req,
id-GANSS-AlmanacModelChoice,
id-DGNSS-ValidityPeriod

```

FROM PCAP-Constants

```

Criticality,
ProcedureCode,
ProtocolIE-ID,
TransactionID,
TriggeringMessage

```

FROM PCAP-CommonDataTypes

```

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

```

FROM PCAP-Containers;

```

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

```

```

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

```

```

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

```

```

AdditionalMethodType ::= ENUMERATED {

```

```

    ue-assisted,
    ue-based,
    ue-based-preferred-but-ue-assisted-allowed,
    ue-assisted-preferred-but-ue-based-allowed,
    ...
}

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

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

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

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

Cause ::= CHOICE {
    radioNetwork          CauseRadioNetwork,
    transport             CauseTransport,
    protocol              CauseProtocol,
    misc                  CauseMisc,
    ...
}

CauseRadioNetwork ::= ENUMERATED {
    invalid-reference-information,
    information-temporarily-not-available,
    information-provision-not-supported-for-the-object,
    position-calculation-error-invalid-GPS-measured-results,
    ...,
    position-calculation-error-invalid-CellID-measured-results,
    position-calculation-error-invalid-OTDOA-measured-results,
    position-calculation-error-AGPS-positioning-method-not-supported,
    position-calculation-error-CellID-positioning-method-not-supported,
    position-calculation-error-OTDOA-positioning-method-not-supported,
    initial-UE-position-estimate-missing,
    position-caclulation-error-invalid-UTDOA-measured-results,
    position-calculation-error-UTDOA-positioning-method-not-supported,

```

```

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

RxTimingDeviationLCRInfo ::=           SEQUENCE {
    rxTimingDeviationLCR              RxTimingDeviationLCR,
    timingAdvanceLCR                  TimingAdvanceLCR,
    -- The content of this IE shall be ignored if the id-extendedTimingAdvanceLCR IE is present.
    iE-Extensions                    ProtocolExtensionContainer { { RxTimingDeviationLCRInfo-ExtIEs } }    OPTIONAL,
    ...
}

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

```



```

ExtendedTimingAdvanceLCR ::=          INTEGER (2048..8191)

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

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

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

RxTimingDeviation384extInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

AddMeasurementInfo ::=                SEQUENCE {
    cpich-RSCP                        CPICH-RSCP                                OPTIONAL,
    cpich-EcNo                        CPICH-EcNo                                OPTIONAL,
    iE-Extensions                      ProtocolExtensionContainer { { AddMeasurementInfo-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

RxTimingDeviation ::=                 INTEGER (0..8191)

RxTimingDeviationLCR ::=              INTEGER (0..511)

RxTimingDeviation768 ::=              INTEGER (0..65535)

```

```

RxTimingDeviation384ext ::=          INTEGER (0..32767)

TimingAdvance ::=                    INTEGER (0..63)

TimingAdvanceLCR ::=                 INTEGER (0..2047)

TimingAdvance768 ::=                 INTEGER (0..511)

TimingAdvance384ext ::=              INTEGER (0..255)

Pathloss ::=                         INTEGER (46..158)
-- Unit: dB; as defined in [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 { { RequestedCellIDMeasurementsFDD-ExtIEs } } OPTIONAL,
        ...
    },
    tdd      SEQUENCE {
        rxTimingDeviationInfoWanted       BOOLEAN,
        pathlossWanted                    BOOLEAN,

```

```

        rxTimingDeviationLCRInfoWanted      BOOLEAN,
        rxTimingDeviation768InfoWanted     BOOLEAN,
        rxTimingDeviation384extInfoWanted  BOOLEAN,
        angleOfArrivalLCRWanted            BOOLEAN,
        timingAdvanceLCRWanted             BOOLEAN,
        iE-Extensions                      ProtocolExtensionContainer { { RequestedCellIDMeasurementsTDD-ExtIEs } } OPTIONAL,
        ...
    },
}
...
}
RequestedCellIDMeasurementsFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
RequestedCellIDMeasurementsTDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

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

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

```

```

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

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

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

CriticalityDiagnosticsRepetition ::= INTEGER (0..255)

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

-- *****
--
-- DGPSCorrections
--
-- *****

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

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

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

```

```

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

DGPS-CorrectionSatInfo ::= SEQUENCE {
    satID          INTEGER (0..63),
    iode           INTEGER (0..255),
    udre           UDRE,
    prc           PRC,
    rrc           RRC,
    iE-Extensions ProtocolExtensionContainer { { DGPS-CorrectionSatInfo-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

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

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

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

```

```

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

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

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

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

UE-PositionEstimate ::= CHOICE {
    point                GA-Point,
    pointWithUncertainty GA-PointWithUncertainty,
    polygon              GA-Polygon,
    pointWithUncertaintyEllipse GA-PointWithUncertaintyEllipse,
    pointWithAltitude   GA-PointWithAltitude,
    pointWithAltitudeAndUncertaintyEllipsoid GA-PointWithAltitudeAndUncertaintyEllipsoid,
    ellipsoidArc        GA-EllipsoidArc,
    ...
}

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

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

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

GA-EllipsoidArc ::= SEQUENCE {
    geographicalCoordinates GeographicalCoordinates,
    innerRadius             INTEGER (0..65535),
    uncertaintyRadius       INTEGER (0..127),
    offsetAngle             INTEGER (0..179),
    includedAngle           INTEGER (0..179),
    confidence               INTEGER (0..100),
}

```

```

    iE-Extensions          ProtocolExtensionContainer { { GA-EllipsoidArc-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

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

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

GA-PointWithAltitudeAndUncertaintyEllipsoid ::= SEQUENCE {
    geographicalCoordinates    GeographicalCoordinates,
    altitudeAndDirection       GA-AltitudeAndDirection,
    uncertaintyEllipse         GA-UncertaintyEllipse,
    uncertaintyAltitude        INTEGER (0..127),
    confidence                  INTEGER (0..100),
    iE-Extensions             ProtocolExtensionContainer { { GA-PointWithAltitudeAndUncertaintyEllipsoid-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

GA-PointWithUnCertaintyEllipse ::= SEQUENCE {

```

```

    geographicalCoordinates    GeographicalCoordinates,
    uncertaintyEllipse         GA-UncertaintyEllipse,
    confidence                 INTEGER (0..100),
    iE-Extensions              ProtocolExtensionContainer { { GA-PointWithUnCertaintyEllipse-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

GA-UncertaintyEllipse ::= SEQUENCE {
    uncertaintySemi-major         INTEGER (0..127),
    uncertaintySemi-minor        INTEGER (0..127),
    orientationOfMajorAxis       INTEGER (0..89),
    ...
}

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

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

UE-PositionEstimateInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore EXTENSION GPSReferenceTimeUncertainty PRESENCE optional}|
    {ID id-PositionDataUEbased         CRITICALITY ignore EXTENSION PositionDataUEbased PRESENCE optional},
    ...
}

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

```



```

}

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

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

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

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

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

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

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

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

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

PositionData ::= SEQUENCE {
  positioningDataDiscriminator  PositioningDataDiscriminator,

```

```

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

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

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

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

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

AzimuthAndElevation ::=
    azimuth                INTEGER (0..31),
    elevation              INTEGER (0..7),
    iE-Extensions         ProtocolExtensionContainer { { AzimuthAndElevation-ExtIEs } }    OPTIONAL,
    ...
}

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

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

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

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

```

```

}

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

```

```

    }

GANSS-AddOrbitModels ::= CHOICE {
    navKeplerianSet      NavModel-NAVKeplerianSet,
    cnavKeplerianSet    NavModel-CNAVKeplerianSet,
    glonasseCEF         NavModel-GLONASsecef,
    sbasECEF            NavModel-SBASsecef,
    ...
}

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

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

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

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

GANSS-Additional-Time-Models ::= SEQUENCE (SIZE (1..maxGANS-1)) OF GANS-Time-Model

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

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

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

```

```

}

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

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

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

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

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

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

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

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

```

```

}

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

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

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

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

Extension-GANSS-AlmanacModel-IE PCAP-PROTOCOL-IES ::= {
    { ID id-GANSS-alm-keplerianNAValmanac          CRITICALITY ignore TYPE GANSS-ALM-NAVKeplerianSet PRESENCE mandatory } |
    { ID id-GANSS-alm-keplerianReducedAlmanac     CRITICALITY ignore TYPE GANSS-ALM-ReducedKeplerianSet PRESENCE mandatory } |
    { ID id-GANSS-alm-keplerianMidiAlmanac        CRITICALITY ignore TYPE GANSS-ALM-MidiAlmanacSet PRESENCE mandatory } |
    { ID id-GANSS-alm-keplerianGLONASS           CRITICALITY ignore TYPE GANSS-ALM-GlonassAlmanacSet PRESENCE mandatory } |
    { ID id-GANSS-alm-ecefSBASAlmanac            CRITICALITY ignore TYPE GANSS-ALM-ECEFSbasAlmanacSet PRESENCE mandatory }
}

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

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

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

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

```



```

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

GANSS-CommonAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-Additional-Ionospheric-Model          CRITICALITY ignore EXTENSION GANSS-Additional-Ionospheric-Model PRESENCE optional }|
    { ID id-GANSS-Earth-Orientation-Parameters         CRITICALITY ignore EXTENSION GANSS-Earth-Orientation-Parameters PRESENCE optional },
    ...
}

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

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

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

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

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

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

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

```

```

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

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

GANSS-Earth-Orientation-Parameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

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

GANSSGenericAssistanceData ::= SEQUENCE{
    ganssId                GANSSID                OPTIONAL,
    ganss-Real-Time-Integrity GANSS-Real-Time-Integrity OPTIONAL,
    ganss-DataBitAssistance GANSS-Data-Bit-Assistance OPTIONAL,
    dganss-Corrections     DGANSS-Corrections    OPTIONAL,
    ganss-AlmanacAndSatelliteHealth GANSS-AlmanacAndSatelliteHealth OPTIONAL,
    ganss-ReferenceMeasurementInfo GANSS-ReferenceMeasurementInfo OPTIONAL,
    ganss-UTC-Model        GANSS-UTC-Model       OPTIONAL,
    ganss-Time-Model       GANSS-Time-Model      OPTIONAL,
    ganss-Navigation-Model GANSS-Navigation-Model OPTIONAL,
    ie-Extensions          ProtocolExtensionContainer { { GANSSGenericAssistance-ExtIEs } }    OPTIONAL,
    ...
}

GANSSGenericAssistance-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GANSS-Additional-Time-Models          CRITICALITY ignore EXTENSION GANSS-Additional-Time-Models PRESENCE optional }|
    { ID id-GANSS-Additional-Navigation-Models     CRITICALITY ignore EXTENSION GANSS-Additional-Navigation-Models PRESENCE optional }|

```

```

    { ID id-GANSS-Additional-UTC-Models          CRITICALITY ignore EXTENSION GANSS-Additional-UTC-Models PRESENCE optional }|
    { ID id-GANSS-Auxiliary-Information          CRITICALITY ignore EXTENSION GANSS-Auxiliary-Information PRESENCE optional }|
    -- the following IE shall be present if 'GANSSID' in 'GANSSGenericAssistanceData' is '0' (SBAS)
    { ID id-GANSS-SBAS-ID                        CRITICALITY ignore EXTENSION GANSS-SBAS-ID PRESENCE optional },
    ...
}

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

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

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

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

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

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

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

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

```

```

GANSS-KeplerianParametersAlm ::= SEQUENCE {
    t-oa                    INTEGER(0..255),
    iod-a                    INTEGER(0..3),
    gANSS-SatelliteInformationKP GANSS-SatelliteInformationKP,
    ie-Extensions            ProtocolExtensionContainer { { GANSS-KeplerianParametersAlm-ExtIEs } } OPTIONAL,
    ...
}

```

```

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

```

```

GANSS-KeplerianParametersOrb ::= SEQUENCE {
    toe-nav                  BIT STRING (SIZE (14)),
    ganss-omega-nav          BIT STRING (SIZE (32)),
    delta-n-nav              BIT STRING (SIZE (16)),

```

```

m-zero-nav          BIT STRING (SIZE (32)),
omegadot-nav        BIT STRING (SIZE (24)),
ganss-e-nav         BIT STRING (SIZE (32)),
idot-nav           BIT STRING (SIZE (14)),
a-sqrt-nav         BIT STRING (SIZE (32)),
i-zero-nav         BIT STRING (SIZE (32)),
omega-zero-nav     BIT STRING (SIZE (32)),
c-rs-nav          BIT STRING (SIZE (16)),
c-is-nav          BIT STRING (SIZE (16)),
c-us-nav          BIT STRING (SIZE (16)),
c-rc-nav          BIT STRING (SIZE (16)),
c-ic-nav          BIT STRING (SIZE (16)),
c-uc-nav          BIT STRING (SIZE (16)),
ie-Extensions      ProtocolExtensionContainer { { GANSS-KeplerianParametersOrb-ExtIEs } } OPTIONAL,
...
}

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

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

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

GANSS-MeasurementParametersItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
{ID id-ganssIntegerCodePhaseExt CRITICALITY ignore EXTENSION GanssIntegerCodePhaseExt PRESENCE optional},
...
}

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

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

```

```

}

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

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

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

GANSS-Navigation-Model ::= SEQUENCE {
    non-broadcastIndication ENUMERATED{true} OPTIONAL,
    ganssSatInfoNav GANSS-Sat-Info-Nav,
    ie-Extensions ProtocolExtensionContainer { { GANSS-Navigation-Model-ExtIEs } } OPTIONAL,
    ...
}

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

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

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

GANSS-RealTimeInformationItem ::= SEQUENCE {
    bad-ganss-satId INTEGER(0..63),
    bad-ganss-signalId BIT STRING(SIZE(8)) OPTIONAL,
    ie-Extensions ProtocolExtensionContainer { { GANSS-RealTimeInformationItem-ExtIEs } } OPTIONAL,
    ...
}

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

```

```

GANSS-Reference-Location ::= SEQUENCE {
    ue-PositionEstimate      UE-PositionEstimate,
    iE-Extensions            ProtocolExtensionContainer { { GANSS-Reference-Location-ExtIEs } } OPTIONAL,
    ...
}

GANSS-Reference-Location-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ReferenceMeasurementInfo ::= SEQUENCE {
    ganssSignalId            GANSS-SignalID                                OPTIONAL,
    satelliteInformation      GANSS-SatelliteInformation,
    ie-Extensions            ProtocolExtensionContainer { { GANSS-ReferenceMeasurementInfo-ExtIEs } } OPTIONAL,
    ...
}

GANSS-ReferenceMeasurementInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Reference-Time ::= SEQUENCE {
    ganssDay                 INTEGER(0..8191)                                OPTIONAL,
    ganssTod                 INTEGER(0..86399),
    ganssTodUncertainty       INTEGER(0..127)                                OPTIONAL,
    ganssTimeId              GANSSID                                        OPTIONAL,
    utran-ganssreferenceTime  UTRAN-GANSSReferenceTimeDL                 OPTIONAL,
    tutran-ganss-driftRate    TUTRAN-GANSS-DriftRate                     OPTIONAL,
    ie-Extensions            ProtocolExtensionContainer { { GANSS-Reference-Time-ExtIEs } } OPTIONAL,
    ...
}

GANSS-Reference-Time-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-ReferenceTimeOnly ::= SEQUENCE {
    gANSS-tod                INTEGER(0..3599999),
    gANSS-timeId             GANSSID                                OPTIONAL,
    gANSS-TimeUncertainty     INTEGER(0..127) OPTIONAL,
    ie-Extensions            ProtocolExtensionContainer { { GANSS-ReferenceTimeOnly-ExtIEs } } OPTIONAL,
    ...
}

GANSS-ReferenceTimeOnly-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

GANSS-SatelliteClockModelItem ::= SEQUENCE {
    t-oc                BIT STRING (SIZE(14)),
    a-i2                BIT STRING (SIZE(12)),
    a-i1                BIT STRING (SIZE(18)),
    a-i0                BIT STRING (SIZE(28)),
    t-gd                BIT STRING (SIZE(10))          OPTIONAL,
    model-id            INTEGER(0..3)                  OPTIONAL,
    ie-Extensions       ProtocolExtensionContainer { { GANSS-SatelliteClockModelItem-ExtIEs } }  OPTIONAL,
    ...
}

GANSS-SatelliteClockModelItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SatelliteInformation ::= SEQUENCE(SIZE(1..maxGANSSSat)) OF GANSS-SatelliteInformationItem

GANSS-SatelliteInformationItem ::= SEQUENCE {
    ganssSatId          INTEGER(0..63),
    dopplerZeroOrder    INTEGER(-2048..2047),
    extraDoppler        GANSS-ExtraDoppler          OPTIONAL,
    codePhase           INTEGER(0..1023),
    integerCodePhase    INTEGER(0..127),
    codePhaseSearchWindow INTEGER(0..31),
    azimuthAndElevation GANSS-AzimuthAndElevation  OPTIONAL,
    ie-Extensions       ProtocolExtensionContainer { { GANSS-SatelliteInformationItem-ExtIEs } }  OPTIONAL,
    ...
}

GANSS-SatelliteInformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SatelliteInformationKP ::= SEQUENCE (SIZE (1..maxGANSSSatAlmanac)) OF GANSS-SatelliteInformationKPItem

GANSS-SatelliteInformationKPItem ::= SEQUENCE {
    satId                INTEGER(0..63),
    ganss-e-alm          BIT STRING (SIZE (11)),
    ganss-delta-I-alm    BIT STRING (SIZE (11)),
    ganss-omegadot-alm   BIT STRING (SIZE (11)),
    ganss-svhealth-alm   BIT STRING (SIZE (4)),
    ganss-delta-a-sqrt-alm BIT STRING (SIZE (17)),
    ganss-omegazero-alm  BIT STRING (SIZE (16)),
    ganss-m-zero-alm     BIT STRING (SIZE (16)),
    ganss-omega-alm      BIT STRING (SIZE (16)),
    ganss-af-zero-alm    BIT STRING (SIZE (14)),
    ganss-af-one-alm     BIT STRING (SIZE (11)),

```



```

    ie-Extensions          ProtocolExtensionContainer { { GANSS-SatelliteInformationKPItem-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SatelliteInformationKPItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-GLOkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-GLOkp

GANSS-SAT-Info-Almanac-GLOkp ::= SEQUENCE {
    gloAlmNA                BIT STRING (SIZE(11)),
    gloAlmNA                BIT STRING (SIZE(5)),
    gloAlmHA                BIT STRING (SIZE(5)),
    gloAlmLambdaA          BIT STRING (SIZE(21)),
    gloAlmTlambdAA         BIT STRING (SIZE(21)),
    gloAlmDeltaIA          BIT STRING (SIZE(18)),
    gloAkmDeltaTA          BIT STRING (SIZE(22)),
    gloAlmDeltaTdotA       BIT STRING (SIZE(7)),
    gloAlmEpsilonA         BIT STRING (SIZE(15)),
    gloAlmOmegaA           BIT STRING (SIZE(16)),
    gloAlmTauA             BIT STRING (SIZE(10)),
    gloAlmCA               BIT STRING (SIZE(1)),
    gloAlmMA               BIT STRING (SIZE(2))
    ie-Extensions          ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-GLOkp-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-GLOkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-MIDIkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-MIDIkp

GANSS-SAT-Info-Almanac-MIDIkp ::= SEQUENCE {
    svID                    INTEGER(0..63),
    midiAlmE                BIT STRING (SIZE (11)),
    midiAlmDeltaI           BIT STRING (SIZE (11)),
    midiAlmOmegaDot        BIT STRING (SIZE (11)),
    midiAlmSqrtA            BIT STRING (SIZE (17)),
    midiAlmOmega0           BIT STRING (SIZE (16)),
    midiAlmOmega            BIT STRING (SIZE (16)),
    midiAlmMo               BIT STRING (SIZE (16)),
    midiAlmaf0              BIT STRING (SIZE (11)),
    midiAlmaf1              BIT STRING (SIZE (10)),
    midiAlmL1Health         BIT STRING (SIZE (1)),
    midiAlmL2Health         BIT STRING (SIZE (1)),
    midiAlmL5Health         BIT STRING (SIZE (1)),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-MIDIkp-ExtIEs } } OPTIONAL,
    ...
}

```

```

}

GANSS-SAT-Info-Almanac-MIDIkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-NAVkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-NAVkp

GANSS-SAT-Info-Almanac-NAVkp ::= SEQUENCE {
    svID                INTEGER(0..63),
    navAlmE             BIT STRING (SIZE (16)),
    navAlmDeltaI       BIT STRING (SIZE (16)),
    navAlmOMEGADOT     BIT STRING (SIZE (16)),
    navAlmSVHealth     BIT STRING (SIZE (8)),
    navAlmSqrtA        BIT STRING (SIZE (24)),
    navAlmOMEGAo       BIT STRING (SIZE (24)),
    navAlmOmega        BIT STRING (SIZE (24)),
    navAlmMo           BIT STRING (SIZE (24)),
    navAlmaf0          BIT STRING (SIZE (11)),
    navAlmaf1          BIT STRING (SIZE (11)),
    ie-Extensions      ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-NAVkp-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-NAVkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-REDkpList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-REDkp

GANSS-SAT-Info-Almanac-REDkp ::= SEQUENCE {
    svID                INTEGER(0..63),
    redAlmDeltaA       BIT STRING (SIZE (8)),
    redAlmOmega0       BIT STRING (SIZE (7)),
    redAlmPhi0         BIT STRING (SIZE (7)),
    redAlmL1Health     BIT STRING (SIZE (1)),
    redAlmL2Health     BIT STRING (SIZE (1)),
    redAlmL5Health     BIT STRING (SIZE (1)),
    ie-Extensions      ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-REDkp-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-REDkp-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SAT-Info-Almanac-SBAscefcList ::= SEQUENCE (SIZE (1.. maxGANSSSatAlmanac)) OF GANSS-SAT-Info-Almanac-SBAscefc

GANSS-SAT-Info-Almanac-SBAscefc ::= SEQUENCE {

```

```

    sbasAlmDataID          BIT STRING (SIZE(2)),
    svID                   INTEGER(0..63),
    sbasAlmHealth          BIT STRING (SIZE(8)),
    sbasAlmXg              BIT STRING (SIZE(15)),
    sbasAlmYg              BIT STRING (SIZE(15)),
    sbasAlmZg              BIT STRING (SIZE(9)),
    sbasAlmXgdot           BIT STRING (SIZE(3)),
    sbasAlmYgDot           BIT STRING (SIZE(3)),
    sbasAlmZgDot           BIT STRING (SIZE(4)),
    sbasAlmTo              BIT STRING (SIZE(11)),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-SAT-Info-Almanac-SBAsSecef-ExtIEs } } OPTIONAL,
    ...
}

GANSS-SAT-Info-Almanac-SBAsSecef-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ganss-Sat-Info-AddNavList ::= SEQUENCE (SIZE (1..maxGANSSSat)) OF SEQUENCE {
    satId                   INTEGER (0..63),
    svHealth                BIT STRING (SIZE (6)),
    iod                     BIT STRING (SIZE (11)),
    ganssAddClockModels     GANSS-AddClockModels,
    ganssAddOrbitModels     GANSS-AddOrbitModels,
    ie-Extensions          ProtocolExtensionContainer { { Ganss-Sat-Info-AddNavList-ExtIEs } } OPTIONAL,
    ...
}

Ganss-Sat-Info-AddNavList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-Sat-Info-Nav ::= SEQUENCE (SIZE(1..maxGANSSSat)) OF SEQUENCE {
    satId                   INTEGER(0..63),
    svHealth                BIT STRING (SIZE(5)),
    iod                     BIT STRING (SIZE(10)),
    ganssClockModel         GANSS-Clock-Model,
    ganssOrbitModel         GANSS-Orbit-Model,
    ie-Extensions          ProtocolExtensionContainer { { GANSS-Sat-Info-Nav-ExtIEs } } OPTIONAL,
    ...
}

GANSS-Sat-Info-Nav-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-SignalID ::= SEQUENCE {
    ganssSignalID           INTEGER(0..3,...,4..7),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-SignalID-ExtIEs } } OPTIONAL,
    ...
}

```

```

}

GANSS-SignalID-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-StatusHealth ::= ENUMERATED {
    udre-scale-1dot0,
    udre-scale-0dot75,
    udre-scale-0dot5,
    udre-scale-0dot3,
    udre-scale-0dot2,
    udre-scale-0dot1,
    no-data,
    invalid-data
}

GANSS-Time-Model ::= SEQUENCE {
    ganss-time-model-refTime      INTEGER(0..37799),
    ganss-t-a0                    INTEGER(-2147483648..2147483647),
    ganss-t-a1                    INTEGER(-8388608..8388607)                OPTIONAL,
    ganss-t-a2                    INTEGER(-64..63)                        OPTIONAL,
    gnss-to-id                   ENUMERATED{gps,...,galileo,qzss,glonass},
    ganss-wk-number              INTEGER(0..8191)                        OPTIONAL,
    ie-Extensions                ProtocolExtensionContainer { { GANSS-Time-Model-ExtIEs } } OPTIONAL,
    ...
}

GANSS-Time-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-UTRAN-TimeRelationshipUncertainty ::= ENUMERATED {
    gANSS-UTRAN-TRU-50nano,
    gANSS-UTRAN-TRU-500nano,
    gANSS-UTRAN-TRU-1micro,
    gANSS-UTRAN-TRU-10micro,
    gANSS-UTRAN-TRU-1milli,
    gANSS-UTRAN-TRU-10milli,
    gANSS-UTRAN-TRU-100milli,
    gANSS-UTRAN-TRU-unreliable,
    ...
}

GANSS-UTRAN-TRU ::= SEQUENCE {
    gANSS-UTRAN-TimeRelationshipUncertainty  GANSS-UTRAN-TimeRelationshipUncertainty,
    ganssId                                  GANSSID                                OPTIONAL,

```

```

    ie-Extensions          ProtocolExtensionContainer { { GANSS-UTRAN-TRU-ExtIEs } }      OPTIONAL,
    ...
}

GANSS-UTRAN-TRU-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-UTC-Model ::= SEQUENCE {
    a-one-utc              BIT STRING (SIZE (24)),
    a-zero-utc             BIT STRING (SIZE (32)),
    t-ot-utc               BIT STRING (SIZE (8)),
    w-n-t-utc              BIT STRING (SIZE (8)),
    delta-t-ls-utc         BIT STRING (SIZE (8)),
    w-n-lsf-utc             BIT STRING (SIZE (8)),
    dn-utc                  BIT STRING (SIZE (8)),
    delta-t-lsf-utc        BIT STRING (SIZE (8)),
    ie-Extensions          ProtocolExtensionContainer { { GANSS-UTC-Model-ExtIEs } }      OPTIONAL,
    ...
}

GANSS-UTC-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TUTRAN-GANSS-DriftRate ::= ENUMERATED {
    uTRAN-GANSSDrift0,      uTRAN-GANSSDrift1,      uTRAN-GANSSDrift2,
    uTRAN-GANSSDrift5,      uTRAN-GANSSDrift10,     uTRAN-GANSSDrift15,
    uTRAN-GANSSDrift25,     uTRAN-GANSSDrift50,     uTRAN-GANSSDrift-1,
    uTRAN-GANSSDrift-2,     uTRAN-GANSSDrift-5,     uTRAN-GANSSDrift-10,
    uTRAN-GANSSDrift-15,    uTRAN-GANSSDrift-25,    uTRAN-GANSSDrift-50,
    ...
}

GLONASSclockModel ::= SEQUENCE {
    gloTau                  BIT STRING (SIZE (22)),
    gloGamma                 BIT STRING (SIZE (11)),
    gloDeltaTau              BIT STRING (SIZE (5))                                OPTIONAL,
    ie-Extensions          ProtocolExtensionContainer { { GLONASSclockModel-ExtIEs } } OPTIONAL,
    ...
}

GLONASSclockModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NAVclockModel ::= SEQUENCE {
    navToc                   BIT STRING (SIZE (16)),
    navaf2                    BIT STRING (SIZE (8)),

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```

    navaf1                BIT STRING (SIZE (16)),
    navaf0                BIT STRING (SIZE (22)),
    navTgd                BIT STRING (SIZE (8)),
    ie-Extensions        ProtocolExtensionContainer { { NAVclockModel-ExtIEs } } OPTIONAL,
    ...
}

NAVclockModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModel-CNAVKeplerianSet ::= SEQUENCE {
    cnavTop                BIT STRING (SIZE (11)),
    cnavURAindex          BIT STRING (SIZE (5)),
    cnavDeltaA             BIT STRING (SIZE (26)),
    cnavAdot               BIT STRING (SIZE (25)),
    cnavDeltaNo            BIT STRING (SIZE (17)),
    cnavDeltaNoDot        BIT STRING (SIZE (23)),
    cnavMo                 BIT STRING (SIZE (33)),
    cnavE                  BIT STRING (SIZE (33)),
    cnavOmega              BIT STRING (SIZE (33)),
    cnavOMEGA0             BIT STRING (SIZE (33)),
    cnavDeltaOmegaDot     BIT STRING (SIZE (17)),
    cnavIo                 BIT STRING (SIZE (33)),
    cnavIoDot              BIT STRING (SIZE (15)),
    cnavCis                BIT STRING (SIZE (16)),
    cnavCic                BIT STRING (SIZE (16)),
    cnavCrs                BIT STRING (SIZE (24)),
    cnavCrc                BIT STRING (SIZE (24)),
    cnavCus                BIT STRING (SIZE (21)),
    cnavCuc                BIT STRING (SIZE (21)),
    ie-Extensions        ProtocolExtensionContainer { { NavModel-CNAVKeplerianSet-ExtIEs } } OPTIONAL,
    ...
}

NavModel-CNAVKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModel-GLONASSecef ::= SEQUENCE {
    gloEn                  BIT STRING (SIZE (5)),
    gloP1                  BIT STRING (SIZE (2)),
    gloP2                  BIT STRING (SIZE (1)),
    gloM                   BIT STRING (SIZE (2)) OPTIONAL,
    gloX                   BIT STRING (SIZE (27)),
    gloXdodot              BIT STRING (SIZE (24)),
    gloXdodotdot           BIT STRING (SIZE (5)),
    gloY                   BIT STRING (SIZE (27)),
    gloYdotdot             BIT STRING (SIZE (24)),
    gloYdotdotdot          BIT STRING (SIZE (5)),
    gloZ                   BIT STRING (SIZE (27)),
    gloZdotdot             BIT STRING (SIZE (24)),
    gloZdotdotdot          BIT STRING (SIZE (5)),
}

```

```

    ie-Extensions          ProtocolExtensionContainer { { NavModel-GLONASSecef-ExtIEs } } OPTIONAL,
    ...
}

NavModel-GLONASSecef-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModel-NAVKeplerianSet ::= SEQUENCE {
    navURA                BIT STRING (SIZE (4)),
    navFitFlag             BIT STRING (SIZE (1)),
    navToe                 BIT STRING (SIZE (16)),
    navOmega               BIT STRING (SIZE (32)),
    navDeltaN              BIT STRING (SIZE (16)),
    navM0                  BIT STRING (SIZE (32)),
    navOmegaADot           BIT STRING (SIZE (24)),
    navE                   BIT STRING (SIZE (32)),
    navIDot                BIT STRING (SIZE (14)),
    navAPowerHalf          BIT STRING (SIZE (32)),
    navI0                  BIT STRING (SIZE (32)),
    navOmegaA0             BIT STRING (SIZE (32)),
    navCrs                 BIT STRING (SIZE (16)),
    navCis                 BIT STRING (SIZE (16)),
    navCus                 BIT STRING (SIZE (16)),
    navCrc                 BIT STRING (SIZE (16)),
    navCic                 BIT STRING (SIZE (16)),
    navCuc                 BIT STRING (SIZE (16)),
    ie-Extensions          ProtocolExtensionContainer { { NavModel-NAVKeplerianSet-ExtIEs } } OPTIONAL,
    ...
}

NavModel-NAVKeplerianSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModel-SBAsSecef ::= SEQUENCE {
    -- the following IE shall be present if 'SBASclockModel' in 'GANSS-AddClockModels' is not included in 'Ganss-Sat-Info-AddNavList'
    sbasTo                 BIT STRING (SIZE (13))                                OPTIONAL,
    sbasAccuracy           BIT STRING (SIZE (4)),
    sbasXg                 BIT STRING (SIZE (30)),
    sbasYg                 BIT STRING (SIZE (30)),
    sbasZg                 BIT STRING (SIZE (25)),
    sbasXgDot              BIT STRING (SIZE (17)),
    sbasYgDot              BIT STRING (SIZE (17)),
    sbasZgDot              BIT STRING (SIZE (18)),
    sbasXgDotDot           BIT STRING (SIZE (10)),
    sbasYgDotDot           BIT STRING (SIZE (10)),
    sbasZgDotDot           BIT STRING (SIZE (10)),
    ie-Extensions          ProtocolExtensionContainer { { NavModel-SBAsSecef-ExtIEs } } OPTIONAL,
    ...
}

```

```

NavModel-SBAscefc-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SBASclockModel ::= SEQUENCE {
    sbasTo          BIT STRING (SIZE (13)),
    sbasAgfo        BIT STRING (SIZE (12)),
    sbasAgfl        BIT STRING (SIZE (8)),
    ie-Extensions  ProtocolExtensionContainer { { SBASclockModel-ExtIEs } } OPTIONAL,
    ...
}

SBASclockModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTCmodelSet1 ::= SEQUENCE {
    utcA0          BIT STRING (SIZE(16)),
    utcA1          BIT STRING (SIZE(13)),
    utcA2          BIT STRING (SIZE(7)),
    utcDeltaTls   BIT STRING (SIZE(8)),
    utcTot         BIT STRING (SIZE(16)),
    utcWNot        BIT STRING (SIZE(13)),
    utcWNlfsf     BIT STRING (SIZE(8)),
    utcDN          BIT STRING (SIZE(4)),
    utcDeltaTlsf  BIT STRING (SIZE(8)),
    ie-Extensions ProtocolExtensionContainer { { UTCmodelSet1-ExtIEs } } OPTIONAL,
    ...
}

UTCmodelSet1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTCmodelSet2 ::= SEQUENCE {
    nA            BIT STRING (SIZE(11)),
    tauC          BIT STRING (SIZE(32)),
    deltaUT1      DeltaUT1                                OPTIONAL,
    kp            BIT STRING (SIZE(2))                    OPTIONAL,
    ie-Extensions ProtocolExtensionContainer { { UTCmodelSet2-ExtIEs } } OPTIONAL,
    ...
}

UTCmodelSet2-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTCmodelSet3 ::= SEQUENCE {
    utcAlwnt      BIT STRING (SIZE(24)),
    utcA0wnt      BIT STRING (SIZE(32)),
    utcTot        BIT STRING (SIZE(8)),
    utcWNT        BIT STRING (SIZE(8)),

```



```

    utcDeltaTls          BIT STRING (SIZE(8)),
    utcWNlsf            BIT STRING (SIZE(8)),
    utcDN              BIT STRING (SIZE(8)),
    utcDeltaTlsf       BIT STRING (SIZE(8)),
    utcStandardID      BIT STRING (SIZE(3)),
    ie-Extensions      ProtocolExtensionContainer { { UTCmodelSet3-ExtIEs } } OPTIONAL,
    ...
}

UTCmodelSet3-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTRAN-GANSSReferenceTimeDL ::= SEQUENCE {
    utran-GANSSTimingOfCellFrames  INTEGER(0..3999999),
    uC-ID                          UC-ID                                OPTIONAL,
    referenceSfn                    INTEGER(0..4095),
    ie-Extensions                  ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeDL-ExtIEs } } OPTIONAL,
    ...
}

UTRAN-GANSSReferenceTimeDL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTRAN-GANSSReferenceTimeUL ::= SEQUENCE {
    ue-GANSSTimingOfCellFrames  INTEGER(0..3455999999),
    gANSS-TimeId                GANSSID                                OPTIONAL,
    gANSS-TimeUncertainty        INTEGER(0..127)                       OPTIONAL,
    uC-ID                        UC-ID,
    referenceSfn                  INTEGER(0..4095),
    ie-Extensions                ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeUL-ExtIEs } } OPTIONAL,
    ...
}

UTRAN-GANSSReferenceTimeUL-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS Almanac and Satellite Health
--
-- *****

GPS-AlmanacAndSatelliteHealth ::= SEQUENCE {
    wn-a                        BIT STRING (SIZE (8)),
    almanacSatInfoList          AlmanacSatInfoList,
    svGlobalHealth              BIT STRING (SIZE (364)) OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { GPS-AlmanacAndSatelliteHealth-ExtIEs } } OPTIONAL,
}

```

```

    ...
}

GPS-AlmanacAndSatelliteHealth-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

AlmanacSatInfoList ::= SEQUENCE (SIZE (1..maxSatAlmanac)) OF
    AlmanacSatInfo

AlmanacSatInfo ::= SEQUENCE {
    dataID BIT STRING (SIZE (2)),
    satID INTEGER (0..63),
    e BIT STRING (SIZE (16)),
    t-oa BIT STRING (SIZE (8)),
    deltaI BIT STRING (SIZE (16)),
    omegaDot BIT STRING (SIZE (16)),
    satHealth BIT STRING (SIZE (8)),
    a-Sqrt BIT STRING (SIZE (24)),
    omega0 BIT STRING (SIZE (24)),
    m0 BIT STRING (SIZE (24)),
    omega BIT STRING (SIZE (24)),
    af0 BIT STRING (SIZE (11)),
    af1 BIT STRING (SIZE (11)),
    iE-Extensions ProtocolExtensionContainer { { AlmanacSatInfo-ExtIEs } } OPTIONAL,
    ...
}

AlmanacSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS Clock And Ephemeris Parameters
--
-- *****

GPS-ClockAndEphemerisParameters ::= SEQUENCE {
    codeOnL2 BIT STRING (SIZE (2)),
    uraIndex BIT STRING (SIZE (4)),
    satHealth BIT STRING (SIZE (6)),
    iodc BIT STRING (SIZE (10)),
    l2Pflag BIT STRING (SIZE (1)),
    sflRevd SubFrame1Reserved,
    t-GD BIT STRING (SIZE (8)),
    t-oc BIT STRING (SIZE (16)),
    af2 BIT STRING (SIZE (8)),
    af1 BIT STRING (SIZE (16)),
    af0 BIT STRING (SIZE (22)),
    c-rs BIT STRING (SIZE (16)),

```

```

delta-n          BIT STRING (SIZE (16)),
m0              BIT STRING (SIZE (32)),
c-uc           BIT STRING (SIZE (16)),
e              BIT STRING (SIZE (32)),
c-us          BIT STRING (SIZE (16)),
a-Sqrt        BIT STRING (SIZE (32)),
t-oe         BIT STRING (SIZE (16)),
fitInterval    BIT STRING (SIZE (1)),
aodo          BIT STRING (SIZE (5)),
c-ic         BIT STRING (SIZE (16)),
omega0       BIT STRING (SIZE (32)),
c-is        BIT STRING (SIZE (16)),
i0         BIT STRING (SIZE (32)),
c-rc      BIT STRING (SIZE (16)),
omega     BIT STRING (SIZE (32)),
omegaDot  BIT STRING (SIZE (24)),
iDot     BIT STRING (SIZE (14)),
iE-Extensions ProtocolExtensionContainer { { GPS-ClockAndEphemerisParameters-ExtIEs } } OPTIONAL,
...
}

```

```

GPS-ClockAndEphemerisParameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
...
}

```

```

SubFrame1Reserved ::= SEQUENCE {
reserved1 BIT STRING (SIZE (23)),
reserved2 BIT STRING (SIZE (24)),
reserved3 BIT STRING (SIZE (24)),
reserved4 BIT STRING (SIZE (16))
}

```

```

-- *****
--
-- GPS Ionospheric Model
--
-- *****

```

```

GPS-Ionospheric-Model ::= SEQUENCE {
alfa0 BIT STRING (SIZE (8)),
alfa1 BIT STRING (SIZE (8)),
alfa2 BIT STRING (SIZE (8)),
alfa3 BIT STRING (SIZE (8)),
beta0 BIT STRING (SIZE (8)),
beta1 BIT STRING (SIZE (8)),
beta2 BIT STRING (SIZE (8)),
beta3 BIT STRING (SIZE (8)),
iE-Extensions ProtocolExtensionContainer { { GPS-Ionospheric-Model-ExtIEs } } OPTIONAL,
...
}

```

```

GPS-Ionospheric-Model-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS Measured Results
--
-- *****

MeasuredResultsList ::= SEQUENCE (SIZE (1..maxNrOfSets)) OF
    GPS-MeasuredResults

GPS-MeasuredResults ::= SEQUENCE {
    gps-TOW-1msec INTEGER (0..604799999),
    gps-MeasurementParamList GPS-MeasurementParamList,
    iE-Extensions ProtocolExtensionContainer { { GPS-MeasuredResults-ExtIEs } } OPTIONAL,
    ...
}

GPS-MeasuredResults-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTimeResult CRITICALITY ignore EXTENSION UTRAN-GPSReferenceTimeResult PRESENCE optional} |
    {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore EXTENSION GPSReferenceTimeUncertainty PRESENCE optional},
    ...
}

GPS-MeasurementParamList ::= SEQUENCE (SIZE (1..maxSat)) OF
    GPS-MeasurementParam

GPS-MeasurementParam ::= SEQUENCE {
    satelliteID INTEGER (0..63),
    c-N0 INTEGER (0..63),
    doppler INTEGER (-32768..32768),
    wholeGPS-Chips INTEGER (0..1022),
    fractionalGPS-Chips INTEGER (0..1023),
    multipathIndicator MultipathIndicator,
    pseudorangeRMS-Error INTEGER (0..63),
    iE-Extensions ProtocolExtensionContainer { { GPS-MeasurementParam-ExtIEs } } OPTIONAL,
    ...
}

MultipathIndicator ::= ENUMERATED {
    nm,
    low,
    medium,
    high }

GPS-MeasurementParam-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

-- *****
--
-- GPS Navigation Model
--
-- *****

GPS-NavigationModel ::=      SEQUENCE (SIZE (1..maxSat)) OF
                              NavigationModelSatInfo

NavigationModelSatInfo ::=  SEQUENCE {
  satID                      INTEGER (0..63),
  satelliteStatus            SatelliteStatus,
  gps-clockAndEphemerisParms GPS-ClockAndEphemerisParameters OPTIONAL,
  -- This IE is not present if satelliteStatus is es-SN
  iE-Extensions             ProtocolExtensionContainer { { NavigationModelSatInfo-ExtIEs } } OPTIONAL,
  ...
}

NavigationModelSatInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

SatelliteStatus ::=          ENUMERATED {
                              ns-NN,
                              es-SN,
                              es-NN,
                              rev2,
                              rev }

-- *****
--
-- GPS Real Time Integrity
--
-- *****

GPS-RealTimeIntegrity ::= CHOICE {
  badSatellites             BadSatList,
  noBadSatellites          NoBadSatellites,
  ...
}

BadSatList ::=               SEQUENCE (SIZE (1..maxSat)) OF
                              INTEGER (0..63)

NoBadSatellites ::= NULL

-- *****
--
-- GPS Reference Location

```

```

--
-- *****
GPS-ReferenceLocation ::=          SEQUENCE {
    ue-PositionEstimate            UE-PositionEstimate,
    iE-Extensions                  ProtocolExtensionContainer { { GPS-ReferenceLocation-ExtIEs } } OPTIONAL,
    ...
}

GPS-ReferenceLocation-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS Reference Time
--
-- *****

GPS-ReferenceTime ::=          SEQUENCE {
    gps-Week                       INTEGER (0..1023),
    gps-TOW-1msec                  INTEGER (0..604799999),
    gps-TOW-AssistList             GPS-TOW-AssistList                               OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { GPS-ReferenceTime-ExtIEs } } OPTIONAL,
    ...
}

GPS-ReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-UTRAN-GPSReferenceTime  CRITICALITY ignore  EXTENSION  UTRAN-GPSReferenceTime  PRESENCE optional}|
    {ID id-GPS-UTRAN-TRU           CRITICALITY ignore  EXTENSION  GPS-UTRAN-TRU           PRESENCE optional}|
    {ID id-UTRAN-GPS-DriftRate     CRITICALITY ignore  EXTENSION  UTRAN-GPS-DriftRate     PRESENCE optional}|
    {ID id-GPSReferenceTimeUncertainty CRITICALITY ignore  EXTENSION  GPSReferenceTimeUncertainty PRESENCE optional},
    ...
}

GPS-TOW-AssistList ::=          SEQUENCE (SIZE (1..maxSat)) OF
    GPS-TOW-Assist

GPS-TOW-Assist ::=             SEQUENCE {
    satID                          INTEGER (0..63),
    tlm-Message                     BIT STRING (SIZE (14)),
    antiSpoof                       BOOLEAN,
    alert                           BOOLEAN,
    tlm-Reserved                    BIT STRING (SIZE (2)),
    iE-Extensions                  ProtocolExtensionContainer { { GPS-TOW-Assist-ExtIEs } } OPTIONAL,
    ...
}

GPS-TOW-Assist-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

UTRAN-GPS-DriftRate ::=
    ENUMERATED {
        utran-GPSDrift0, utran-GPSDrift1, utran-GPSDrift2,
        utran-GPSDrift5, utran-GPSDrift10, utran-GPSDrift15,
        utran-GPSDrift25, utran-GPSDrift50, utran-GPSDrift-1,
        utran-GPSDrift-2, utran-GPSDrift-5, utran-GPSDrift-10,
        utran-GPSDrift-15, utran-GPSDrift-25, utran-GPSDrift-50,
        ...}

-- *****
--
-- GPS Reference Time Uncertainty
--
-- *****

GPSReferenceTimeUncertainty ::= SEQUENCE {
    gps-RefTimeUNC      INTEGER(0..127),
    iE-Extensions      ProtocolExtensionContainer { { GPSReferenceTimeUncertainty-ExtIEs } } OPTIONAL,
    ...
}

GPSReferenceTimeUncertainty-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS Transmission TOW
--
-- *****

GPS-Transmission-TOW ::= INTEGER (0..604799)

-- *****
--
-- GPS UTC Model
--
-- *****

GPS-UTC-Model ::=
    SEQUENCE {
        a1          BIT STRING (SIZE (24)),
        a0          BIT STRING (SIZE (32)),
        t-ot        BIT STRING (SIZE (8)),
        delta-t-LS  BIT STRING (SIZE (8)),
        wn-t        BIT STRING (SIZE (8)),
        wn-lsf      BIT STRING (SIZE (8)),
        dn          BIT STRING (SIZE (8)),
        delta-t-LSF BIT STRING (SIZE (8)),
        iE-Extensions ProtocolExtensionContainer { { GPS-UTCmodel-ExtIEs } } OPTIONAL,
        ...
}

```

```

GPS-UTCmodel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- GPS UTRAN Time Relationship Uncertainty
-- nsec=nanosecond, usec=microsecond, msec=millisecond, sec=second
--
-- *****

GPS-UTRAN-TRU ::= ENUMERATED {
    nsec-50,
    nsec-500,
    usec-1,
    usec-10,
    msec-1,
    msec-10,
    msec-100,
    unreliable,
    ...}

-- *****
--
-- Additional GPS Assistance Data Required
--
-- *****

AdditionalGPSAssistDataRequired ::= SEQUENCE {
    almanacRequest          BOOLEAN,
    utcModelRequest        BOOLEAN,
    ionosphericModelRequest BOOLEAN,
    navigationModelRequest BOOLEAN,
    dgpsCorrectionsRequest BOOLEAN,
    referenceLocationRequest BOOLEAN,
    referenceTimeRequest   BOOLEAN,
    aquisitionAssistanceRequest BOOLEAN,
    realTimeIntegrityRequest BOOLEAN,
    navModelAddDataRequest NavModelAdditionalData OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { AdditionalGPSAssistDataRequired-ExtIEs } } OPTIONAL,
    ...
}

AdditionalGPSAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****

```



```

--
-- Additional GANSS Assistance Data Required
--
-- *****
AdditionalGanssAssistDataRequired ::= SEQUENCE {
    ganssReferenceTime          BOOLEAN,
    ganssreferenceLocation      BOOLEAN,
    ganssIonosphericModel       BOOLEAN,
    ganssRequestedGenericAssistanceDataList GanssRequestedGenericAssistanceDataList,
    iE-Extensions               ProtocolExtensionContainer { { AdditionalGanssAssistDataRequired-ExtIEs } } OPTIONAL,
    ...
}

AdditionalGanssAssistDataRequired-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-ganssReq-AddIonosphericModel      CRITICALITY ignore EXTENSION  GANSSReq-AddIonosphericModel  PRESENCE optional}|
    {ID id-ganssReq-EarthOrientPara         CRITICALITY ignore EXTENSION  GANSSReq-EarthOrientPara    PRESENCE optional},
    ...
}

GANSSReq-AddIonosphericModel ::= SEQUENCE {
    ganss-add-iono-mode-req      BIT STRING (SIZE(2)),
    iE-Extensions                ProtocolExtensionContainer { { GANSSReq-AddIonosphericModel-ExtIEs } } OPTIONAL,
    ...
}

GANSSReq-AddIonosphericModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSSReq-EarthOrientPara ::= BOOLEAN

GanssRequestedGenericAssistanceDataList ::= SEQUENCE (SIZE (1..maxGANSS)) OF
    GanssReqGenericData

GanssReqGenericData ::= SEQUENCE {
    ganssId                      GANSSID                                OPTIONAL,
    ganssRealTimeIntegrity       BOOLEAN                                OPTIONAL,
    ganssDifferentialCorrection  DGANSS-Sig-Id-Req                       OPTIONAL,
    ganssAlmanac                 BOOLEAN                                OPTIONAL,
    ganssNavigationModel         BOOLEAN                                OPTIONAL,
    ganssTimeModelGnssGnss       BIT STRING (SIZE (9))                OPTIONAL,
    ganssReferenceMeasurementInfo BOOLEAN                                OPTIONAL,
    ganssDataBits                GanssDataBits                          OPTIONAL,
    ganssUTCModel                BOOLEAN                                OPTIONAL,
    ganssNavigationModelAdditionalData NavigationModelGANSS          OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { GanssReqGenericData-ExtIEs } } OPTIONAL,
    ...
}

GanssReqGenericData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-ganssAddNavigationModel-req      CRITICALITY ignore EXTENSION  GANSS-AddNavigationModel-Req  PRESENCE optional}|
    {ID id-ganssAddUTCModel-req            CRITICALITY ignore EXTENSION  GANSS-AddUTCModel-Req        PRESENCE optional}|
    {ID id-ganssAuxInfo-req                CRITICALITY ignore EXTENSION  GANSS-AuxInfo-req            PRESENCE optional}|
    {ID id-GANSS-SBAS-ID                   CRITICALITY ignore EXTENSION  GANSS-SBAS-ID                PRESENCE optional}|
    {ID id-GANSS-AddADchoices              CRITICALITY ignore EXTENSION  GANSS-AddADchoices           PRESENCE optional},
    ...
}

```

```

}

GANSS-AddNavigationModel-Req ::= BOOLEAN

GANSS-AddUTCModel-Req ::= BOOLEAN

GANSS-AuxInfo-req ::= BOOLEAN

GANSS-AddADchoices ::= SEQUENCE {
    orbitModelID          INTEGER (0..7)                OPTIONAL,
    clockModelID          INTEGER (0..7)                OPTIONAL,
    utcModelID            INTEGER (0..7)                OPTIONAL,
    almanacModelID       INTEGER (0..7)                OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { GANSS-AddADchoices-ExtIEs } } OPTIONAL,
    ...}

GANSS-AddADchoices-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DGANSS-Sig-Id-Req ::= BIT STRING (SIZE (8))

GanssDataBits ::= SEQUENCE {
    ganssTod              INTEGER (0..86399),
    dataBitAssistancelist ReqDataBitAssistanceList,
    iE-Extensions        ProtocolExtensionContainer { { GanssDataBits-ExtIEs } } OPTIONAL,
    ...
}

GanssDataBits-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

ReqDataBitAssistanceList ::= SEQUENCE {
    ganssSignalID        BIT STRING (SIZE (8)),
    ganssDataBitInterval INTEGER(0..15),
    ganssSatelliteInfo   SEQUENCE (SIZE (1..maxGANSSSat)) OF INTEGER(0..63)    OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { ReqDataBitAssistanceList-ExtIEs } } OPTIONAL,
    ...
}

ReqDataBitAssistanceList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Information Exchange ID
--
-- *****

```

```
InformationExchangeID ::= INTEGER (0..1048575)

-- *****
--
-- Information Report Characteristics
--
-- *****

InformationReportCharacteristics ::= SEQUENCE {
    type                InformationReportCharacteristicsType,
    periodicity         InformationReportPeriodicity    OPTIONAL,
    -- present if type indicates periodic
    ...
}

InformationReportCharacteristicsType ::= ENUMERATED {
    onDemand,
    periodic,
    onModification,
    ...
}

InformationReportPeriodicity ::= CHOICE {
    min                INTEGER (1..60, ...),
    -- Unit min, Step 1min
    hour               INTEGER (1..24, ...),
    -- Unit hour, Step 1hour
    ...
}

-- *****
--
-- Information Type
--
-- *****

InformationType ::= CHOICE {
    implicitInformation    MethodType,
    explicitInformation    ExplicitInformationList,
    ...
}

ExplicitInformationList ::= SEQUENCE (SIZE (1..maxNrOfExpInfo)) OF ExplicitInformation

ExplicitInformation ::= CHOICE {
    almanacAndSatelliteHealth    AlmanacAndSatelliteHealth,
    utcModel                     UtcModel,
    ionosphericModel             IonosphericModel,
    navigationModel              NavigationModel,
    dgpsCorrections              DgpsCorrections,
```

```

referenceTime           ReferenceTime,
acquisitionAssistance  AcquisitionAssistance,
realTimeIntegrity      RealTimeIntegrity,
almanacAndSatelliteHealthSIB  AlmanacAndSatelliteHealthSIB-InfoType,
... ,
referenceLocation      ReferenceLocation,
ganss-Common-DataReq  GANSSCommonDataReq,
ganss-Generic-DataList GANSSGenericDataList
}

DganssCorrectionsReq ::= SEQUENCE {
  transmissionGanssTimeIndicator  TransmissionGanssTimeIndicator          OPTIONAL,
  dganss-sig-id-req               DGANSS-Sig-Id-Req,
  iE-Extensions                   ProtocolExtensionContainer { { DganssCorrectionsReq-ExtIEs } } OPTIONAL,
  ...
}

DganssCorrectionsReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

Ganss-almanacAndSatelliteHealthReq ::= SEQUENCE {
  transmissionGanssTimeIndicator  TransmissionGanssTimeIndicator  OPTIONAL,
  iE-Extensions                   ProtocolExtensionContainer { { Ganss-almanacAndSatelliteHealthReq-ExtIEs } } OPTIONAL,
  ...
}

Ganss-almanacAndSatelliteHealthReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

GANSSCommonDataReq ::= SEQUENCE{
  ganss-ReferenceTime             ENUMERATED {requested, not-requested}  OPTIONAL,
  ganss-IonosphericModel          ENUMERATED {requested, not-requested}  OPTIONAL,
  ganss-ReferenceLocation         ENUMERATED {requested, not-requested}  OPTIONAL,
  ie-Extensions                   ProtocolExtensionContainer { { GANSSCommonDataReq-ExtIEs } }          OPTIONAL,
  ...
}

GANSSCommonDataReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  {ID id-GANSS-AddIonoModelReq    CRITICALITY ignore  EXTENSION  GANSS-AddIonoModelReq    PRESENCE optional} |
  {ID id-GANSS-EarthOrientParaReq CRITICALITY ignore  EXTENSION  GANSS-EarthOrientParaReq    PRESENCE optional} ,
  ...
}

GANSS-AddIonoModelReq ::= SEQUENCE {
  dataID                          BIT STRING (SIZE(2)),
  iE-Extensions                   ProtocolExtensionContainer { { GANSS-AddIonoModelReq-ExtIEs } }  OPTIONAL,
  ...
}

GANSS-AddIonoModelReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
GANSS-EarthOrientParaReq ::= SEQUENCE {
    eopReq      ENUMERATED {requested, not-requested},
    iE-Extensions ProtocolExtensionContainer { { GANSS-EarthOrientParaReq-ExtIEs } } OPTIONAL,
    ...
}

GANSS-EarthOrientParaReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSSGenericDataList ::= SEQUENCE (SIZE(1..maxGANSS)) OF GANSSGenericDataReq

GANSSGenericDataReq ::= SEQUENCE {
    ganssID                GANSSID                OPTIONAL,
    ganss-realTimeIntegrity Ganss-realTimeIntegrityReq OPTIONAL,
    ganss-dataBitAssistance GanssDataBits          OPTIONAL,
    dganssCorrections      DganssCorrectionsReq    OPTIONAL,
    ganss-almanacAndSatelliteHealth Ganss-almanacAndSatelliteHealthReq OPTIONAL,
    ganss-referenceMeasurementInfo Ganss-referenceMeasurementInfoReq OPTIONAL,
    ganss-utcModel          Ganss-utcModelReq       OPTIONAL,
    ganss-TimeModel-Gnss-Gnss Ganss-TimeModel-Gnss-Gnss OPTIONAL,
    navigationModel        NavigationModelGANSS     OPTIONAL,
    ...,
    ganss-AddNavModelsReq   AddNavigationModelsGANSS OPTIONAL,
    ganss-AddUtcModelsReq   GANSS-AddUtcModelsReq   OPTIONAL,
    ganss-AuxInfoReq        GANSS-AuxInfoReq        OPTIONAL,
    -- the following IE shall be present if GANSSID is '0' (SBAS)
    ganss-SBAS-ID           GANSS-SBAS-ID           OPTIONAL
}

AddNavigationModelsGANSS ::= SEQUENCE {
    ganssWeek      INTEGER(0..4095),
    ganssTOE       INTEGER(0..167),
    t-toe-limit    INTEGER(0..10),
    addSatRelatedDataListGANSS AddSatelliteRelatedDataListGANSS,
    iE-Extensions ProtocolExtensionContainer { { AddNavigationModelsGANSS-ExtIEs } } OPTIONAL,
    ...
}

AddNavigationModelsGANSS-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

AddSatelliteRelatedDataListGANSS ::= SEQUENCE (SIZE (0..maxGANSSSat)) OF AddSatelliteRelatedDataGANSS

AddSatelliteRelatedDataGANSS ::= SEQUENCE {
    satID          INTEGER (0..63),
    iod            BIT STRING (SIZE(10)),
    iE-Extensions ProtocolExtensionContainer { { AddSatelliteRelatedDataGANSS-ExtIEs } } OPTIONAL,
    ...
}

```

```

}
AddSatelliteRelatedDataGANSS-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
GANSS-AddUtcModelsReq ::= SEQUENCE {
  transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { GANSS-AddUtcModelsReq-ExtIEs} } OPTIONAL,
  ...
}
GANSS-AddUtcModelsReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
GANSS-AuxInfoReq ::= SEQUENCE {
  transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { GANSS-AuxInfoReq-ExtIEs} } OPTIONAL,
  ...
}
GANSS-AuxInfoReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

GANSS-SBAS-ID ::= ENUMERATED {
  waas,
  egnos,
  msas,
  gagan,
  ...
}

Ganss-utcModelReq ::= SEQUENCE {
  transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { Ganss-utcModelReq-ExtIEs} } OPTIONAL,
  ...
}
Ganss-utcModelReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
Ganss-realTimeIntegrityReq ::= SEQUENCE {
  transmissionGanssTimeIndicator TransmissionGanssTimeIndicator OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { Ganss-realTimeIntegrityReq-ExtIEs} } OPTIONAL,
  ...
}
Ganss-realTimeIntegrityReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
}

Ganss-referenceMeasurementInfoReq ::= SEQUENCE {
    transmissionGanssTimeIndicator  TransmissionGanssTimeIndicator  OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { { Ganss-referenceMeasurementInfoReq-ExtIEs } } OPTIONAL,
    ...
}

Ganss-referenceMeasurementInfoReq-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ganss-TimeModel-Gnss-Gnss ::= SEQUENCE{
    ganssTimeModelGnssGnssExt      BIT STRING (SIZE(9)),
    transmissionGanssTimeIndicator  TransmissionGanssTimeIndicator  OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { Ganss-TimeModel-Gnss-Gnss-ExtIEs } } OPTIONAL,
    ...
}

Ganss-TimeModel-Gnss-Gnss-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TransmissionGanssTimeIndicator ::= ENUMERATED {
    requested,
    not-Requested
}

AlmanacAndSatelliteHealth ::= NULL

UtcModel ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
    iE-Extensions                  ProtocolExtensionContainer { { UtcModel-ExtIEs } } OPTIONAL,
    ...
}

UtcModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

IonosphericModel ::= SEQUENCE {
    transmissionTOWIndicator        TransmissionTOWIndicator,
    iE-Extensions                  ProtocolExtensionContainer { { IonosphericModel-ExtIEs } } OPTIONAL,
    ...
}

IonosphericModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

NavigationModel ::= SEQUENCE {
    transmissionTOWIndicator      TransmissionTOWIndicator,
    navModelAdditionalData       NavModelAdditionalData OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { NavigationModel-ExtIEs } } OPTIONAL,
    ...
}

NavigationModel-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavModelAdditionalData ::= SEQUENCE {
    gps-Week                     INTEGER (0..1023),
    gps-TOE                     INTEGER (0..167),
    t-TOE-limit                 INTEGER (0..10),
    satRelatedDataList          SatelliteRelatedDataList,
    iE-Extensions                ProtocolExtensionContainer { { NavModelAdditionalData-ExtIEs } } OPTIONAL,
    ...
}

NavModelAdditionalData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SatelliteRelatedDataList ::= SEQUENCE (SIZE (0..maxSat)) OF SatelliteRelatedData

SatelliteRelatedData ::= SEQUENCE {
    satID                       INTEGER (0..63),
    iode                        INTEGER (0..255),
    iE-Extensions                ProtocolExtensionContainer { { SatelliteRelatedData-ExtIEs } } OPTIONAL,
    ...
}

SatelliteRelatedData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

NavigationModelGANSS ::= SEQUENCE {
    ganssWeek                   INTEGER (0..4095),
    ganssTOE                    INTEGER (0..167),
    t-toe-limit                 INTEGER (0..10),
    satRelatedDataListGANSS     SatelliteRelatedDataListGANSS,
    iE-Extensions                ProtocolExtensionContainer { { NavigationModelGANSS-ExtIEs } } OPTIONAL,
    ...
}

NavigationModelGANSS-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SatelliteRelatedDataListGANSS ::= SEQUENCE (SIZE (0..maxGANSSSat)) OF SatelliteRelatedDataGANSS

SatelliteRelatedDataGANSS ::= SEQUENCE {

```



```

    satID                INTEGER (0..63),
    iod                  BIT STRING (SIZE(10)),
    iE-Extensions        ProtocolExtensionContainer { { SatelliteRelatedDataGANSS-ExtIEs } } OPTIONAL,
    ...
}

SatelliteRelatedDataGANSS-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DgpsCorrections ::= NULL

ReferenceTime ::= NULL

AcquisitionAssistance ::= NULL

RealTimeIntegrity ::= NULL

AlmanacAndSatelliteHealthSIB-InfoType ::= SEQUENCE {
    transmissionTOWIndicator      TransmissionTOWIndicator,
    iE-Extensions                ProtocolExtensionContainer { { AlmanacAndSatelliteHealthSIB-InfoType-ExtIEs } } OPTIONAL,
    ...
}

AlmanacAndSatelliteHealthSIB-InfoType-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

ReferenceLocation ::= NULL

TransmissionTOWIndicator ::= ENUMERATED {
    requested,
    not-Requested
}

-- *****
--
-- Message Structure
--
-- *****

MessageStructure ::= SEQUENCE (SIZE (1..maxNrOfLevels)) OF
SEQUENCE {
    iE-ID                ProtocolIE-ID,
    repetitionNumber     MessageStructureRepetition              OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { {MessageStructure-ExtIEs} }  OPTIONAL,
    ...
}

MessageStructureRepetition ::= INTEGER (1..256)

MessageStructure-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

-- *****
--
-- Measurement Instructions Used
--
-- *****

MeasInstructionsUsed ::= SEQUENCE {
    measurementValidity      MeasurementValidity,
    iE-Extensions            ProtocolExtensionContainer { { MeasInstructionsUsed-ExtIEs } } OPTIONAL,
    ...
}

MeasInstructionsUsed-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Measurement Validity
--
-- *****

MeasurementValidity ::= SEQUENCE {
    ue-State                 ENUMERATED { cell-DCH, all-States-Except-Cell-DCH, all-States, ... },
    iE-Extensions            ProtocolExtensionContainer { { MeasurementValidity-ExtIEs } } OPTIONAL,
    ...
}

MeasurementValidity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Method Type
--
-- *****

MethodType ::= ENUMERATED {
    ue-assisted,
    ue-based
}

-- *****
--
-- OTDOA Measurement Group
--
-- *****

OTDOA-MeasurementGroup ::= SEQUENCE {
    otdoa-ReferenceCellInfo      OTDOA-ReferenceCellInfo,
    otdoa-NeighbourCellInfoList  OTDOA-NeighbourCellInfoList,

```

```

    otdoa-MeasuredResultsSets      OTDOA-MeasuredResultsSets,
    iE-Extensions                  ProtocolExtensionContainer { { OTDOA-MeasurementGroup-ExtIEs } }    OPTIONAL,
    ...
}

OTDOA-MeasurementGroup-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOA-ReferenceCellInfo ::=          SEQUENCE {
    uC-ID                            UC-ID,
    uTRANAccessPointPositionAltitude UTRANAccessPointPositionAltitude,
    tUTRANGPSMeasurementValueInfo    TUTRANGPSMeasurementValueInfo    OPTIONAL,
    iE-Extensions                    ProtocolExtensionContainer { { OTDOA-ReferenceCellInfo-ExtIEs } }    OPTIONAL,
    ...
}

OTDOA-ReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-TUTRANGANSSMeasurementValueInfo    CRITICALITY ignore    EXTENSION TUTRANGANSSMeasurementValueInfo    PRESENCE optional } |
    { ID id-additionalMeasurementInforLCR      CRITICALITY ignore    EXTENSION AdditionalMeasurementInforLCR    PRESENCE optional },
    -- 1.28Mcps TDD only
    ...
}

OTDOA-ReferenceCellInfoSAS-centric ::=          SEQUENCE {
    uC-ID                            UC-ID,
    iE-Extensions                    ProtocolExtensionContainer { { OTDOA-ReferenceCellInfoSAS-centric-ExtIEs } }    OPTIONAL,
    ...
}

OTDOA-ReferenceCellInfoSAS-centric-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOA-NeighbourCellInfoList ::=          SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
    OTDOA-NeighbourCellInfo

OTDOA-NeighbourCellInfo ::=          SEQUENCE {
    uC-ID                            UC-ID,
    uTRANAccessPointPositionAltitude UTRANAccessPointPositionAltitude,
    relativeTimingDifferenceInfo      RelativeTimingDifferenceInfo,
    iE-Extensions                    ProtocolExtensionContainer { { OTDOA-NeighbourCellInfo-ExtIEs } }    OPTIONAL,
    ...
}

OTDOA-NeighbourCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOA-MeasuredResultsSets ::=          SEQUENCE (SIZE (1..maxNrOfMeasurements)) OF
    OTDOA-MeasuredResultsInfoList

OTDOA-MeasuredResultsInfoList ::=      SEQUENCE (SIZE (1..maxNrOfMeasNCell)) OF
    OTDOA-MeasuredResultsInfo

```

```

OTDOA-MeasuredResultsInfo ::= SEQUENCE {
    uC-ID UC-ID,
    ue-SFNSFNTimeDifferenceType2Info UE-SFNSFNTimeDifferenceType2Info,
    iE-Extensions ProtocolExtensionContainer { { OTDOA-MeasuredResultsInfo-ExtIEs } } OPTIONAL,
    ...
}

OTDOA-MeasuredResultsInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-OTDOA-AddMeasuredResultsInfo CRITICALITY ignore EXTENSION OTDOA-AddMeasuredResultsInfo PRESENCE optional},
    ...
}

OTDOA-AddMeasuredResultsInfo ::= SEQUENCE {
    primaryCPICH-Info PrimaryScramblingCode,
    iE-Extensions ProtocolExtensionContainer { { OTDOA-AddMeasuredResultsInfo-ExtIEs } } OPTIONAL,
    ...
}

OTDOA-AddMeasuredResultsInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-SFNSFNTimeDifferenceType2Info ::= SEQUENCE {
    ue-SFNSFNTimeDifferenceType2 INTEGER (0..40961),
    ue-PositioningMeasQuality UE-PositioningMeasQuality,
    measurementDelay INTEGER (0..65535),
    iE-Extensions ProtocolExtensionContainer { { UE-SFNSFNTimeDifferenceInfo-ExtIEs } } OPTIONAL,
    ...
}

UE-SFNSFNTimeDifferenceInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UC-ID ::= SEQUENCE {
    rNC-ID INTEGER (0..4095),
    c-ID INTEGER (0..65535),
    iE-Extensions ProtocolExtensionContainer { { UC-ID-ExtIEs } } OPTIONAL,
    ...
}

UC-ID-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-Extended-RNC-ID CRITICALITY reject EXTENSION Extended-RNC-ID PRESENCE optional},
    ...
}

Extended-RNC-ID ::= INTEGER (4096..65535)

RelativeTimingDifferenceInfo ::= CHOICE {
    sFNSFNMeasurementValueInfo SFNSFNMeasurementValueInfo,
    tUTRANGPSMeasurementValueInfo TUTRANGPSMeasurementValueInfo,
    ...
}

```

```

    tUTRANGANSSMeasurementValueInfo    TUTRANGANSSMeasurementValueInfo
}
SFNSFNMeasurementValueInfo ::= SEQUENCE {
    sFNSFNValue                SFNSFNValue,
    sFNSFNQuality              SFNSFNQuality,                                OPTIONAL,
    sFNSFNDriftRate           SFNSFNDriftRate,
    sFNSFNDriftRateQuality    SFNSFNDriftRateQuality,                    OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { SFNSFNMeasurementValueInfo-ExtIEs } } OPTIONAL,
    ...
}
SFNSFNMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
SFNSFNValue ::=
    INTEGER (0..614399)
SFNSFNQuality ::=
    INTEGER (0..255)
-- Unit chip, Step 1/16 chip, Range 0.. 255/16 chip
SFNSFNDriftRate ::=
    INTEGER (-100..100)
-- Unit chip/s, Step 1/256 chip/s, Range -100/256..+100/256 chip/s
SFNSFNDriftRateQuality ::=
    INTEGER (0..100)
-- Unit chip/s, Step 1/256 chip/s, Range 0..100/256 chip/s
TUTRANGPSMeasurementValueInfo ::= SEQUENCE {
    sFN                        SFN,
    tUTRANGPS                 TUTRANGPS,
    tUTRANGPSQuality          TUTRANGPSQuality,                                OPTIONAL,
    tUTRANGPSDriftRate       TUTRANGPSDriftRate,
    tUTRANGPSDriftRateQuality TUTRANGPSDriftRateQuality,                    OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { TUTRANGPSMeasurementValueInfo-ExtIEs } } OPTIONAL,
    ...
}
TUTRANGPSMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
SFN ::=
    INTEGER (0..4095)
TUTRANGPS ::=
    SEQUENCE {
        ms-part                INTEGER (0..16383),
        ls-part                INTEGER (0..4294967295)
    }
TUTRANGPSQuality ::=
    INTEGER (0..255)
-- Unit chip, Step 1/16 chip, Range 0.. 255/16 chip
TUTRANGPSDriftRate ::=
    INTEGER (-50..50)
-- Unit chip/s, Step 1/256 chip/s, Range -50/256..+50/256 chip/s

```

```

TUTRANGPSDriftRateQuality ::=          INTEGER (0..50)
-- Unit chip/s, Step 1/256 chip/s, Range 0..50/256 chip/s

TUTRANGANSSMeasurementValueInfo ::= SEQUENCE {
    ganssID                GANSSID                OPTIONAL,
    sFN                    SFN,
    tUTRANGANSS            TUTRANGANSS,
    tUTRANGANSSQuality     INTEGER(0..255)        OPTIONAL,
    tUTRANGANSSDriftRate   INTEGER(-50..50),
    tUTRANGANSSDriftRateQuality   INTEGER(0..50)    OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { { TUTRANGANSSMeasurementValueInfo-ExtIEs } } OPTIONAL,
    ...
}

TUTRANGANSSMeasurementValueInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TUTRANGANSS ::=
    ms-part                SEQUENCE {
        INTEGER (0..16383),
    ls-part                INTEGER (0..4294967295)
}

AdditionalMeasurementInforLCR ::= SEQUENCE {
    timingAdvanceLCR-R7    TimingAdvanceLCR-R7,
    rxTimingDeviationLCR  RxTimingDeviationLCR,
    angleOfArrivalLCR     AngleOfArrivalLCR        OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { { AdditionalMeasurementInforLCR-ExtIEs } } OPTIONAL,
    ...
}

AdditionalMeasurementInforLCR-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TimingAdvanceLCR-R7 ::=          INTEGER (0..8191)

-- *****
--
-- Periodic Position Calculation Info
--
-- *****

PeriodicPosCalcInfo ::= SEQUENCE {
    referenceNumber        INTEGER (0..32767, ...),
    amountOutstandingRequests   INTEGER (1..8639999, ...),
    reportingInterval      INTEGER (1..8639999, ...),
    iE-Extensions         ProtocolExtensionContainer { { PeriodicPosCalcInfo-ExtIEs } } OPTIONAL,
    ...
}

PeriodicPosCalcInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

-- *****
--
-- Periodic Location Info
--
-- *****

PeriodicLocationInfo ::= SEQUENCE {
    reportingAmount          INTEGER (1..8639999, ...),
    reportingInterval        INTEGER (1..8639999, ...),
    iE-Extensions            ProtocolExtensionContainer { { PeriodicLocationInfo-ExtIEs } } OPTIONAL,
    ...
}

PeriodicLocationInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Periodic Termination Cause
--
-- *****

PeriodicTerminationCause ::= ENUMERATED {
    rrc-state-transition,
    cancelled-by-srnc,
    cancelled-by-sas,
    undefined,
    ...
}

-- *****
--
-- Positioning Method
--
-- *****

PositioningMethod ::= SEQUENCE {
    additionalMethodType     AdditionalMethodType,
    selectedPositionMethod    SelectedPositionMethod,
    iE-Extensions            ProtocolExtensionContainer { { PositioningMethod-ExtIEs } } OPTIONAL,
    ...
}

PositioningMethod-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
-- The following IE shall be present if the Selected Position Method IE value is set to "GNSS" or "OTDOA or GNSS"
    { ID id-GNSS-PositioningMethod CRITICALITY ignore EXTENSION GNSS-PositioningMethod PRESENCE conditional },
    ...
}

```

```

GNSS-PositioningMethod ::= BIT STRING (SIZE(9))

SelectedPositionMethod ::= ENUMERATED {
    oTDOA,
    gps,
    oTDOA-or-GPS,
    cell-id,
    uTDOA,
    ...,
    gNSS,
    oTDOA-or-GNSS
}

-- *****
--
-- Positioning Priority
--
-- *****
PositioningPriority ::= ENUMERATED {
    high-priority,
    normal-priority,
    ...
}

-- *****
--
-- RRC State Change
--
-- *****

RRCstateChange ::= SEQUENCE {
    new-ue-State          ENUMERATED { cell-DCH, cell-FACH, cell-PCH, ura-PCH, ... },
    iE-Extensions        ProtocolExtensionContainer { { RRCstateChange-ExtIEs } } OPTIONAL,
    ...
}

RRCstateChange-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Requested Data Value
--
-- *****

RequestedDataValue ::= SEQUENCE {
    gpsAlmanacAndSatelliteHealth    GPS-AlmanacAndSatelliteHealth    OPTIONAL,
    gps-UTC-Model                   GPS-UTC-Model                   OPTIONAL,
    gps-Ionospheric-Model            GPS-Ionospheric-Model            OPTIONAL,
    gps-NavigationModel              GPS-NavigationModel              OPTIONAL,
    dgpsCorrections                  DGPSCorrections                  OPTIONAL,
    referenceTime                    GPS-ReferenceTime                OPTIONAL,
    gps-AcquisitionAssistance        GPS-AcquisitionAssistance        OPTIONAL,

```



```

    gps-RealTime-Integrity          GPS-RealTimeIntegrity          OPTIONAL,
    almanacAndSatelliteHealthSIB    AlmanacAndSatelliteHealthSIB    OPTIONAL,
    gps-Transmission-TOW           GPS-Transmission-TOW           OPTIONAL,
    iE-Extensions                  ProtocolExtensionContainer { { RequestedDataValue-ExtIEs } } OPTIONAL,
    ...
}

--at least one of the above IEs shall be present in the requested data value

RequestedDataValue-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    { ID id-GPS-ReferenceLocation      CRITICALITY ignore EXTENSION GPS-ReferenceLocation      PRESENCE optional } |
    { ID id-GANSS-CommonAssistanceData  CRITICALITY ignore EXTENSION GANSS-CommonAssistanceData  PRESENCE optional } |
    { ID id-GANSS-GenericAssistanceDataList CRITICALITY ignore EXTENSION GANSS-GenericAssistanceDataList PRESENCE optional },
    ...
}

-- *****
--
-- Requested Data Value Information
--
-- *****

RequestedDataValueInformation ::= CHOICE {
    informationAvailable      InformationAvailable,
    informationNotAvailable    InformationNotAvailable
}

InformationAvailable ::= SEQUENCE {
    requestedDataValue      RequestedDataValue,
    iE-Extensions          ProtocolExtensionContainer { { InformationAvailable-ExtIEs } } OPTIONAL,
    ...
}

InformationAvailable-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

InformationNotAvailable ::= NULL

-- *****
--
-- Request Type
--
-- *****

RequestType ::= SEQUENCE {
    event          RequestTypeEvent,
    reportArea     RequestTypeReportArea,
    horizontalaccuracyCode RequestTypeAccuracyCode OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { RequestType-ExtIEs } } OPTIONAL,
    ...
}

RequestType-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

}

RequestTypeEvent ::= ENUMERATED {
    stop-change-of-service-area,
    direct,
    change-of-service-area,
    stop-direct,
    ...,
    periodic,
    stop-periodic
}

RequestTypeReportArea ::= ENUMERATED {
    service-area,
    geographical-area,
    ...
}

RequestTypeAccuracyCode ::= INTEGER (0..127)

-- *****
--
-- Response Time
--
-- *****
ResponseTime ::= ENUMERATED {
    low-delay,
    delay-tolerant,
    ...
}

-- *****
--
-- Horizontal Accuracy Code
--
-- *****

HorizontalAccuracyCode ::= INTEGER (0..127)

-- *****
--
-- UE Positioning Capability
--
-- *****
UE-PositioningCapability ::= SEQUENCE {
    standAloneLocationMethodsSupported    BOOLEAN,
    ueBasedOTDOASupported                 BOOLEAN,
    networkAssistedGPSsupport             NetworkAssistedGPSsupport,
    supportGPSTimingOfCellFrame           BOOLEAN,
    supportForIPDL                         BOOLEAN,
    supportForRxTxTimeDiff                 BOOLEAN,
    supportForUEAGPSinCellPCH             BOOLEAN,
    supportForSFNSFNTimeDiff              BOOLEAN,
    iE-Extensions                          ProtocolExtensionContainer { {UE-PositioningCapability-ExtIEs} } OPTIONAL,

```

```

}
...
}
UE-PositioningCapability-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-NetworkAssistedGANSSSupport          CRITICALITY ignore  EXTENSION NetworkAssistedGANSSSupport          PRESENCE optional },
  ...
}

NetworkAssistedGANSSSupport ::= SEQUENCE (SIZE (1..maxGANSS)) OF SEQUENCE {
  ganssID          GANSSID          OPTIONAL,
  ganssMode        ENUMERATED {
    networkBased,
    ue-Based,
    both,
    none
  },
  ganssSignalID   GANSS-SignalID   OPTIONAL,
  supportGANSSTimingOfCellFrame  BOOLEAN,
  supportGANSSCarrierPhaseMeasurement  BOOLEAN,
  iE-Extensions   ProtocolExtensionContainer { { NetworkAssistedGANSSSupport-ExtIEs } } OPTIONAL,
  ...
}

NetworkAssistedGANSSSupport-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  -- the following IE shall be present if 'GANSSID' in 'NetworkAssistedGANSSSupport' is '0' (SBAS)
  { ID id-GANSS-SBAS-IDs          CRITICALITY ignore  EXTENSION GANSS-SBAS-IDs          PRESENCE optional } |
  { ID id-GANSS-Signal-IDs       CRITICALITY ignore  EXTENSION GANSS-Signal-IDs       PRESENCE optional } |
  { ID id-supportGANSSNonNativeADchoices  CRITICALITY ignore  EXTENSION SupportGANSSNonNativeADchoices  PRESENCE optional },
  ...
}

NetworkAssistedGPSSupport ::= ENUMERATED {
  network-based,
  ue-based,
  both,
  none,
  ...
}

GANSS-SBAS-IDs ::= SEQUENCE {
  ganss-sbas-ids  BIT STRING (SIZE(8)),
  iE-Extensions  ProtocolExtensionContainer { { GANSS-SBAS-IDs-ExtIEs } } OPTIONAL,
  ...
}

GANSS-SBAS-IDs-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

GANSS-Signal-IDs ::= SEQUENCE {
  ganss-signal-ids  BIT STRING (SIZE(8)),
  iE-Extensions    ProtocolExtensionContainer { { GANSS-Signal-IDs-ExtIEs } }  OPTIONAL,
  ...
}

```

```

}

GANSS-Signal-IDs-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

SupportGANSSNonNativeADchoices ::= BOOLEAN

-- *****
--
-- UTDOA Positioning (Position Activation Request Message)
--
-- *****

UTDOAPositioning ::= SEQUENCE {
  utdoa-BitCount          UTDOA-BitCount,
  utdoa-timeInterval     UTDOA-TimeInterval,
  iE-Extensions          ProtocolExtensionContainer { { UTDOAPositioning-ExtIEs } } OPTIONAL,
  ...
}

UTDOAPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

UTDOA-BitCount ::= INTEGER (0..5000)

UTDOA-TimeInterval ::= INTEGER (0..3000)

EnvironmentCharacterisation ::= ENUMERATED { heavyMultipathandNLOSconditions,
  noOrLightMultipathAndUsuallyLOSconditions,
  notDefinedOrMixedEnvironment,
  ...
}

-- *****
--
-- GPS and GANSS Positioning (Position Activation Request Message)
--
-- *****

GPSPositioning ::= SEQUENCE {
  gpsPositioningInstructions  GPSPositioningInstructions,
  requestedDataValue          RequestedDataValue OPTIONAL,
  iE-Extensions               ProtocolExtensionContainer { { GPSPositioning-ExtIEs } } OPTIONAL,
  ...
}

GPSPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

```

```

GPSPositioningInstructions ::= SEQUENCE {
    horizontalAccuracyCode      HorizontalAccuracyCode          OPTIONAL,
    verticalAccuracyCode        VerticalAccuracyCode            OPTIONAL,
    gpsTimingOfCellWanted      BOOLEAN,
    additionalAssistanceDataRequest  BOOLEAN,
    iE-Extensions              ProtocolExtensionContainer { { GPSPositioningInstructions-ExtIEs } } OPTIONAL,
    ...
}

GPSPositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-MeasurementValidity    CRITICALITY ignore    EXTENSION    MeasurementValidity    PRESENCE optional},
    ...
}

GANSSPositioning ::= SEQUENCE {
    ganssPositioningInstructions  GANSS-PositioningInstructions,
    requestedDataValue            RequestedDataValue          OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { GANSSPositioning-ExtIEs } } OPTIONAL,
    ...
}

GANSSPositioning-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

GANSS-PositioningInstructions ::= SEQUENCE {
    horizontalAccuracyCode      HorizontalAccuracyCode          OPTIONAL,
    verticalAccuracyCode        VerticalAccuracyCode            OPTIONAL,
    ganssTimingOfCellWanted     BIT STRING (SIZE (8)),
    additionalAssistanceDataRequest  BIT STRING (SIZE (8)),
    measurementValidity         MeasurementValidity            OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { GANSS-PositioningInstructions-ExtIEs } } OPTIONAL,
    ...
}

GANSS-PositioningInstructions-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    {ID id-GANSScarrierPhaseRequested  CRITICALITY ignore  EXTENSION  GANSScarrierPhaseRequested  PRESENCE optional}|
    {ID id-GANSSMultiFreqMeasRequested  CRITICALITY ignore  EXTENSION  GANSSMultiFreqMeasRequested  PRESENCE optional},
    ...
}

GANSScarrierPhaseRequested ::= BIT STRING (SIZE (8))

GANSSMultiFreqMeasRequested ::= BIT STRING (SIZE (8))

-- *****
--
-- OTDOA Assistance Data
--
-- *****
OTDOAAssistanceData ::= SEQUENCE {
    uE-Positioning-OTDOA-AssistanceData    UE-Positioning-OTDOA-AssistanceData,

```

```

    iE-Extensions                ProtocolExtensionContainer { { OTDOAAssistanceData-ExtIEs } } OPTIONAL,
    ...
}
OTDOAAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
-- *****
--
-- UE Positioning OTDOA Assistance Data
--
-- *****

UE-Positioning-OTDOA-AssistanceData ::= SEQUENCE {
    ue-positioning-OTDOA-ReferenceCellInfo    UE-Positioning-OTDOA-ReferenceCellInfo    OPTIONAL,
    ue-positioning-OTDOA-NeighbourCellList    UE-Positioning-OTDOA-NeighbourCellList    OPTIONAL,
    iE-Extensions                             ProtocolExtensionContainer { { UE-Positioning-OTDOAAssistanceData-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-OTDOAAssistanceData-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-Positioning-OTDOA-ReferenceCellInfo ::= SEQUENCE {
    sfn                SFN                OPTIONAL,
    modeSpecificInfo CHOICE {
        fdd                SEQUENCE {
            primaryCPICH-Info    PrimaryScramblingCode,
            ...
        },
        tdd                SEQUENCE{
            cellParameterID    CellParameterID,
            --- coding is FFS
            ...
        },
        ...
    },
    frequencyInfo                FrequencyInfo                OPTIONAL,
    positioningMode CHOICE {
        ueBased                SEQUENCE {
            cellPosition                ReferenceCellPosition    OPTIONAL,
            -- actual value roundTripTime = (IE value * 0.0625) + 876
            roundTripTime                INTEGER (0..32766)                OPTIONAL,
            ...
        },
        ueAssisted                SEQUENCE {
            ...
        },
        ...
    },
    ue-positioning-IPDL-Parements    UE-Positioning-IPDL-Parameters    OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { UE-Positioning-OTDOAReferenceCellInfo-ExtIEs } } OPTIONAL,

```

```

}
...
}
UE-Positioning-OTDOAReferenceCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  { ID id-ExtendedRoundTripTime    CRITICALITY ignore  EXTENSION ExtendedRoundTripTime    PRESENCE optional } | -- FDD only
  { ID id-timingAdvanceLCR-R7      CRITICALITY ignore  EXTENSION TimingAdvanceLCR-R7          PRESENCE optional } | -- 1.28Mcps TDD only
  { ID id-rxTimingDeviationLCR     CRITICALITY ignore  EXTENSION RxTimingDeviationLCR       PRESENCE optional } | -- 1.28Mcps TDD only
  { ID id-angleOfArrivalLCR        CRITICALITY ignore  EXTENSION AngleOfArrivalLCR         PRESENCE optional }, -- 1.28Mcps TDD only
  ...
}
ReferenceCellPosition ::= CHOICE {
  ellipsoidPoint           GeographicalCoordinates,
  ellipsoidPointWithAltitude GA-PointWithAltitude,
  ...
}
UE-Positioning-IPDL-Parameters ::= SEQUENCE {
  modeSpecificInfo        CHOICE {
    fdd                    SEQUENCE {
      ip-Spacing           IP-Spacing,
      ip-Length            IP-Length,
      ip-Offset            INTEGER (0..9),
      seed                 INTEGER (0..63),
      ...
    },
    tdd                    SEQUENCE {
      -- coding is FFS
      ...
    },
    ...
  },
  burstModeParameters     BurstModeParameters OPTIONAL,
  iE-Extensions           ProtocolExtensionContainer { { UE-Positioning-IPDL-Parameters-ExtIEs } } OPTIONAL,
  ...
}
UE-Positioning-IPDL-Parameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}
IP-Spacing ::= ENUMERATED {
  e5, e7, e10, e15, e20,
  e30, e40, e50, ... }
IP-Length ::= ENUMERATED {
  ipl5, ipl10, ... }
BurstModeParameters ::= SEQUENCE {
  burstStart              INTEGER (0..15),
  burstLength            INTEGER (10..25),
  burstFreq               INTEGER (1..16),

```

```

    iE-Extensions          ProtocolExtensionContainer { { BurstModeParameters-ExtIEs } } OPTIONAL,
    ...
}

BurstModeParameters-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UE-Positioning-OTDOA-NeighbourCellList ::= SEQUENCE (SIZE (1..maxCellMeas)) OF
    UE-Positioning-OTDOA-NeighbourCellInfo

UE-Positioning-OTDOA-NeighbourCellInfo ::= SEQUENCE {
    modeSpecificInfo      CHOICE {
        fdd                SEQUENCE {
            primaryCPICH-Info          PrimaryScramblingCode,
            ...
        },
        tdd                SEQUENCE {
            cellParameterID            CellParameterID,
            -- coding is FFS
            ...
        },
        ...
    },
    frequencyInfo          FrequencyInfo                                OPTIONAL,
    ue-positioning-IPDL-Parameters UE-Positioning-IPDL-Parameters    OPTIONAL,
    sfn-SFN-RelTimeDifference SFN-SFN-RelTimeDifference1,
    sfn-Offset-Validity     SFN-Offset-Validity                        OPTIONAL,
    sfn-SFN-Drift           SFN-SFN-Drift                             OPTIONAL,
    searchWindowSize        OTDOA-SearchWindowSize,
    positioningMode        CHOICE {
        ueBased            SEQUENCE {
            relativeNorth      INTEGER (-20000..20000)            OPTIONAL,
            relativeEast       INTEGER (-20000..20000)            OPTIONAL,
            relativeAltitude   INTEGER (-4000..4000)              OPTIONAL,
            fineSFN-SFN        FINESFNSFN                        OPTIONAL,
            -- actual value roundTripTime = (IE value * 0.0625) + 876
            roundTripTime      INTEGER (0.. 32766)                OPTIONAL,
            ...
        },
        ueAssisted          SEQUENCE {
            ...
        },
        ...
    },
    iE-Extensions          ProtocolExtensionContainer { { UE-Positioning-OTDOANeighbourCellInfo-ExtIEs } } OPTIONAL,
    ...
}

UE-Positioning-OTDOANeighbourCellInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```



```

    { ID id-ExtendedRoundTripTime    CRITICALITY ignore    EXTENSION ExtendedRoundTripTime    PRESENCE optional }, -- FDD only
    ...
}

SFN-SFN-RelTimeDifference1 ::=      SEQUENCE {
    sfn-Offset                      INTEGER (0 .. 4095),
    sfn-sfn-Reltimedifference        INTEGER (0.. 38399),
    iE-Extensions                    ProtocolExtensionContainer { { SFN-SFN-RelTimeDifference1-ExtIEs } } OPTIONAL,
    ...
}

SFN-SFN-RelTimeDifference1-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SFN-Offset-Validity ::=            ENUMERATED { false }

OTDOA-SearchWindowSize ::=        ENUMERATED {
    c20, c40, c80, c160, c320,
    c640, c1280, moreThan1280, ... }

SFN-SFN-Drift ::=                 ENUMERATED {
    sfnsfndrift0, sfnsfndrift1, sfnsfndrift2,
    sfnsfndrift3, sfnsfndrift4, sfnsfndrift5,
    sfnsfndrift8, sfnsfndrift10, sfnsfndrift15,
    sfnsfndrift25, sfnsfndrift35, sfnsfndrift50,
    sfnsfndrift65, sfnsfndrift80, sfnsfndrift100,
    sfnsfndrift-1, sfnsfndrift-2, sfnsfndrift-3,
    sfnsfndrift-4, sfnsfndrift-5, sfnsfndrift-8,
    sfnsfndrift-10, sfnsfndrift-15, sfnsfndrift-25,
    sfnsfndrift-35, sfnsfndrift-50, sfnsfndrift-65,
    sfnsfndrift-80, sfnsfndrift-100, ...}

FineSFNSFN      ::= INTEGER (0..15)
-- Range 0..0.9375 step size 0.0625

-- *****
--
-- Vertical Accuracy Code
--
-- *****

VerticalAccuracyCode      ::= INTEGER (0..127)

-- *****
--
-- UTDOA Group
--
-- *****

```

```

UTDOA-Group ::= SEQUENCE {
    uC-ID                UC-ID,
    frequencyInfo        FrequencyInfo,
    uTDOA-ChannelSettings UTDOA-RRCState,
    iE-Extensions        ProtocolExtensionContainer { { UTDOA-Group-ExtIEs } } OPTIONAL,
    ...
}

UTDOA-Group-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

FrequencyInfo ::= SEQUENCE {
    modeSpecificInfo     CHOICE {
        fdd                FrequencyInfoFDD,
        tdd                FrequencyInfoTDD,
        ...
    },
    iE-Extensions        ProtocolExtensionContainer { { FrequencyInfo-ExtIEs } } OPTIONAL,
    ...
}

FrequencyInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

FrequencyInfoFDD ::= SEQUENCE {
    uarfcn-UL            UARFCN OPTIONAL,
    uarfcn-DL            UARFCN,
    iE-Extensions        ProtocolExtensionContainer { { FrequencyInfoFDD-ExtIEs } } OPTIONAL,
    ...
}

FrequencyInfoFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

FrequencyInfoTDD ::= SEQUENCE {
    uarfcn                UARFCN,
    iE-Extensions        ProtocolExtensionContainer { {FrequencyInfoTDD-ExtIEs} } OPTIONAL,
    ...
}

FrequencyInfoTDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UTDOA-RRCState ::= CHOICE {
    uTDOA-CELLDCH        UTDOA-CELLDCH,
    uTDOA-CELLFACH        UTDOA-CELLFACH,
    ...
}

```

```

}
-- *****
--
-- UTDOA Cell DCH Information
--
-- *****
UTDOA-CELLDCH ::= SEQUENCE {
    uL-DPCHInfo                UL-DPCHInfo,
    compressedModeAssistanceData  Compressed-Mode-Assistance-Data    OPTIONAL,
    dCH-Information             DCH-Information    OPTIONAL,
    e-DPCH-Information          E-DPCH-Information  OPTIONAL,
    iE-Extensions               ProtocolExtensionContainer { { UTDOA-CELLDCH-ExtIEs } } OPTIONAL,
    ...
}

UTDOA-CELLDCH-ExtIEs    PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-DPCHInfo ::= CHOICE {
    fdd SEQUENCE {
        scramblingCodeType      ScramblingCodeType,
        scramblingCode          UL-ScramblingCode,
        tfci-Existence          BOOLEAN,
        numberOfFBI-Bits        NumberOfFBI-Bits,
        iE-Extensions           ProtocolExtensionContainer { { UL-DPCHInfoFDD-ExtIEs } } OPTIONAL,
        ...
    },
    tdd SEQUENCE {
        cellParameterID        CellParameterID,
        tFCI-Coding            TFCI-Coding,
        puncturingLimit        PuncturingLimit,
        repetitionPeriod        RepetitionPeriod,
        repetitionLength        RepetitionLength,
        tdd-DPCHOffset         TDD-DPCHOffset,
        uL-Timeslot-Information UL-Timeslot-Information,
        frameOffset            FrameOffset,
        specialBurstScheduling SpecialBurstScheduling,
        iE-Extensions           ProtocolExtensionContainer { { UL-DPCHInfoTDD-ExtIEs } } OPTIONAL,
        ...
    },
    ...
}

UL-DPCHInfoFDD-ExtIEs    PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-DPCHInfoTDD-ExtIEs    PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

Compressed-Mode-Assistance-Data ::= SEQUENCE {
    dl-information          DL-InformationFDD,
    ul-information          UL-InformationFDD,
    iE-Extensions          ProtocolExtensionContainer { { Compressed-Mode-Assistance-DataFDD-ExtIEs } } OPTIONAL,
    ...
}

Compressed-Mode-Assistance-DataFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DL-InformationFDD ::= SEQUENCE {
    primaryScramblingCode PrimaryScramblingCode,
    chipOffset             ChipOffset,
    frameOffset            FrameOffset,
    iE-Extensions          ProtocolExtensionContainer { { DL-InformationFDD-ExtIEs } } OPTIONAL,
    ...
}

DL-InformationFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-InformationFDD ::= SEQUENCE {
    transmissionGapPatternSequenceInfo Transmission-Gap-Pattern-Sequence-Information,
    activePatternSequenceInfo         Active-Pattern-Sequence-Information,
    cFN                                CFN,
    iE-Extensions                      ProtocolExtensionContainer { { UL-InformationFDD-ExtIEs } } OPTIONAL,
    ...
}

UL-InformationFDD-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Transmission-Gap-Pattern-Sequence-Information ::= SEQUENCE (SIZE (1..maxTGPS)) OF
SEQUENCE {
    tGPSID          TGPSID,
    tGSN            TGSN,
    tGL1            GapLength,
    tGL2            GapLength OPTIONAL,
    tGD             TGD,
    tGPL1           GapDuration,
    uplink-Compressed-Mode-Method Uplink-Compressed-Mode-Method,
    iE-Extensions   ProtocolExtensionContainer { {Transmission-Gap-Pattern-Sequence-Information-ExtIEs} } OPTIONAL,
    ...
}

Transmission-Gap-Pattern-Sequence-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

TGD ::= INTEGER (0|15..269)
-- 0 = Undefined, only one transmission gap in the transmission gap pattern sequence

TGPRC ::= INTEGER (0..511)
-- 0 = infinity

TGPSID ::= INTEGER (1.. maxTGPS)

TGSN ::= INTEGER (0..14)

Uplink-Compressed-Mode-Method ::= ENUMERATED {
    sFdiv2,
    higher-layer-scheduling,
    ...
}

GapDuration ::= INTEGER (1..144,...)
-- Unit frame

GapLength ::= INTEGER (1..14)
-- Unit slot

Active-Pattern-Sequence-Information ::= SEQUENCE {
    cmConfigurationChangeCFN CFN,
    transmission-Gap-Pattern-Sequence-Status Transmission-Gap-Pattern-Sequence-Status-List OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {Active-Pattern-Sequence-Information-ExtIEs} } OPTIONAL,
    ...
}

Active-Pattern-Sequence-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Transmission-Gap-Pattern-Sequence-Status-List ::= SEQUENCE (SIZE (1..maxTGPS)) OF
    SEQUENCE {
        tGPSID TGPSID,
        tGPRC TGPRC,
        tGCFN CFN,
        iE-Extensions ProtocolExtensionContainer { { Transmission-Gap-Pattern-Sequence-Status-List-ExtIEs } } OPTIONAL,
        ...
    }

Transmission-Gap-Pattern-Sequence-Status-List-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

DCH-Information ::= SEQUENCE {
    tFCS TFCS,
    trChInfo TrChInfoList,
    iE-Extensions ProtocolExtensionContainer { { DCH-Information-ExtIEs } } OPTIONAL,
    ...
}

```

```

DCH-Information-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TrChInfoList ::= SEQUENCE (SIZE(1..maxTrCH)) OF
    UL-TrCHInfo

UL-TrCHInfo ::= SEQUENCE {
    ul-TrCHType              UL-TrCHType,
    tfs                      TransportFormatSet,
    iE-Extensions           ProtocolExtensionContainer { { UL-TrCHInfo-ExtIEs } } OPTIONAL,
    ...
}

UL-TrCHInfo-ExtIEs        PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

UL-TrCHType ::= ENUMERATED {dch, usch, ...}

E-DPCH-Information ::= SEQUENCE {
    maxSet-E-DPDCHs          Max-Set-E-DPDCHs,
    ul-PunctureLimit         PuncturingLimit,
    e-TFCS-Information       E-TFCS-Information,
    e-TTI                    E-TTI,
    e-DPCCH-PO               E-DPCCH-PO          OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { { E-DPCH-Information-ExtIEs } } OPTIONAL,
    ...
}

E-DPCH-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Max-Set-E-DPDCHs ::= ENUMERATED {
    vN64, vN32, vN16, vN8, v2xN4, v2xN2, v2xN2plus2xN4,
    ...
}
-- Values related to [16]

E-TFCS-Information ::= SEQUENCE {
    e-DCH-TFCS-Index         E-DCH-TFCS-Index,
    reference-E-TFCI-Information Reference-E-TFCI-Information OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { {E-TFCS-Information-ExtIEs} } OPTIONAL,
    ...
}

E-TFCS-Information-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```
E-DCH-TFCS-Index ::= INTEGER (1..4,...)

Reference-E-TFCI-Information ::= SEQUENCE (SIZE (1..maxNrOfRefETFCIs)) OF Reference-E-TFCI-Information-Item

Reference-E-TFCI-Information-Item ::= SEQUENCE {
    reference-E-TFCI          E-TFCI,
    reference-E-TFCI-PO      Reference-E-TFCI-PO,
    iE-Extensions           ProtocolExtensionContainer { { Reference-E-TFCI-Information-Item-ExtIEs} } OPTIONAL,
    ...
}

Reference-E-TFCI-Information-Item-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

Reference-E-TFCI-PO ::= INTEGER (0.. maxNrOfRefETFCI-PO-QUANTSTEPS)
-- FFS according to mapping in [17]

E-TFCI ::= INTEGER (0..127)

E-TTI ::= ENUMERATED {
    e-TTI-2ms,
    e-TTI-10ms,
    ...
}

E-DPCCH-PO ::= INTEGER (0..maxNrOfEDPCCH-PO-QUANTSTEPS)

CellParameterID ::= INTEGER (0..127,...)

TFCI-Coding ::= ENUMERATED {
    v4,
    v8,
    v16,
    v32,
    ...
}

RepetitionLength ::= INTEGER (1..63)

RepetitionPeriod ::= ENUMERATED {
    v1,
    v2,
    v4,
    v8,
    v16,
    v32,
    v64,
    ...
}

TDD-DPCHOffset ::= CHOICE {
```

```

    initialOffset      INTEGER (0..255),
    noinitialOffset    INTEGER (0..63)
}

UL-Timeslot-Information ::= SEQUENCE (SIZE (1..maxNrOfULTSs)) OF UL-Timeslot-InformationItem

maxNrOfULTSs          INTEGER ::= 15
UL-Timeslot-InformationItem ::= SEQUENCE {
    timeSlot           TimeSlot,
    midambleShiftAndBurstType MidambleShiftAndBurstType,
    tFCI-Presence      BOOLEAN,
    uL-Code-InformationList TDD-UL-Code-Information,
    iE-Extensions      ProtocolExtensionContainer { { UL-Timeslot-InformationItem-ExtIEs } } OPTIONAL,
    ...
}

UL-Timeslot-InformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TimeSlot ::= INTEGER (0..14)

MidambleShiftAndBurstType ::= CHOICE {
    type1 SEQUENCE {
        midambleConfigurationBurstType1And3 MidambleConfigurationBurstType1And3,
        midambleAllocationMode CHOICE {
            defaultMidamble NULL,
            commonMidamble NULL,
            ueSpecificMidamble MidambleShiftLong,
            ...
        },
        ...
    },
    type2 SEQUENCE {
        midambleConfigurationBurstType2 MidambleConfigurationBurstType2,
        midambleAllocationMode CHOICE {
            defaultMidamble NULL,
            commonMidamble NULL,
            ueSpecificMidamble MidambleShiftShort,
            ...
        },
        ...
    },
    type3 SEQUENCE {
        midambleConfigurationBurstType1And3 MidambleConfigurationBurstType1And3,
        midambleAllocationMode CHOICE {
            defaultMidamble NULL,
            ueSpecificMidamble MidambleShiftLong,
            ...
        },
        ...
    },
    ...
}

```



```

}

MidambleShiftLong ::=                INTEGER (0..15)

MidambleShiftShort ::=               INTEGER (0..5)

MidambleConfigurationBurstType1And3 ::=  ENUMERATED {v4, v8, v16}

MidambleConfigurationBurstType2 ::=  ENUMERATED {v3, v6}

TDD-UL-Code-Information ::= SEQUENCE (SIZE (1..maxNrOfDPCHs)) OF TDD-UL-Code-InformationItem

maxNrOfDPCHs                INTEGER ::= 240

TDD-UL-Code-InformationItem ::= SEQUENCE {
    tdd-ChannelisationCode      TDD-ChannelisationCode,
    iE-Extensions                ProtocolExtensionContainer { { TDD-UL-Code-InformationItem-ExtIEs} }    OPTIONAL,
    ...
}

TDD-UL-Code-InformationItem-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TDD-ChannelisationCode ::= ENUMERATED {
    chCode1div1,
    chCode2div1,
    chCode2div2,
    chCode4div1,
    chCode4div2,
    chCode4div3,
    chCode4div4,
    chCode8div1,
    chCode8div2,
    chCode8div3,
    chCode8div4,
    chCode8div5,
    chCode8div6,
    chCode8div7,
    chCode8div8,
    chCode16div1,
    chCode16div2,
    chCode16div3,
    chCode16div4,
    chCode16div5,
    chCode16div6,
    chCode16div7,
    chCode16div8,
    chCode16div9,
    chCode16div10,
    chCode16div11,
    chCode16div12,
    chCode16div13,
    chCode16div14,

```

```

    chCode16div15,
    chCode16div16,
    ...
}

SpecialBurstScheduling ::= INTEGER (1..256) -- Number of frames between special burst transmission during DTX

-- *****
--
-- UTDOA Cell Fach Information
--
-- *****

UTDOA-CELLFACH ::= SEQUENCE {
    pRACHparameters          PRACHparameters,
    cRNTI                    C-RNTI,
    uschParameters          UschParameters OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer { { UTDOA-CELLFACH-ExtIEs } } OPTIONAL,
    ...
}

UTDOA-CELLFACH-ExtIEs      PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACHparameters ::= SEQUENCE (SIZE (1..maxPRACH)) OF
    PRACH-ChannelInfo

PRACH-ChannelInfo ::= SEQUENCE {
    pRACH-Info              PRACH-Info,
    tFS                    TransportFormatSet,
    tFCS                   TFCS,
    iE-Extensions          ProtocolExtensionContainer { { PRACH-ChannelInfo-ExtIEs } } OPTIONAL,
    ...
}

PRACH-ChannelInfo-ExtIEs   PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACH-Info ::=
    fdd                    CHOICE {
        SEQUENCE {
            availableSignatures AvailableSignatures,
            availableSF         SF-PRACH,
            preambleScramblingCodeWordNumber PreambleScramblingCodeWordNumber,
            puncturingLimit     PuncturingLimit,
            availableSubChannelNumbers AvailableSubChannelNumbers,
            iE-Extensions       ProtocolExtensionContainer { { PRACH-Info-FDD-ExtIEs } } OPTIONAL,
            ...
        },
        tdd                    SEQUENCE {

```

```

        timeSlot                TimeSlot,
        tdd-ChannelisationCode   TDD-ChannelisationCode,
        maxPRACH-MidambleShifts MaxPRACH-MidambleShifts,
        pRACH-Midamble           PRACH-Midamble,
        iE-Extensions            ProtocolExtensionContainer { { PRACH-Info-TDD-ExtIEs} } OPTIONAL,
        ...
    },
    ...
}

PRACH-Info-FDD-ExtIEs          PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

PRACH-Info-TDD-ExtIEs         PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

SF-PRACH ::=
    ENUMERATED {
        sfpr32, sfpr64, sfpr128, sfpr256, ... }

AvailableSignatures ::=
    BIT STRING {
        signature15(0),
        signature14(1),
        signature13(2),
        signature12(3),
        signature11(4),
        signature10(5),
        signature9(6),
        signature8(7),
        signature7(8),
        signature6(9),
        signature5(10),
        signature4(11),
        signature3(12),
        signature2(13),
        signature1(14),
        signature0(15)
    } (SIZE(16))

PreambleScramblingCodeWordNumber ::= INTEGER (0..15)

PuncturingLimit ::= INTEGER (0..15)
-- 0: 40%; 1: 44%; ... 14: 96%; 15: 100%

AvailableSubChannelNumbers ::=
    BIT STRING {
        subCh11(0),
        subCh10(1),
        subCh9(2),
        subCh8(3),
        subCh7(4),
        subCh6(5),
        subCh5(6),

```

```

        subCh4 (7),
        subCh3 (8),
        subCh2 (9),
        subCh1 (10),
        subCh0 (11)
    } (SIZE (12))

ScramblingCodeType ::=
    ENUMERATED {
        shortSC,
        longSC }

UL-ScramblingCode ::=
    INTEGER (0..16777215)

NumberOfFBI-Bits ::=
    INTEGER (0..2)

TransportFormatSet ::=
    SEQUENCE {
        dynamicPart          TransportFormatSet-DynamicPartList,
        semi-staticPart      TransportFormatSet-Semi-staticPart,
        iE-Extensions        ProtocolExtensionContainer { { TransportFormatSet-ExtIEs } } OPTIONAL,
        ...
    }

TransportFormatSet-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TransportFormatSet-DynamicPartList ::= SEQUENCE (SIZE (1..maxNrOfTFs)) OF
    SEQUENCE {
        rlc-Size              RLC-Size,
        numberOfTbsTTIList    SEQUENCE (SIZE (1..maxNrOfTFs)) OF TbsTTIInfo,
        iE-Extensions        ProtocolExtensionContainer { { TransportFormatSet-DynamicPartList-ExtIEs } } OPTIONAL,
        ...
    }

TransportFormatSet-DynamicPartList-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

TbsTTIInfo ::= SEQUENCE {
    tTIInfo                  TransportFormatSet-TransmissionTimeIntervalDynamic OPTIONAL,
    numberOfTbs              TransportFormatSet-NrOfTransportBlocks,
    iE-Extensions            ProtocolExtensionContainer { { TbsTTIInfo-ExtIEs } } OPTIONAL,
    ...
}

TbsTTIInfo-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

RLC-Size ::= INTEGER (129..5055)

TransportFormatSet-NrOfTransportBlocks ::= INTEGER (0..512)

```

```

TransportFormatSet-Semi-staticPart ::= SEQUENCE {
    transmissionTimeInterval      TransportFormatSet-TransmissionTimeIntervalSemiStatic,
    channelCoding                 TransportFormatSet-ChannelCodingType,
    codingRate                    TransportFormatSet-CodingRate                OPTIONAL,
    -- This IE shall be present if the Type of channel coding IE is set to 'convolutional' or 'turbo'
    rateMatchingAttribute        TransportFormatSet-RateMatchingAttribute,
    CRC-Size                     TransportFormatSet-CRC-Size,
    iE-Extensions                ProtocolExtensionContainer { { TransportFormatSet-Semi-staticPart-ExtIEs } } OPTIONAL,
    ...
}

```

```

TransportFormatSet-Semi-staticPart-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

TransportFormatSet-TransmissionTimeIntervalSemiStatic ::= ENUMERATED {
    msec-5,
    msec-10,
    msec-20,
    msec-40,
    msec-80,
    dynamic,
    ...
}

```

```

TransportFormatSet-ChannelCodingType ::= ENUMERATED {
    no-codingTDD,
    convolutional-coding,
    turbo-coding,
    ...
}

```

```

TransportFormatSet-CodingRate ::= ENUMERATED {
    half,
    third,
    ...
}

```

```

TransportFormatSet-RateMatchingAttribute ::= INTEGER (1..maxRateMatching)

```

```

TransportFormatSet-CRC-Size ::= ENUMERATED {
    v0,
    v8,
    v12,
    v16,
    v24,
    ...
}

```

```

TransportFormatSet-TransmissionTimeIntervalDynamic ::= ENUMERATED {

```

```

    msec-10,
    msec-20,
    msec-40,
    msec-80,
    dynamic,
    ...
}

TFCS ::= SEQUENCE (SIZE (1..maxTFC)) OF CTFC

CTFC ::= CHOICE{
    ctfc2Bit          SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..3),
    ctfc4Bit          SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..15),
    ctfc6Bit          SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..63),
    ctfc8Bit          SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..255),
    ctfc12Bit         SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..4095),
    ctfc16Bit         SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..65535),
    ctfc24Bit         SEQUENCE (SIZE (1..maxTFC)) OF INTEGER (0..16777215),
    ...
}

C-RNTI ::= BIT STRING (SIZE (16))

UARFCN ::= INTEGER (0..16383)

CFN ::= INTEGER (0..255)

ChipOffset ::= INTEGER (0..38399)
-- Unit Chip

FrameOffset ::= INTEGER (0..255)

PrimaryScramblingCode ::= INTEGER (0..511)

UschParameters ::= SEQUENCE {
    cellParameterID          CellParameterID,
    tFCI-Coding               TFCI-Coding,
    punctureLimit             PuncturingLimit,
    repetitionPeriod          RepetitionPeriod,
    uSCH-SchedulingOffset     USCH-SchedulingOffset,
    uL-Timeslot-Information    UL-Timeslot-Information,
    tFCS                       TFCS,
    trChInfo                  TrChInfoList,
    iE-Extensions             ProtocolExtensionContainer { { UschParameters-ExtIEs } } OPTIONAL,
    ...
}

UschParameters-ExtIEs       PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```
USCH-SchedulingOffset ::= INTEGER (0..255)

MaxPRACH-MidambleShifts ::= ENUMERATED {
    shift4,
    shift8,
    ...
}

PRACH-Midamble ::= ENUMERATED {
    inverted,
    direct,
    ...
}

--*****
--
-- Positioning Response Time
--
--*****

Positioning-ResponseTime ::=          ENUMERATED {    ms250, ms500, s1, s2, s3, s4, s6,
                                                    s8, s12, s16, s20, s24, s28, s32, s64,
                                                    ...
                                                    }

--*****
--
-- Amount of Reporting
--
--*****

AmountOfReporting ::=  ENUMERATED { ra2, ra4, ra8, ra16, ra32,
                                    ra64, ra-Infinity, ... }

-- *****
--
-- Include Velocity
--
-- *****

IncludeVelocity      ::= ENUMERATED {
    requested
}

-- *****
--
-- VelocityEstimate
--
-- *****

-- VelocityEstimate is based on Description of Velocity in 23.032
```

```

VelocityEstimate ::= CHOICE {
    horizontalVelocity                HorizontalVelocity,
    horizontalWithVerticalVelocity    HorizontalWithVerticalVelocity,
    horizontalVelocityWithUncertainty HorizontalVelocityWithUncertainty,
    horizontalWithVerticalVelocityAndUncertainty HorizontalWithVerticalVelocityAndUncertainty,
    ...
}

HorizontalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    iE-Extensions                ProtocolExtensionContainer { { HorizontalVelocity-ExtIEs} } OPTIONAL,
    ...
}

HorizontalVelocity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

HorizontalWithVerticalVelocity ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    verticalVelocity              VerticalVelocity,
    iE-Extensions                ProtocolExtensionContainer { { HorizontalWithVerticalVelocity-ExtIEs} } OPTIONAL,
    ...
}

HorizontalWithVerticalVelocity-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

HorizontalVelocityWithUncertainty ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    uncertaintySpeed              INTEGER (0..255),
    iE-Extensions                ProtocolExtensionContainer { { HorizontalVelocityWithUncertainty-ExtIEs} } OPTIONAL,
    ...
}

HorizontalVelocityWithUncertainty-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

HorizontalWithVerticalVelocityAndUncertainty ::= SEQUENCE {
    horizontalSpeedAndBearing    HorizontalSpeedAndBearing,
    verticalVelocity              VerticalVelocity,
    horizontalUncertaintySpeed    INTEGER (0..255),
    verticalUncertaintySpeed      INTEGER (0..255),
    iE-Extensions                ProtocolExtensionContainer { { HorizontalWithVerticalVelocityAndUncertainty-ExtIEs} } OPTIONAL,
    ...
}

HorizontalWithVerticalVelocityAndUncertainty-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

}

HorizontalSpeedAndBearing ::= SEQUENCE {
    bearing                INTEGER (0..359),
    horizontalSpeed        INTEGER (0..2047)
}

VerticalVelocity ::= SEQUENCE {
    verticalSpeed           INTEGER (0..255),
    verticalSpeedDirection VerticalSpeedDirection
}

VerticalSpeedDirection ::= ENUMERATED {
    upward,
    downward
}

-----
--
-- UTRAN-GPS Reference Time
--
-----

UTRAN-GPSReferenceTime ::= SEQUENCE {
    utran-GPSTimingOfCell  INTEGER (0..232243199999, ...),
    uC-ID                  UC-ID                OPTIONAL,
    sfn                    INTEGER (0..4095),
    iE-Extensions          ProtocolExtensionContainer { { UTRAN-GPSReferenceTime-ExtIEs } } OPTIONAL,
    ...
}

UTRAN-GPSReferenceTime-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

-----
--
-- UTRAN-GPS Reference Time Result
--
-----

UTRAN-GPSReferenceTimeResult ::= SEQUENCE {
    ue-GPSTimingOfCell    INTEGER (0..3715891199999, ...),
    uC-ID                 UC-ID,
    sfn                   INTEGER (0..4095),
    iE-Extensions         ProtocolExtensionContainer { { UTRAN-GPSReferenceTimeResult-ExtIEs } } OPTIONAL,
    ...
}

UTRAN-GPSReferenceTimeResult-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {

```

```

}
...
--*****
--
-- UTRAN-GANSS Reference Time Result
--
--*****

UTRAN-GANSSReferenceTimeResult ::= SEQUENCE {
    ue-GANSSTimingOfCell      INTEGER (0..3455999999, ...),
    ganss-Time-ID              GANSSID                               OPTIONAL,
    ganssTodUncertainty        INTEGER(0..127)                       OPTIONAL,
    uC-ID                      UC-ID,
    sfn                        INTEGER (0..4095),
    iE-Extensions              ProtocolExtensionContainer { { UTRAN-GANSSReferenceTimeResult-ExtIEs } } OPTIONAL,
    ...
}

UTRAN-GANSSReferenceTimeResult-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

END

```

9.3.5 Common Definitions

```

-- *****
--
-- Common definitions
--
-- *****

PCAP-CommonDataTypes {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    umts-Access (20) modules (3) pcap(4) version1 (1) pcap-CommonDataTypes (3) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- Extension constants
--
-- *****

maxPrivateIEs                INTEGER ::= 65535
maxProtocolExtensions         INTEGER ::= 65535

```

```

maxProtocolIEs                INTEGER ::= 65535

-- *****
--
-- Common Data Types
--
-- *****
Criticality                    ::= ENUMERATED { reject, ignore, notify }

Presence                       ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID                   ::= CHOICE {
    local                       INTEGER (0..65535),
    global                      OBJECT IDENTIFIER
}

ProcedureCode                  ::= INTEGER (0..255)

ProtocolIE-ID                  ::= INTEGER (0..maxProtocolIEs)

TransactionID                  ::= CHOICE {
    shortTID                    INTEGER (0..127),
    longTID                     INTEGER (0..32767)
}

TriggeringMessage              ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome, outcome }

END

```

9.3.6 Constant Definitions

```

-- *****
--
-- Constant definitions
--
-- *****

PCAP-Constants {
    itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
    umts-Access (20) modules (3) pcap(4) version1 (1) pcap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    ProcedureCode,
    ProtocolIE-ID
FROM PCAP-CommonDataTypes;

```

```

-- *****
--
-- Elementary Procedures
--
-- *****

id-PositionCalculation           ProcedureCode ::= 1
id-InformationExchangeInitiation ProcedureCode ::= 2
id-InformationReporting           ProcedureCode ::= 3
id-InformationExchangeTermination ProcedureCode ::= 4
id-InformationExchangeFailure     ProcedureCode ::= 5
id-ErrorIndication               ProcedureCode ::= 6
id-privateMessage                 ProcedureCode ::= 7
id-PositionParameterModification ProcedureCode ::= 8
id-PositionInitiation            ProcedureCode ::= 9
id-PositionActivation            ProcedureCode ::= 10
id-Abort                          ProcedureCode ::= 11
id-PositionPeriodicReport        ProcedureCode ::= 12
id-PositionPeriodicResult        ProcedureCode ::= 13
id-PositionPeriodicTermination   ProcedureCode ::= 14

-- *****
--
-- Lists
--
-- *****

maxNrOfErrors                    INTEGER ::= 256
maxSat                           INTEGER ::= 16
maxSatAlmanac                    INTEGER ::= 32
maxNrOfLevels                    INTEGER ::= 256
maxNrOfPoints                    INTEGER ::= 15
maxNrOfExpInfo                   INTEGER ::= 32
maxNrOfMeasNCell                 INTEGER ::= 32
maxNrOfMeasurements              INTEGER ::= 16
maxNrOfSets                      INTEGER ::= 3
maxRateMatching                  INTEGER ::= 256
maxNrOfTFS                       INTEGER ::= 32
maxTTI-count                     INTEGER ::= 4
maxTS-1                          INTEGER ::= 13
maxCCTrCH                        INTEGER ::= 8
maxTF                             INTEGER ::= 32
maxTFC                           INTEGER ::= 1024
maxPRACH                         INTEGER ::= 16
maxTrCH                          INTEGER ::= 32
maxTGPS                          INTEGER ::= 6
maxNoOfMeasurements              INTEGER ::= 16
maxCellMeas                      INTEGER ::= 32
maxNrOfEDPCCH-PO-QUANTSTEPS      INTEGER ::= 8   -- FFS
maxNrOfRefETFCI-PO-QUANTSTEPS    INTEGER ::= 8   -- FFS
maxNrOfRefETFCIs                 INTEGER ::= 8
maxSet                           INTEGER ::= 9

```

```

maxGANSSSat          INTEGER ::= 64
maxSgnType           INTEGER ::= 8
maxGANS              INTEGER ::= 8
maxGANSSSet         INTEGER ::= 9
maxGANSSSatAlmanac  INTEGER ::= 36
maxGANSSSClockMod   INTEGER ::= 4
maxGANS-1           INTEGER ::= 7

-- *****
--
-- IEs
--
-- *****

id-Cause              ProtocolIE-ID ::= 1
id-CriticalityDiagnostics ProtocolIE-ID ::= 2
id-GPS-UTRAN-TRU     ProtocolIE-ID ::= 3
id-InformationExchangeID ProtocolIE-ID ::= 4
id-InformationExchangeObjectType-InfEx-Rprt ProtocolIE-ID ::= 5
id-InformationExchangeObjectType-InfEx-Rqst ProtocolIE-ID ::= 6
id-InformationExchangeObjectType-InfEx-Rsp ProtocolIE-ID ::= 7
id-InformationReportCharacteristics ProtocolIE-ID ::= 8
id-InformationType    ProtocolIE-ID ::= 9
id-GPS-MeasuredResultsList ProtocolIE-ID ::= 10
id-MethodType         ProtocolIE-ID ::= 11
id-RefPosition-InfEx-Rqst ProtocolIE-ID ::= 12
id-RefPosition-InfEx-Rsp ProtocolIE-ID ::= 13
id-RefPosition-Inf-Rprt ProtocolIE-ID ::= 14
id-RequestedDataValue ProtocolIE-ID ::= 15
id-RequestedDataValueInformation ProtocolIE-ID ::= 16
id-TransactionID      ProtocolIE-ID ::= 17
id-UE-PositionEstimate ProtocolIE-ID ::= 18
id-CellId-MeasuredResultsSets ProtocolIE-ID ::= 20
id-OTDOA-MeasurementGroup ProtocolIE-ID ::= 22
id-AccuracyFulfilmentIndicator ProtocolIE-ID ::= 23
id-HorizontalAccuracyCode ProtocolIE-ID ::= 24
id-VerticalAccuracyCode ProtocolIE-ID ::= 25
id-UTDOA-Group       ProtocolIE-ID ::= 26
id-RequestType       ProtocolIE-ID ::= 28
id-UE-PositioningCapability ProtocolIE-ID ::= 29
id-UC-id             ProtocolIE-ID ::= 30
id-ResponseTime      ProtocolIE-ID ::= 31
id-PositioningPriority ProtocolIE-ID ::= 32
id-ClientType        ProtocolIE-ID ::= 33
id-PositioningMethod ProtocolIE-ID ::= 34
id-UTDOAPositioning ProtocolIE-ID ::= 35
id-GPSPositioning    ProtocolIE-ID ::= 36
id-OTDOAAssistanceData ProtocolIE-ID ::= 37
id-Positioning-ResponseTime ProtocolIE-ID ::= 38
id-EnvironmentCharacterisation ProtocolIE-ID ::= 39
id-PositionData      ProtocolIE-ID ::= 40
id-IncludeVelocity   ProtocolIE-ID ::= 41
id-VelocityEstimate  ProtocolIE-ID ::= 42

```

id-rxTimingDeviation768Info	ProtocolIE-ID ::= 43
id-UC-ID-InfEx-Rqst	ProtocolIE-ID ::= 44
id-UE-PositionEstimateInfo	ProtocolIE-ID ::= 45
id-UTRAN-GPSReferenceTime	ProtocolIE-ID ::= 46
id-UTRAN-GPSReferenceTimeResult	ProtocolIE-ID ::= 47
id-UTRAN-GPS-DriftRate	ProtocolIE-ID ::= 48
id-OTDOA-AddMeasuredResultsInfo	ProtocolIE-ID ::= 49
id-GPS-ReferenceLocation	ProtocolIE-ID ::= 50
id-OTDOA-MeasuredResultsSets	ProtocolIE-ID ::= 51
id-rxTimingDeviation384extInfo	ProtocolIE-ID ::= 55
id-ExtendedRoundTripTime	ProtocolIE-ID ::= 56
id-PeriodicPosCalcInfo	ProtocolIE-ID ::= 57
id-PeriodicLocationInfo	ProtocolIE-ID ::= 58
id-AmountOfReporting	ProtocolIE-ID ::= 59
id-MeasInstructionsUsed	ProtocolIE-ID ::= 60
id-RRCstateChange	ProtocolIE-ID ::= 61
id-PeriodicTerminationCause	ProtocolIE-ID ::= 62
id-MeasurementValidity	ProtocolIE-ID ::= 63
id-roundTripTimeInfoWithType1	ProtocolIE-ID ::= 64
id-CellIDPositioning	ProtocolIE-ID ::= 66
id-AddMeasurementInfo	ProtocolIE-ID ::= 67
id-Extended-RNC-ID	ProtocolIE-ID ::= 68
id-GANSS-CommonAssistanceData	ProtocolIE-ID ::= 69
id-GANSS-GenericAssistanceDataList	ProtocolIE-ID ::= 70
id-GANSS-MeasuredResultsList	ProtocolIE-ID ::= 71
id-GANSS-UTRAN-TRU	ProtocolIE-ID ::= 72
id-GANSSPositioning	ProtocolIE-ID ::= 73
id-GANSS-PositioningDataSet	ProtocolIE-ID ::= 74
id-GNSS-PositioningMethod	ProtocolIE-ID ::= 75
id-NetworkAssistedGANSSSupport	ProtocolIE-ID ::= 76
id-TUTRANGANSSMeasurementValueInfo	ProtocolIE-ID ::= 77
id-AdditionalGPSAssistDataRequired	ProtocolIE-ID ::= 78
id-AdditionalGanssAssistDataRequired	ProtocolIE-ID ::= 79
id-angleOfArrivalLCR	ProtocolIE-ID ::= 80
id-extendedTimingAdvanceLCR	ProtocolIE-ID ::= 81
id-additionalMeasurementInforLCR	ProtocolIE-ID ::= 82
id-timingAdvanceLCR-R7	ProtocolIE-ID ::= 83
id-rxTimingDeviationLCR	ProtocolIE-ID ::= 84
id-GPSReferenceTimeUncertainty	ProtocolIE-ID ::= 85
id-GANSS-AddIonoModelReq	ProtocolIE-ID ::= 86
id-GANSS-EarthOrientParaReq	ProtocolIE-ID ::= 87
id-GANSS-Additional-Ionospheric-Model	ProtocolIE-ID ::= 88
id-GANSS-Earth-Orientation-Parameters	ProtocolIE-ID ::= 89
id-GANSS-Additional-Time-Models	ProtocolIE-ID ::= 90
id-GANSS-Additional-Navigation-Models	ProtocolIE-ID ::= 91
id-GANSS-Additional-UTC-Models	ProtocolIE-ID ::= 92
id-GANSS-Auxiliary-Information	ProtocolIE-ID ::= 93
id-GANSS-SBAS-ID	ProtocolIE-ID ::= 94
id-GANSS-SBAS-IDs	ProtocolIE-ID ::= 95
id-GANSS-Signal-IDs	ProtocolIE-ID ::= 96
id-supportGANSSNonNativeADchoices	ProtocolIE-ID ::= 97
id-PositionDataUEbased	ProtocolIE-ID ::= 98
id-ganssCodePhaseAmbiguityExt	ProtocolIE-ID ::= 99
id-ganssIntegerCodePhaseExt	ProtocolIE-ID ::= 100

```

id-GANSScarrierPhaseRequested      ProtocolIE-ID ::= 101
id-GANSSMultiFreqMeasRequested     ProtocolIE-ID ::= 102
id-ganssReq-AddIonosphericModel    ProtocolIE-ID ::= 103
id-ganssReq-EarthOrientPara        ProtocolIE-ID ::= 104
id-ganssAddNavigationModel-req     ProtocolIE-ID ::= 105
id-ganssAddUTCModel-req            ProtocolIE-ID ::= 106
id-ganssAuxInfo-req                ProtocolIE-ID ::= 107
id-GANSS-AlmanacModelChoice        ProtocolIE-ID ::= 108
id-GANSS-alm-keplerianNAVALmanac   ProtocolIE-ID ::= 109
id-GANSS-alm-keplerianReducedAlmanac ProtocolIE-ID ::= 110
id-GANSS-alm-keplerianMidiAlmanac  ProtocolIE-ID ::= 111
id-GANSS-alm-keplerianGLONASS      ProtocolIE-ID ::= 112
id-GANSS-alm-ecefSBASAlmanac       ProtocolIE-ID ::= 113
id-UTRAN-GANSSReferenceTimeResult  ProtocolIE-ID ::= 114
id-GANSS-Reference-Time-Only       ProtocolIE-ID ::= 115
id-GANSS-AddADchoices              ProtocolIE-ID ::= 116
id-OTDOA-ReferenceCellInfo         ProtocolIE-ID ::= 117
id-DGNSS-ValidityPeriod            ProtocolIE-ID ::= 118

```

END

9.3.7 Container Definitions

```

-- *****
--
-- Container definitions
--
-- *****

PCAP-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) pcap(4) version1 (1) pcap-Containers (5) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID,
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs

```

```
FROM PCAP-CommonDataTypes;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

PCAP-PROTOCOL-IES ::= CLASS {
    &id                ProtocolIE-ID        UNIQUE,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                &id
    CRITICALITY        &criticality
    TYPE               &Value
    PRESENCE           &presence
}

-- *****
--
-- Class Definition for Protocol Extensions
--
-- *****

PCAP-PROTOCOL-EXTENSION ::= CLASS {
    &id                ProtocolIE-ID UNIQUE,
    &criticality        Criticality,
    &Extension,
    &presence           Presence
}
WITH SYNTAX {
    ID                &id
    CRITICALITY        &criticality
    EXTENSION          &Extension
    PRESENCE           &presence
}

-- *****
--
-- Class Definition for Private IEs
--
-- *****

PCAP-PRIVATE-IES ::= CLASS {
    &id                PrivateIE-ID,
    &criticality        Criticality,
    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                &id
```



```

    CRITICALITY      &criticality
    TYPE             &Value
    PRESENCE         &presence
}

-- *****
--
-- Container for Protocol IEs
--
-- *****

ProtocolIE-Container {PCAP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
        ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container {PCAP-PROTOCOL-IES : IEsSetParam} ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field {PCAP-PROTOCOL-IES : IEsSetParam} ::= SEQUENCE {
    id                PCAP-PROTOCOL-IES.&id                ({{IEsSetParam}}),
    criticality       PCAP-PROTOCOL-IES.&criticality        ({{IEsSetParam}}{@id}),
    value             PCAP-PROTOCOL-IES.&Value              ({{IEsSetParam}}{@id})
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

ProtocolIE-ContainerList {INTEGER : lowerBound, INTEGER : upperBound, PCAP-PROTOCOL-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
        ProtocolIE-Container {{IEsSetParam}}

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer {PCAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
        ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField {PCAP-PROTOCOL-EXTENSION : ExtensionSetParam} ::= SEQUENCE {
    id                PCAP-PROTOCOL-EXTENSION.&id            ({{ExtensionSetParam}}),
    criticality       PCAP-PROTOCOL-EXTENSION.&criticality    ({{ExtensionSetParam}}{@id}),
    extensionValue    PCAP-PROTOCOL-EXTENSION.&Extension      ({{ExtensionSetParam}}{@id})
}

-- *****
--
-- Container for Private IEs
--

```

```
-- *****
PrivateIE-Container {PCAP-PRIVATE-IES : IEsSetParam } ::=
  SEQUENCE (SIZE (1.. maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field {PCAP-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id                PCAP-PRIVATE-IES.&id                ({{IEsSetParam}}),
  criticality       PCAP-PRIVATE-IES.&criticality       ({{IEsSetParam}}{@id}),
  value            PCAP-PRIVATE-IES.&Value            ({{IEsSetParam}}{@id})
}

END
```

9.4 Message Transfer Syntax

PCAP shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in [9].

10 Handling of Unknown, Unforeseen and Erroneous Protocol Data

10.1 General

Protocol Error cases can be divided into three classes:

- Transfer Syntax Error.
- Abstract Syntax Error.
- Logical Error.

Protocol errors can occur in the following functions within a receiving node.

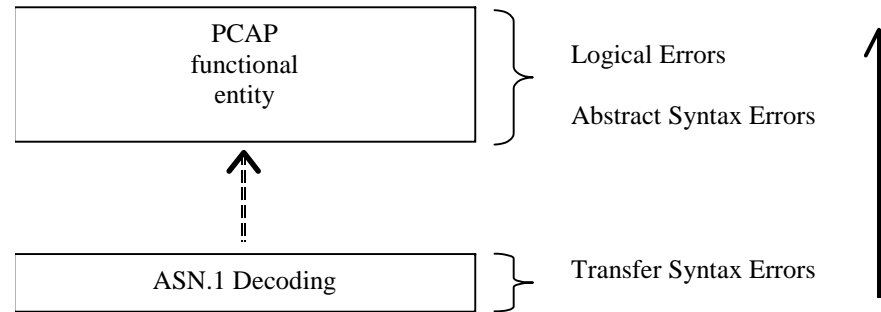


Figure 10: Protocol Errors in PCAP

The information stated in subclauses 10.2, 10.3 and 10.4, to be included in the message used when reporting an error, is what at minimum shall be included. Other optional information elements within the message may also be included, if available. This is also valid for the case when the reporting is done with a response message. The latter is an exception to what is stated in subclause 4.1.

10.2 Transfer Syntax Error

A Transfer Syntax Error occurs when the receiver is not able to decode the received physical message. Transfer syntax errors are always detected in the process of ASN.1 decoding. If a Transfer Syntax Error occurs, the receiver should initiate Error Indication procedure with appropriate cause value for the Transfer Syntax protocol error.

Examples for Transfer Syntax Errors are:

- Violation of value ranges in ASN.1 definition of messages. e.g.: If an IE has a defined value range of 0 to 10 (ASN.1: INTEGER (0..10)), and 12 will be received, then this will be treated as a transfer syntax error.
- Violation in list element constraints. e.g.: If a list is defined as containing 1 to 10 elements, and 12 elements will be received, then this case will be handled as a transfer syntax error.
- Missing mandatory elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).
- Wrong order of elements in ASN.1 SEQUENCE definitions (as sent by the originator of the message).

10.3 Abstract Syntax Error

10.3.1 General

An Abstract Syntax Error occurs when the receiving functional PCAP entity:

- 1) receives IEs or IE groups that cannot be understood (unknown IE id);

- 2) receives IEs for which the logical range is violated (e.g.: ASN.1 definition: 0 to 15, the logical range is 0 to 10 (values 11 to 15 are undefined), and 12 will be received; this case will be handled as an abstract syntax error using criticality information sent by the originator of the message);
- 3) does not receive IEs or IE groups but according to the specified presence of the concerning object, the IEs or IE groups should have been present in the received message;
- 4) receives IEs or IE groups that are defined to be part of that message in wrong order or with too many occurrences of the same IE or IE group;
- 5) receives IEs or IE groups but according to the conditional presence of the concerning object and the specified condition, the IEs or IE groups should not have been present in the received message.

Cases 1 and 2 (not comprehended IE/IE group) are handled based on received Criticality information. Case 3 (missing IE/IE group) is handled based on Criticality information and Presence information for the missing IE/IE group specified in the version of the specification used by the receiver. Case 4 (IEs or IE groups in wrong order or with too many occurrences) and Case 5 (erroneously present conditional IEs or IE groups) result in rejecting the procedure.

If an Abstract Syntax Error occurs, the receiver shall read the remaining message and shall then for each detected Abstract Syntax Error that belong to cases 1-3 act according to the Criticality Information and Presence Information for the IE/IE group due to which Abstract Syntax Error occurred in accordance with subclauses 10.3.4 and 10.3.5. The handling of cases 4 and 5 is specified in subclause 10.3.6.

10.3.2 Criticality Information

In the PCAP messages there is criticality information set for individual IEs and/or IE groups. This criticality information instructs the receiver how to act when receiving an IE or an IE group that is not comprehended, i.e. the entire item (IE or IE group) which is not (fully or partially) comprehended shall be treated in accordance with its own criticality information as specified in subclause 10.3.4.

In addition, the criticality information is used in case of the missing IE/IE group abstract syntax error (see subclause 10.3.5).

The receiving node shall take different actions depending on the value of the Criticality Information. The three possible values of the Criticality Information for an IE/IE group are:

- Reject IE.
- Ignore IE and Notify Sender.
- Ignore IE.

The following rules restrict when a receiving entity may consider an IE, an IE group, or an EP not comprehended (not implemented), and when action based on criticality information is applicable:

1. IE or IE group: When one new or modified IE or IE group is implemented for one EP from a standard version, then other new or modified IEs or IE groups specified for that EP in that standard version shall be considered comprehended by a receiving entity (some may still remain unsupported).
2. EP: The comprehension of different EPs within a standard version or between different standard versions is not mandated. Any EP that is not supported may be considered not comprehended, even if another EP from that standard version is comprehended, and action based on criticality shall be applied.

10.3.3 Presence Information

For many IEs/IE groups which are optional according to the ASN.1 transfer syntax, PCAP specifies separately if the presence of these IEs/IE groups is optional or mandatory with respect to RNS application by means of the presence field of the concerning object of class PCAP-PROTOCOL-IES, PCAP -PROTOCOL-IES-PAIR, PCAP -PROTOCOL-EXTENSION or PCAP -PRIVATE-IES.

The presence field of the indicated classes supports three values:

1. Optional;
2. Conditional;
3. Mandatory.

If an IE/IE group is not included in a received message and the presence of the IE/IE group is mandatory or the presence is conditional and the condition is true according to the version of the specification used by the receiver, an abstract syntax error occurs due to a missing IE/IE group.

If an IE/IE group is included in a received message and the presence of the IE/IE group is conditional and the condition is false according to the version of the specification used by the receiver, an abstract syntax error occurs due to this erroneously present conditional IE/IE group.

10.3.4 Not comprehended IE/IE group

10.3.4.1 Procedure Code

The receiving node shall treat the different types of received criticality information of the *Procedure Code* IE according to the following:

Reject IE:

- If a message is received with a *Procedure Code* IE marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall reject the procedure using the Error Indication procedure.

Ignore IE and Notify Sender:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the procedure and initiate the Error Indication procedure.

Ignore IE:

- If a message is received with a *Procedure Code* IE marked with "*Ignore IE*" which the receiving node does not comprehend, the receiving node shall ignore the procedure.

When using the Error Indication procedure to reject a procedure or to report an ignored procedure it shall include the *Procedure Code* IE, the *Triggering Message* IE, and the *Procedure Criticality* IE in the *Criticality Diagnostics* IE.

10.3.4.1A Type of Message

When the receiving node cannot decode the *Type of Message* IE, the Error Indication procedure shall be initiated with an appropriate cause value.

10.3.4.2 IEs other than the Procedure Code and Type of Message

The receiving node shall treat the different types of received criticality information of an IE/IE group other than the *Procedure Code* IE and *Type of Message* IE according to the following:

Reject IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the rejection of one or more IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing one or more IEs/IE groups marked with "*Reject IE*" which the receiving node does not comprehend, the receiving node shall terminate the procedure and initiate the Error Indication procedure.
- If a *response* message is received containing one or more IEs/IE groups marked with "*Reject IE*", that the receiving node does not comprehend, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and report in the response message of the procedure that one or more IEs/IE groups have been ignored. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a message *initiating* a procedure that does not have a message to report the outcome of the procedure is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups, and initiate the Error Indication procedure to report that one or more IEs/IE groups have been ignored.
- If a *response* message is received containing one or more IEs/IE groups marked with "*Ignore IE and Notify Sender*" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups, continue with the procedure as if the not comprehended IEs/IE groups were not received (except for the reporting) using the understood IEs/IE groups and initiate the Error Indication procedure.

Ignore IE:

- If a message *initiating* a procedure is received containing one or more IEs/IE groups marked with "Ignore IE" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups and continue with the procedure as if the not comprehended IEs/IE groups were not received using the understood IEs/IE groups.
- If a *response* message is received containing one or more IEs/IE groups marked with "Ignore IE" which the receiving node does not comprehend, the receiving node shall ignore the content of the not comprehended IEs/IE groups.

When reporting not comprehended IEs/IE groups marked with "Reject IE" or "Ignore IE and Notify Sender" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group. The *Repetition Number* IE shall be included in the *Information Element Criticality Diagnostics* IE if the reported IE/IE group was part of a "SEQUENCE OF" definition.

When reporting not comprehended IEs/IE groups marked with "Reject IE" or "Ignore IE and Notify Sender" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, the *Transaction Id* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group. The *Repetition Number* IE shall be included in the *Information Element Criticality Diagnostics* IE if the reported IE/IE group was part of a "SEQUENCE OF" definition.

10.3.5 Missing IE or IE group

The receiving node shall treat the missing IE/IE group according to the criticality information for the missing IE/IE group in the received message specified in the version of the present document used by the receiver:

Reject IE:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "Reject IE"; none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the missing IEs/IE groups using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.
- If a received message *initiating* a procedure that does not have a message to report unsuccessful outcome is missing one or more IEs/IE groups with specified criticality "Reject IE", the receiving node shall initiate the Error Indication procedure.
- If a received *response* message is missing one or more IEs/IE groups with specified criticality "Reject IE", the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

Ignore IE and Notify Sender:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "Ignore IE and Notify Sender", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and report in the response message of the procedure that one or more IEs/IE groups were missing. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the response message, the receiving node shall instead terminate the procedure and initiate the Error Indication procedure.

- If a received message *initiating* a procedure that does not have a message to report the outcome of the procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.
- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE and Notify Sender*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message and initiate the Error Indication procedure to report that one or more IEs/IE groups were missing.

Ignore IE:

- If a received message *initiating* a procedure is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs are missing and continue with the procedure based on the other IEs/IE groups present in the message.
- If a received *response* message is missing one or more IEs/IE groups with specified criticality "*Ignore IE*", the receiving node shall ignore that those IEs/IE groups are missing.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using a response message defined for the procedure, the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

When reporting missing IEs/IE groups with specified criticality "*Reject IE*" or "*Ignore IE and Notify Sender*" using the Error Indication procedure, the *Procedure Code* IE, the *Triggering Message* IE, *Procedure Criticality* IE, the *Transaction Id* IE, and the *Information Element Criticality Diagnostics* IE shall be included in the *Criticality Diagnostics* IE for each reported IE/IE group.

10.3.6 IEs or IE groups received in wrong order or with too many occurrences or erroneously present

If a message with IEs or IE groups in wrong order or with too many occurrences is received or if IEs or IE groups with a conditional presence are present when the condition is not met (i.e. erroneously present), the receiving node shall behave according to the following:

- If a message *initiating* a procedure is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, none of the functional requests of the message shall be executed. The receiving node shall reject the procedure and report the cause value "Abstract Syntax Error (Falsely Constructed Message)" using the message normally used to report unsuccessful outcome of the procedure. In case the information received in the initiating message was insufficient to determine a value for all IEs that are required to be present in the message used to report the unsuccessful outcome of the procedure, the receiving node shall instead terminate the procedure and initiate the Error Indication.
- If a message *initiating* a procedure that does not have a message to report unsuccessful outcome is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall terminate the procedure and initiate the Error Indication procedure, and use cause value "Abstract Syntax Error (Falsely Constructed Message)".
- If a *response* message is received containing IEs or IE groups in wrong order or with too many occurrences or erroneously present, the receiving node shall consider the procedure as unsuccessfully terminated and initiate local error handling.

10.4 Logical Error

Logical error situations occur when a message is comprehended correctly, but the information contained within the message is not valid (i.e. semantic error), or describes a procedure which is not compatible with the state of the receiver. In these conditions, the following behaviour shall be performed (unless otherwise specified) as defined by the class of the elementary procedure, irrespective of the criticality of the IEs/IE groups containing the erroneous values.

Class 1:

Protocol Causes:

Where the logical error occurs in a request message of a class 1 procedure, and the procedure has a message to report this unsuccessful outcome, this message shall be sent with an appropriate cause value. Typical cause values are:

1. Semantic Error.
2. Message not compatible with receiver state.

Where the logical error is contained in a request message of a class 1 procedure, and the procedure does not have a message to report this unsuccessful outcome, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value.

Where the logical error exists in a response message of a class 1 procedure, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.

Class 2:

Where the logical error occurs in a message of a class 2 procedure, the procedure shall be terminated and the Error Indication procedure shall be initiated with an appropriate cause value.

10.5 Exceptions

The error handling for all the cases described hereafter shall take precedence over any other error handling described in the other subclauses of clause 10.

- If any type of error (Transfer Syntax Error, Abstract Syntax Error or Logical Error) is detected in the ERROR INDICATION message, it shall not trigger the Error Indication procedure in the receiving Node but local error handling.
- In case a response message or Error Indication message needs to be returned, but the information necessary to determine the receiver of that message is missing, the procedure shall be considered as unsuccessfully terminated and local error handling shall be initiated.
- If an error that terminates a procedure occurs, the returned cause value shall reflect the error that caused the termination of the procedure even if one or more abstract syntax errors with criticality “ignore and notify” have earlier occurred within the same procedure.

Annex A (informative): Guidelines for Usage of the Criticality Diagnostics IE

A.1 EXAMPLE MESSAGE Layout

Assume the following message format:

Table A.1

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M				YES	Reject
Transaction ID	M				-	
A	M				YES	reject
B	M				YES	reject
>E		1..<maxE>			EACH	ignore
>>F		1..<maxF>			-	
>>>G		0..3, ...			EACH	ignore
>>H		1..<maxH>			EACH	ignore
>>>G		0..3, ...			EACH	ignore and notify
>>G	M				YES	reject
>>J		1..<maxJ>			-	
>>>G		0..3, ...			EACH	reject
C	M				YES	reject
>K		1..<maxK>			EACH	ignore and notify
>>L		1..<maxL>			-	
>>>M	O				-	
D	M				YES	reject

NOTE: The IEs F, J, and L do not have assigned criticality. The IEs F, J, and L are consequently realised as the ASN.1 type SEQUENCE OF of "ordinary" ASN.1 type, e.g. INTEGER. On the other hand, the repeatable IEs with assigned criticality are realised as the ASN.1 type SEQUENCE OF of an IE object, e.g. ProtocolIE-
Single-Container.

For the corresponding ASN.1 layout, see clause A.4.

A.2 Example on a Received EXAMPLE MESSAGE

Assume further more that a received message based on the above tabular format is according to figure A.1.

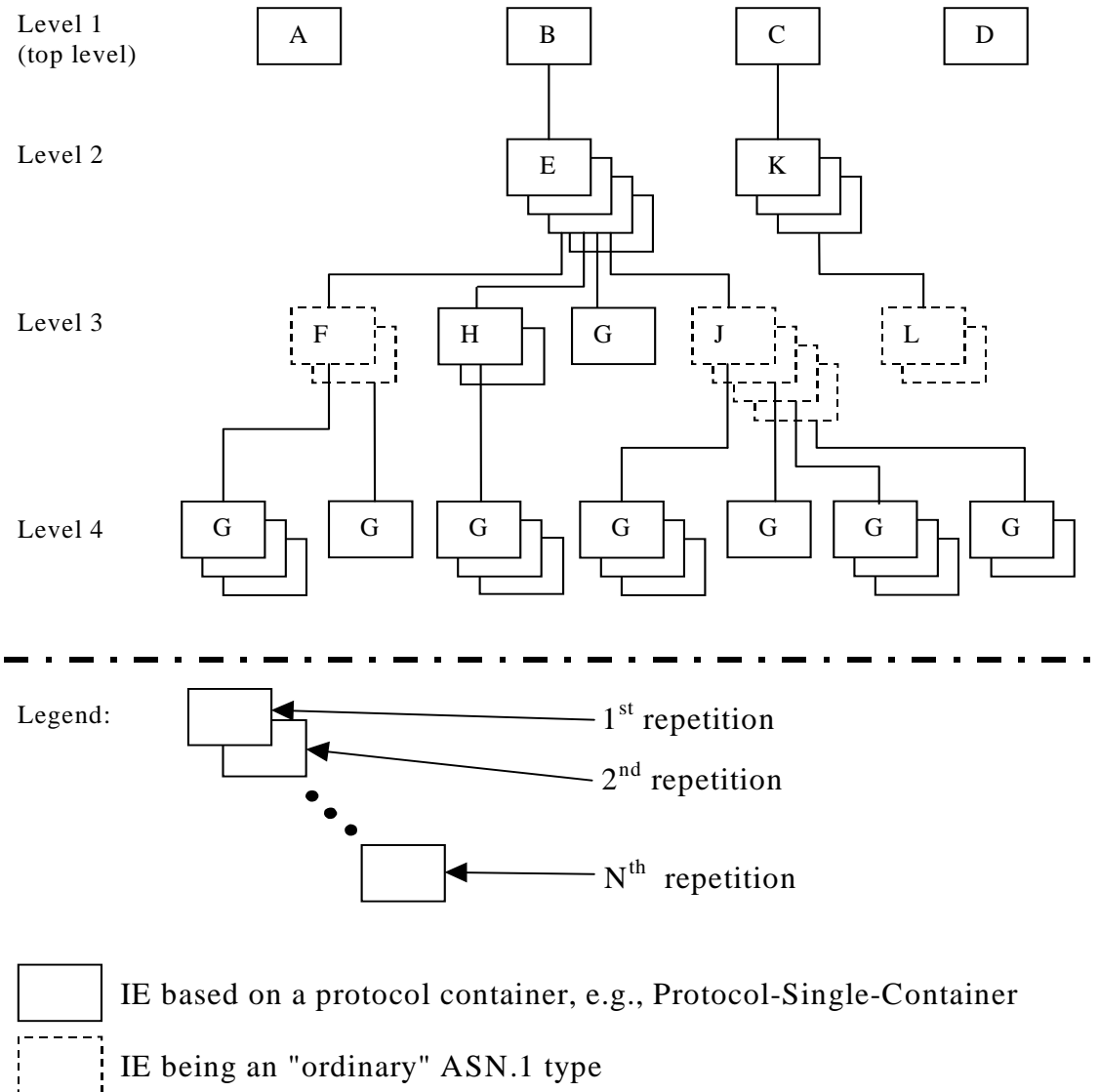


Figure A.1: Example of content of a received PCAP message based on the EXAMPLE MESSAGE

A.3 Content of Criticality Diagnostics

A.3.1 Example 1

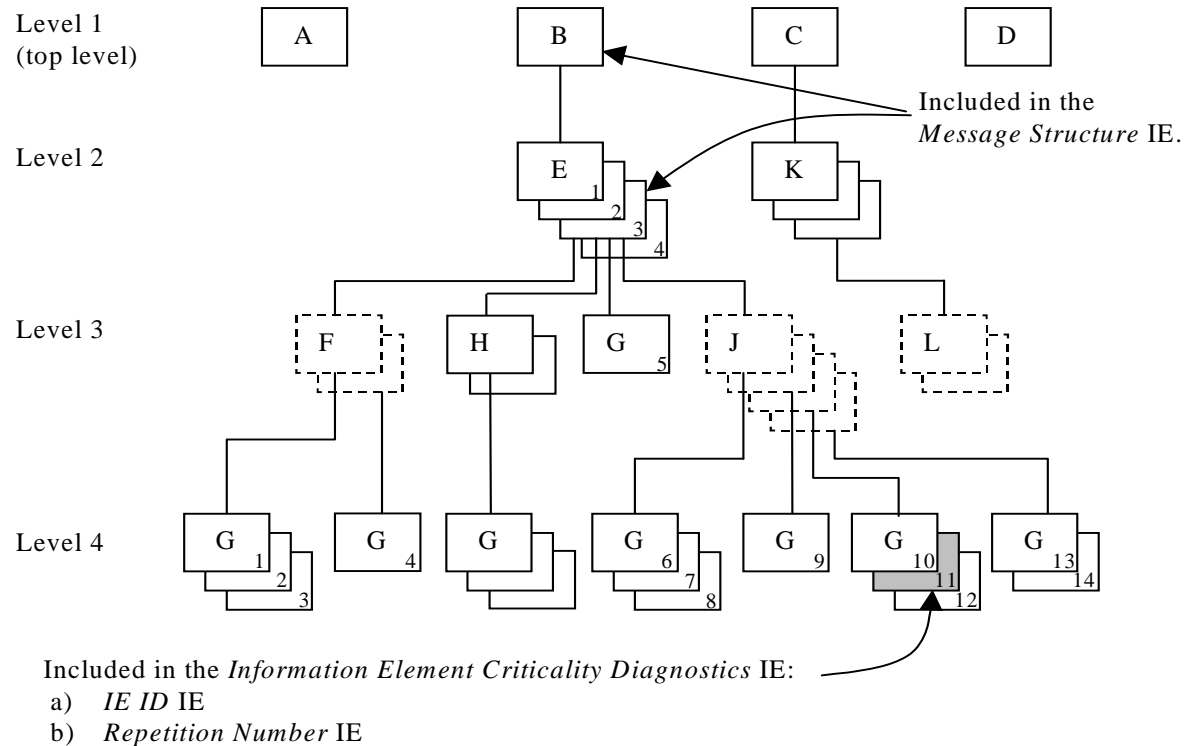


Figure A.2: Example of a received PCAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE J shown in the figure A.2, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics 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 understood	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE 1: The IE J on level 3 cannot be included in the *Message Structure* IE since they have no criticality of their own.

NOTE 2: The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.3.2 Example 2

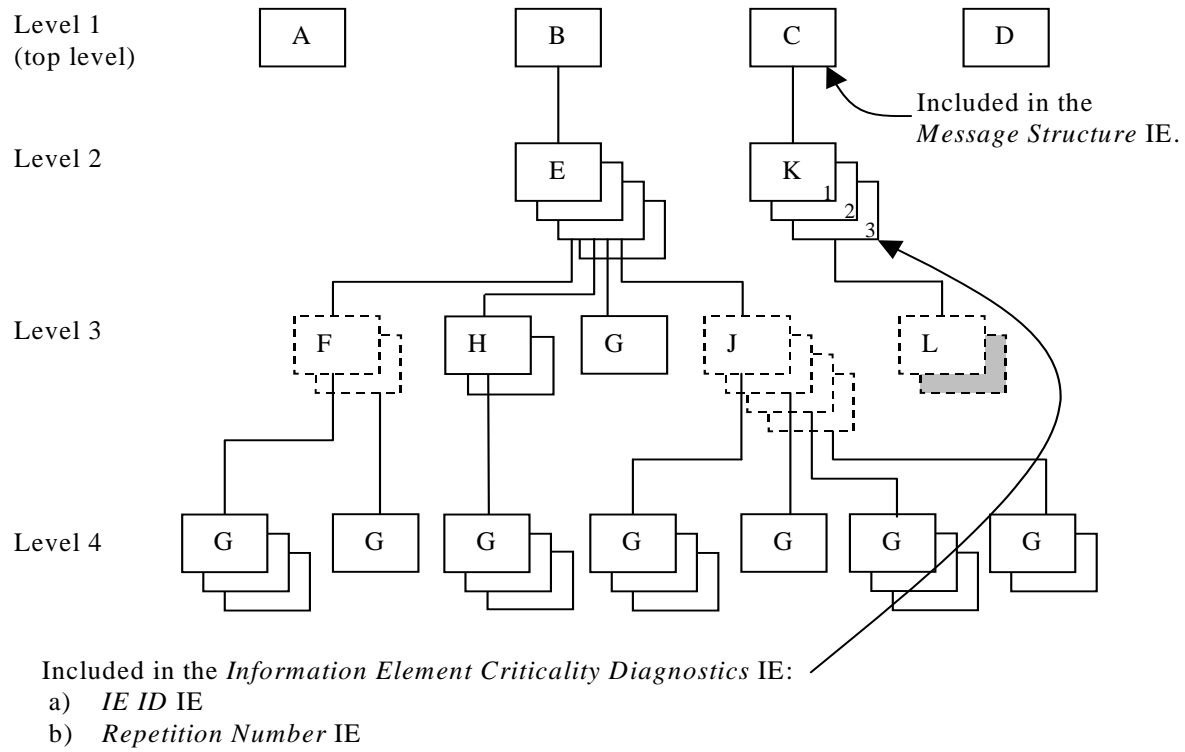


Figure A.3: Example of a received PCAP message containing a not comprehended IE

If there is an error within the second instance (marked as grey) in the sequence (IE L in the tabular format) on level 3 below IE K in the structure shown in the figure A.3, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IEAs* in table A.3.

Table A.3

IE name	Value	Comment
IE Criticality	ignore and notify	Criticality for IE on the reported level, i.e. level 2.
IE ID	id-K	IE ID from the reported level, i.e. level 2.
Repetition Number	3	Repetition number on the reported level, i.e. level 2.
Type of Error	not understood	
<i>Message Structure, first repetition</i>		
>IE ID	id-C	IE ID from the lowest level above the reported level, i.e. level 1.

NOTE: The IE L on level 3 cannot be reported individually included in the *Message Structure* IE since it has no criticality of its own.

A.3.3 Example 3

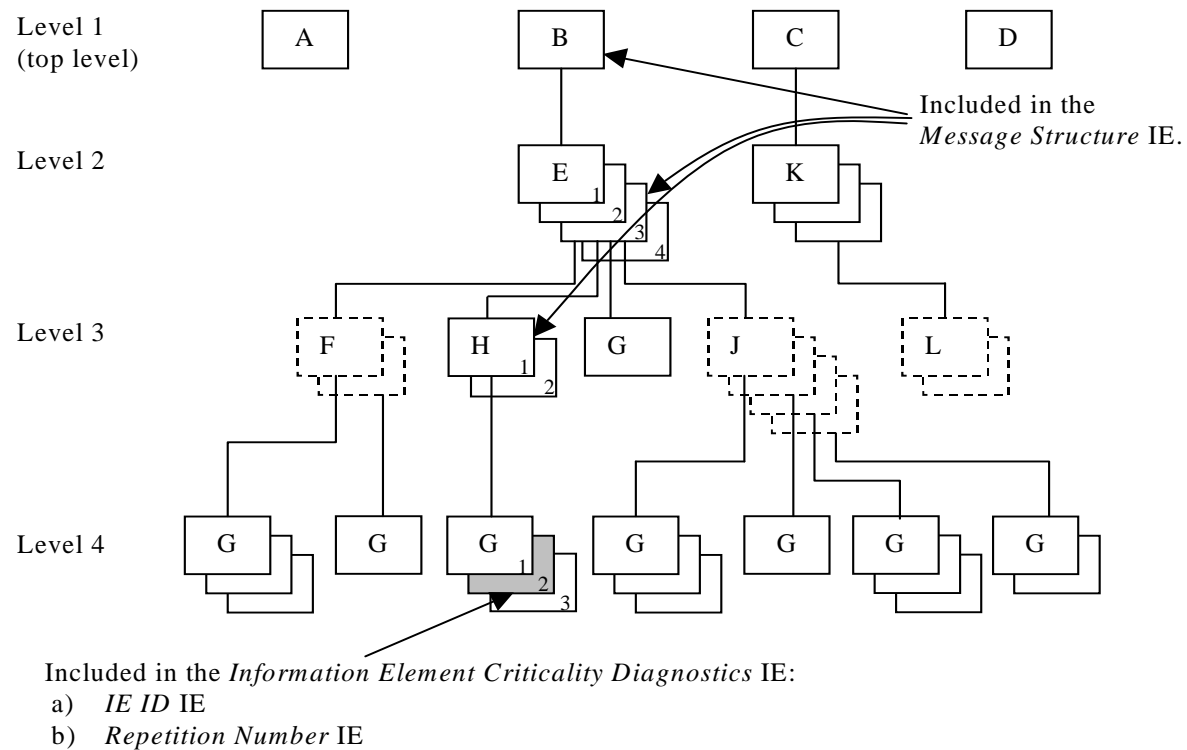


Figure A.4: Example of a received PCAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE H shown in the figure A.4, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE*s in table A.4.

Table A.4

IE name	Value	Comment
IE Criticality	ignore and notify	Criticality for IE on the reported level, i.e. level 4.
IE ID	id-G	IE ID from the reported level, i.e. level 4.
Repetition Number	2	Repetition number on the reported level, i.e. level 4.
Type of Error	not understood	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from level 2.
>Repetition Number	3	Repetition number from level 2.
<i>Message Structure, third repetition</i>		
>IE ID	id-H	IE ID from the lowest level above the reported level, i.e. level 3.
>Repetition Number	1	Repetition number from the lowest level above the reported level, i.e. level 3.

NOTE: The repetition number of level 4 indicates the number of repetitions of IE G received up to the detected erroneous repetition, counted below the same instance of the previous level with assigned criticality (instance 1 of IE H on level 3).

A.3.4 Example 4

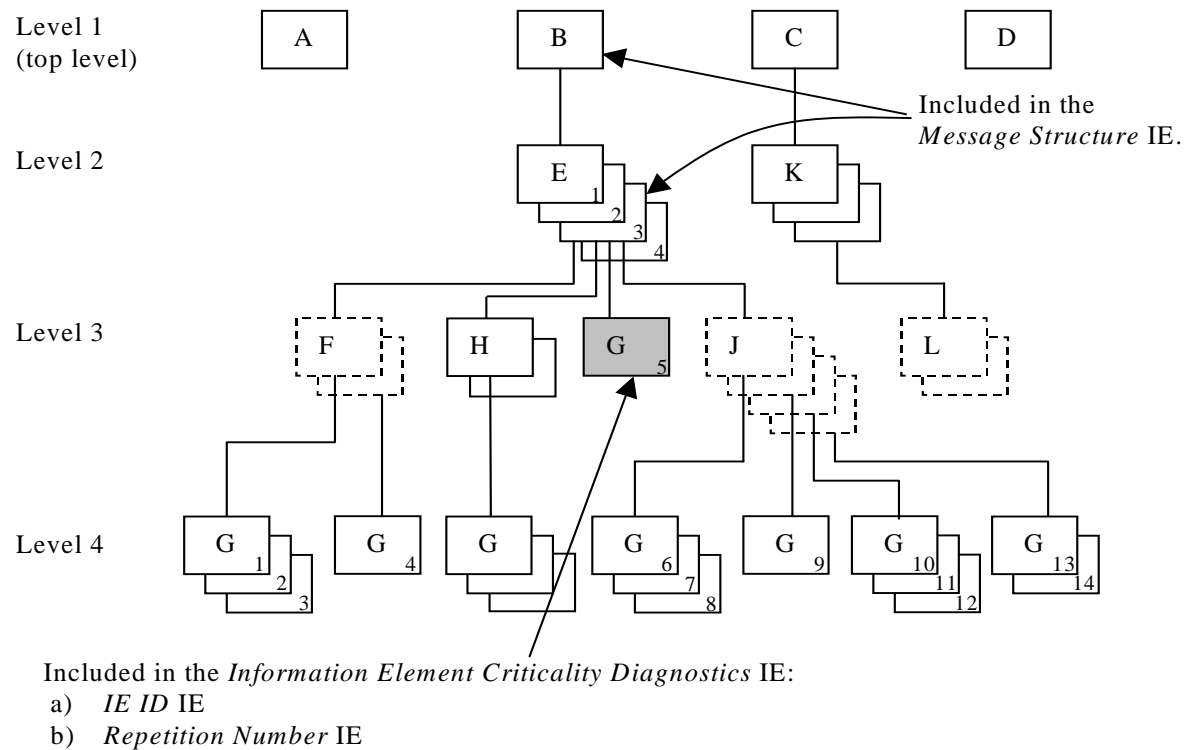


Figure A.5: Example of a received PCAP message containing a not comprehended IE

If there is an error within the instance marked as grey in the IE G in the IE E shown in the figure A.5, this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE*, as in table A.5.

Table A.5

IE name	Value	Comment
IE Criticality	Reject	Criticality for IE on the reported level, i.e. level 3.
IE ID	id-G	IE ID from the reported level, i.e. level 3.
Repetition Number	5	Repetition number on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the <i>Message Structure</i> IE this is the fifth occurrence of IE G within the IE E (level 2).
Type of Error	not understood	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE: The repetition number of the reported IE indicates the number of repetitions of IE G received up to the detected erroneous repetition, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.3.5 Example 5

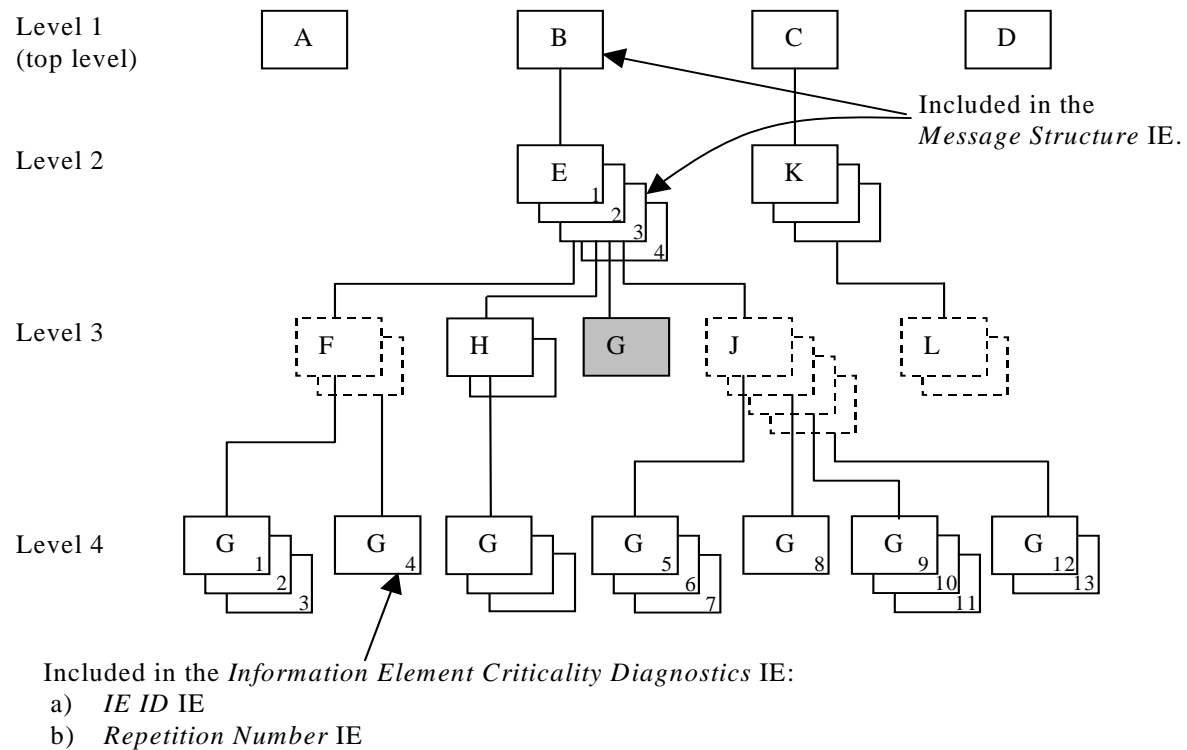


Figure A.6: Example of a received PCAP message with a missing IE

If the instance marked as grey in the IE G in the IE E shown in the figure A.6, is missing this will be reported within the *Information Element Criticality Diagnostics IE* within the *Criticality Diagnostics IE*, as in table A.6.

Table A.6

IE name	Value	Comment
IE Criticality	reject	Criticality for IE on the reported level, i.e. level 3.
IE ID	id-G	IE ID from the reported level, i.e. level 3.
Repetition Number	4	Repetition number up to the missing IE on the reported level, i.e. level 3. (Since the IE E (level 2) is the lowest level included in the <i>Message Structure</i> IE there have been four occurrences of IE G within the IE E (level 2) up to the missing occurrence.
Type of Error	missing	
<i>Message Structure, first repetition</i>		
>IE ID	id-B	IE ID from level 1.
<i>Message Structure, second repetition</i>		
>IE ID	id-E	IE ID from the lowest level above the reported level, i.e. level 2.
>Repetition Number	3	Repetition number from the lowest level above the reported level, i.e. level 2.

NOTE: The repetition number of the reported IE indicates the number of repetitions of IE G received up to but not including the missing occurrence, counting all occurrences of the IE G below the same instance of the previous level with assigned criticality (instance 3 of IE E on level 2).

A.4 ASN.1 of EXAMPLE MESSAGE

```

ExampleMessage ::= SEQUENCE {
    ProtocolIEs      ProtocolIE-Container    {{ExampleMessage-IEs}},
    ProtocolExtensions ProtocolExtensionContainer {{ExampleMessage-Extensions}}  OPTIONAL,
    ...
}

ExampleMessage-IEs PCAP-PROTOCOL-IES ::= {
    { ID id-A    CRITICALITY reject  TYPE A  PRESENCE mandatory} |
    { ID id-B    CRITICALITY reject  TYPE B  PRESENCE mandatory} |
    { ID id-C    CRITICALITY reject  TYPE C  PRESENCE mandatory} |
    { ID id-D    CRITICALITY reject  TYPE D  PRESENCE mandatory} ,
    ...
}

B ::= SEQUENCE {
    e          E-List,
    iE-Extensions ProtocolExtensionContainer { {B-ExtIEs} }  OPTIONAL,
    ...
}

B-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

E-List ::= SEQUENCE (SIZE (1..maxE)) OF ProtocolIE-Single-Container { {E-IEs} }

E-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-E    CRITICALITY ignore  TYPE E  PRESENCE mandatory }
}

E ::= SEQUENCE {
  f          F-List,
  h          H-List,
  g          G-List1,
  j          J-List,
  iE-Extensions ProtocolExtensionContainer { {E-ExtIEs} }  OPTIONAL,
  ...
}

E-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

F-List ::= SEQUENCE (SIZE (1..maxF)) OF F

F ::= SEQUENCE {
  g          G-List2 OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {F-ExtIEs} }  OPTIONAL,
  ...
}

F-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

G-List2 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G2-IEs} }

G2-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY ignore  TYPE G  PRESENCE mandatory }
}

H-List ::= SEQUENCE (SIZE (1..maxH)) OF ProtocolIE-Single-Container { {H-IEs} }

H-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-H    CRITICALITY ignore  TYPE H  PRESENCE mandatory }
}

H ::= SEQUENCE {
  g          G-List3 OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {H-ExtIEs} }  OPTIONAL,
  ...
}

H-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

G-List3 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G3-IEs} }

```

```

G3-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY notify TYPE G  PRESENCE mandatory }
}

G-List1 ::= ProtocolIE-Single-Container { {G1-IEs} }

G1-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY reject TYPE G  PRESENCE mandatory }
}

J-List ::= SEQUENCE (SIZE (1..maxJ)) OF J

J ::= SEQUENCE {
  g          G-List4 OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { {J-ExtIEs} } OPTIONAL,
  ...
}

J-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

G-List4 ::= SEQUENCE (SIZE (1..3, ...)) OF ProtocolIE-Single-Container { {G4-IEs} }

G4-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-G    CRITICALITY reject TYPE G  PRESENCE mandatory }
}

C ::= SEQUENCE {
  k          K-List,
  iE-Extensions ProtocolExtensionContainer { {C-ExtIEs} } OPTIONAL,
  ...
}

C-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

K-List ::= SEQUENCE (SIZE (1..maxK)) OF ProtocolIE-Single-Container { {K-IEs} }

K-IEs PCAP-PROTOCOL-IES ::= {
  { ID id-K    CRITICALITY notify TYPE K  PRESENCE mandatory }
}

K ::= SEQUENCE {
  l          L-List,
  iE-Extensions ProtocolExtensionContainer { {K-ExtIEs} } OPTIONAL,
  ...
}

K-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
  ...
}

```



```
L-List ::= SEQUENCE (SIZE (1..maxL)) OF L

L ::= SEQUENCE {
    m          M OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { {L-ExtIEs} } OPTIONAL,
    ...
}

L-ExtIEs PCAP-PROTOCOL-EXTENSION ::= {
    ...
}

ExampleMessage-Extensions PCAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

Annex B (informative): Change History

TSG #	TSG Doc.	CR	Rev	Subject/Comment	New
12/2008	-	-	-	Creation of Rel-8 version based on v 7.11.0	8.0.0
42	RP-080852	0115	1	Support for additional navigation satellite systems in PCAP	8.0.0
43	RP-090076	0117		PCAP Review	8.1.0
43	RP-090076	0118		Correction to Additional GANSS Assistance Data Required IE	8.1.0
45	RP-090770	0119	1	Correction on Cell-ID Measured Results Sets in INFORMATION EXCHANGE INITIATION REQUEST	8.2.0
12/2009	-	-	-	Creation of Rel-9 version based on v 8.2.0	9.0.0
47	RP-100229	0120		Correction to OTDOA in SAS-centric mode	9.1.0
47	RP-100230	0121	1	Addition of DGNSS Validity Period in PCAP	9.1.0

History

Document history		
V9.0.0	January 2010	Publication
V9.1.0	April 2010	Publication