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NR Positioning Protocol A (NRPPa)
(3GPP TS 38.455 version 17.1.1 Release 17)**



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1 Scope

The present document specifies the control plane radio network layer signalling procedures between a NG-RAN node and the LMF. NRPPa supports the concerned functions by signalling procedures defined in this document.

2 References

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

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

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] 3GPP TS 38.413: "NG-RAN; NG Application Protocol (NGAP)".
- [3] 3GPP TS 38.300: "NR; NR and NG-RAN Overall Description; Stage 2".
- [4] Void.
- [5] 3GPP TR 25.921 (version.7.0.0): "Guidelines and principles for protocol description and error handling".
- [6] ITU-T Recommendation X.691 (2002-07): "Information technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER)".
- [7] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Base Station (BS) radio transmission and reception".
- [8] 3GPP TS 23.032: "Technical Specification Group Services and System Aspects; Universal Geographical Area Description (GAD)".
- [9] 3GPP TS 36.133: "Evolved Universal Terrestrial Radio Access (E-UTRA); Requirements for support of radio resource management".
- [10] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Physical Channels and Modulation".
- [11] IEEE Std 802.11™-2012, IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area network.
- [12] 3GPP TS 36.455: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol A (LPPa)".
- [13] 3GPP TS 38.331: "NR; Radio Resource Control (RRC); Protocol specification".
- [14] 3GPP TS 37.355: "Technical Specification Group Radio Access Network; LTE Positioning Protocol (LPP)".
- [15] 3GPP TS 38.321: "NR; Medium Access Control (MAC) protocol specification".
- [16] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".
- [17] 3GPP TS 36.214: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer (PHY); Measurements".

- [18] 3GPP TS 38.305: "NG Radio Access Network (NG-RAN); Stage 2 functional specification of User Equipment (UE) positioning in NG-RAN".
- [19] 3GPP TS 38.215: "NR; Physical layer (PHY); Measurements".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

gNB: as defined in TS 38.300 [3].

NG-RAN node: as defined in TS 38.300 [3].

ng-eNB: as defined in TS 38.300 [3].

3.2 Symbols

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

<symbol> <Explanation>

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

ARP	Antenna Reference Point
BDS	BeiDou Navigation Satellite System
CG-SDT	Configured Grant Small Data Transmission
CID	Cell-ID (positioning method)
DL-PRS	Downlink Positioning Reference Signal
E-CID	Enhanced Cell-ID (positioning method)
EGNOS	European Geostationary Navigation Overlay Service
GAGAN	GPS Aided Geo Augmented Navigation
GLONASS	GLObal'naya NAVigatsionnaya Sputnikovaya Sistema (Engl.: Global Navigation Satellite System)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
LMF	Location Management Function
LPP	LTE Positioning Protocol
MSAS	Multi-functional Satellite Augmentation System
NavIC	NAVigation with Indian Constellation
NRPPa	NR Positioning Protocol A
OTDOA	Observed Time Difference of Arrival
posSIB	Positioning SIB
PRS	Positioning Reference Signal (for E-UTRA)
QZSS	Quasi-Zenith Satellite System
RSRP	Reference Signal Received Power
RSSI	Received Signal Strength Indicator
RSTD	Reference Signal Time Difference
SBAS	Space Based Augmentation System
SRS	Sounding Reference Signal
TEG	Timing Error group
TRP	Transmission-Reception Point

UE	User Equipment
UL-AoA	Uplink Angle of Arrival
UL-RTOA	Uplink Relative Time of Arrival
UL-SRS	Uplink Sounding Reference Signal
UL SRS-RSRPP	UL SRS reference signal received path power
WAAS	Wide Area Augmentation System
Z-AoA	Zenith Angles of Arrival

4 General

4.1 Procedure specification principles

The principle for specifying the procedure logic is to specify the functional behaviour of the terminating NG-RAN Node exactly and completely. Any rule that specifies the behaviour of the originating NG-RAN Node shall be possible to be verified with information that is visible within the system.

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 initiating 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. For requirements on including *Criticality Diagnostics* IE, see section 10.

4.2 Forwards and backwards compatibility

The forwards and backwards compatibility of the protocol is assured by a 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:

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. Handover Preparation 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. ERROR INDICATION 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>Cause</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 sub clause 9.2 enclosed by quotation marks, e.g. "Value".

5 NRPPa services

The present clause describes the services an NG -RAN Node offers to the LMF.

5.1 NRPPa procedure modules

The procedures are divided into two modules as follows:

1. NRPPa Location Information Transfer Procedures;
2. NRPPa Management Procedures;

The NRPPa Location Information Transfer Procedures module contains procedures used to handle the transfer of positioning related information between NG-RAN Node and LMF.

The Management Procedures module contains procedures that are not related specifically to positioning, i.e. error handling.

5.2 Parallel transactions

Unless explicitly indicated in the procedure specification, at any instance in time one protocol peer may have more than one ongoing NRPPa procedure.

6 Services expected from lower layer

Within 5G RAN, NRPPa protocol uses the services provided by the NGAP protocol. An NRPPa message is carried inside an NGAP message.

NGAP signalling is described in TS 38.413 [2].

7 Functions of NRPPa

The NRPPa protocol provides the following functions:

- E-CID Location Information Transfer. This function allows the NG-RAN node to exchange location information with LMF for the purpose of E-CID positioning and NR E-CID positioning.
- OTDOA Information Transfer. This function allows the NG-RAN node to exchange information with the LMF for the purpose of OTDOA positioning.
- Reporting of General Error Situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.
- Assistance Information Transfer. This function allows the LMF to exchange information with the NG-RAN node for the purpose of assistance information broadcasting.
- Positioning Information Transfer. This function allows the NG-RAN node to exchange positioning information with the LMF for the purpose of positioning.
- Measurement Information Transfer. This function allows the LMF to exchange measurement information with the NG-RAN node for the purpose of positioning.
- TRP Information Transfer. This function allows an LMF to obtain TRP related information from an NG-RAN node.

- PRS Information Transfer. This function allows the LMF to exchange PRS related information with the NG-RAN node.
- Measurement Preconfiguration Information Transfer. This function allows the LMF to request the NG-RAN node to preconfigure and activate measurement gap and/or PRS processing window.

The mapping between the above functions and NRPPa EPs is shown in the table below.

Table 7-1: Mapping between NRPPa functions and NRPPa EPs

Function	Elementary Procedure(s)
E-CID Location Information Transfer	a) E-CID Measurement Initiation b) E-CID Measurement Failure Indication c) E-CID Measurement Report d) E-CID Measurement Termination
OTDOA Information Transfer	OTDOA Information Exchange
Assistance Information Transfer	a) Assistance Information Control b) Assistance Information Feedback
Reporting of General Error Situations	Error Indication
Positioning Information Transfer	a) Positioning Information Exchange b) Positioning Information Update c) Positioning Activation d) Positioning Deactivation
TRP Information Transfer	TRP Information Exchange
Measurement Information Transfer	a) Measurement b) Measurement Update c) Measurement Report d) Measurement Abort e) Measurement Failure Indication
PRS Information Transfer	PRS Configuration Exchange
Measurement Preconfiguration Information Transfer	Measurement Preconfiguration Measurement Activation

8 NRPPa procedures

8.1 Elementary procedures

In the following tables, all EPs are divided into Class 1 and Class 2 EPs.

Table 8.1-1: Class 1 Elementary Procedures

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
E-CID Measurement Initiation	E-CID MEASUREMENT INITIATION REQUEST	E-CID MEASUREMENT INITIATION RESPONSE	E-CID MEASUREMENT INITIATION FAILURE
OTDOA Information Exchange	OTDOA INFORMATION REQUEST	OTDOA INFORMATION RESPONSE	OTDOA INFORMATION FAILURE
Positioning Information Exchange	POSITIONING INFORMATION REQUEST	POSITIONING INFORMATION RESPONSE	POSITIONING INFORMATION FAILURE
TRP Information Exchange	TRP INFORMATION REQUEST	TRP INFORMATION RESPONSE	TRP INFORMATION FAILURE
Measurement	MEASUREMENT REQUEST	MEASUREMENT RESPONSE	MEASUREMENT FAILURE
Positioning Activation	POSITIONING ACTIVATION REQUEST	POSITIONING ACTIVATION RESPONSE	POSITIONING ACTIVATION FAILURE
PRS Configuration Exchange	PRS CONFIGURATION REQUEST	PRS CONFIGURATION RESPONSE	PRS CONFIGURATION FAILURE
Measurement Preconfiguration	MEASUREMENT PRECONFIGURATION REQUIRED	MEASUREMENT PRECONFIGURATION CONFIRM	MEASUREMENT PRECONFIGURATION REFUSE

Table 8.1-2: Class 2 Elementary Procedures

Elementary Procedure	Initiating Message
E-CID Measurement Failure Indication	E-CID MEASUREMENT FAILURE INDICATION
E-CID Measurement Report	E-CID MEASUREMENT REPORT
E-CID Measurement Termination	E-CID MEASUREMENT TERMINATION COMMAND
Error Indication	ERROR INDICATION
Assistance Information Control	ASSISTANCE INFORMATION CONTROL
Assistance Information Feedback	ASSISTANCE INFORMATION FEEDBACK
Positioning Information Update	POSITIONING INFORMATION UPDATE
Measurement Report	MEASUREMENT REPORT
Measurement Update	MEASUREMENT UPDATE
Measurement Abort	MEASUREMENT ABORT
Measurement Failure Indication	MEASUREMENT FAILURE INDICATION
Positioning Deactivation	POSITIONING DEACTIVATION
Measurement Activation	MEASUREMENT ACTIVATION

8.2 Location Information Transfer Procedures

8.2.1 E-CID Measurement Initiation

8.2.1.1 General

The purpose of E-CID Measurement Initiation procedure is to allow the LMF to request the NG-RAN node to report E-CID measurements used by LMF to compute the location of the UE.

8.2.1.2 Successful Operation

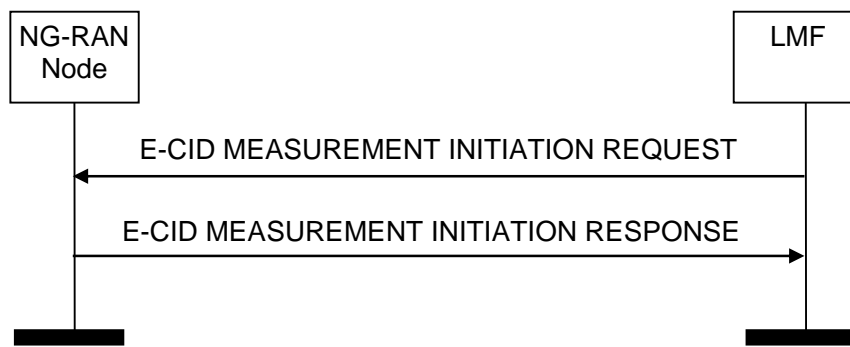


Figure 8.2.1.2-1: E-CID Measurement Initiation procedure, successful operation

The LMF initiates the procedure by sending an E-CID MEASUREMENT INITIATION REQUEST message. If the NG-RAN node is able to initiate the requested E-CID measurements, it shall reply with the E-CID MEASUREMENT INITIATION RESPONSE message.

The *Measured Results* IE shall be included in the *E-CID Measurement Result* IE of the E-CID MEASUREMENT INITIATION RESPONSE message when measurement results other than the "Cell-ID" have been requested.

If the *Report Characteristics* IE is set to "OnDemand", the NG-RAN node shall return the result of the measurement in the E-CID MEASUREMENT INITIATION RESPONSE message including, if available, the *NG-RAN Access Point Position* IE in the *E-CID Measurement Result* IE, and the LMF shall consider that the E-CID measurements for the UE has been terminated by the NG-RAN node. If available, the NG-RAN node shall include the *Cell Portion ID* IE in the E-CID MEASUREMENT INITIATION RESPONSE message. Upon reception of the *Cell Portion ID* IE, the LMF may use the value as the cell portion for the measurement. If the *Report Characteristics* IE is set to "OnDemand" and the *Inter-RAT Measurement Quantities* IE is included in the E-CID MEASUREMENT INITIATION REQUEST message, the NG-RAN node shall, if supported, provide the corresponding measurements, if available in the NG-RAN node, in the *Inter-RAT Measurement Result* IE in E-CID MEASUREMENT INITIATION RESPONSE message. If the *Report Characteristics* IE is set to "OnDemand" and the *WLAN Measurement Quantities* IE is included in the E-CID MEASUREMENT INITIATION REQUEST message, the NG-RAN node shall, if supported, provide the corresponding measurements, if available in the NG-RAN node, in the *WLAN Measurement Result* IE in E-CID MEASUREMENT INITIATION RESPONSE message.

If the *Report Characteristics* IE is set to "Periodic", the NG-RAN node shall initiate the requested measurements and shall reply with the E-CID MEASUREMENT INITIATION RESPONSE message without including either the *E-CID Measurement Result* IE or the *Cell Portion ID* IE in this message. The NG-RAN node shall then periodically initiate the E-CID Measurement Report procedure for the measurements, with the requested reporting periodicity.

8.2.1.3 Unsuccessful Operation

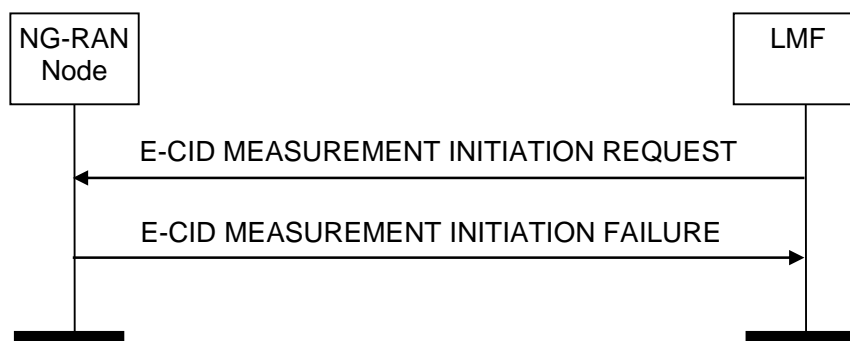


Figure 8.2.1.3-1: E-CID Measurement Initiation procedure, unsuccessful operation

If the NG-RAN node is not able to initiate at least one of the requested E-CID measurements, the NG-RAN node shall respond with an E-CID MEASUREMENT INITIATION FAILURE message.

8.2.1.4 Abnormal Conditions

Void.

8.2.2 E-CID Measurement Failure Indication

8.2.2.1 General

The purpose of the E-CID Measurement Failure Indication procedure is for the NG-RAN node to notify the LMF that the E-CID measurements previously requested with the E-CID Measurement Initiation procedure can no longer be reported.

8.2.2.2 Successful Operation

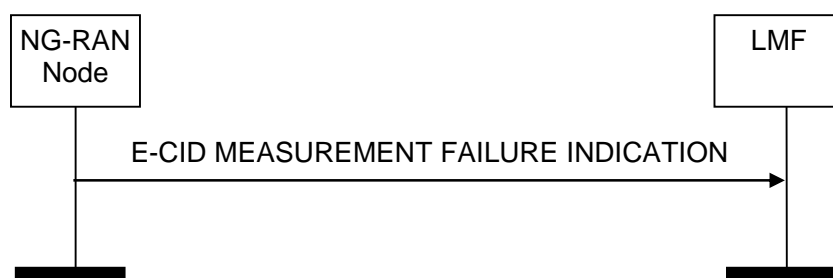


Figure 8.2.2.2-1: E-CID Measurement Failure Indication, successful operation

Upon reception of the E-CID MEASUREMENT FAILURE INDICATION message, the LMF shall consider that the E-CID measurements for the UE have been terminated by the NG-RAN node.

8.2.2.3 Unsuccessful Operation

Not applicable.

8.2.2.4 Abnormal Conditions

Void.

8.2.3 E-CID Measurement Report

8.2.3.1 General

The purpose of E-CID Measurement Report procedure is for the NG-RAN node to provide the E-CID measurements for the UE to the LMF.

8.2.3.2 Successful Operation



Figure 8.2.3.2-1: E-CID Measurement Report procedure, successful operation

The NG-RAN node initiates the procedure by sending an E-CID MEASUREMENT REPORT message. The E-CID MEASUREMENT REPORT message contains the E-CID measurement results according to the measurement configuration in the respective E-CID MEASUREMENT INITIATION REQUEST message.

The *Measured Results* IE shall be included in the *E-CID Measurement Result* IE of the E-CID MEASUREMENT REPORT message when measurement results other than the "Cell-ID" have been requested.

If available, the NG-RAN node shall include the *NG-RAN Access Point Position* IE or the *Geographical Coordinates* IE which is the configured estimated serving antenna position in the *E-CID Measurement Result* IE within the E-CID MEASUREMENT REPORT message. Upon reception of this *NG-RAN Access Point Position* IE, the LMF may use the value as the geographical position of the NG-RAN access point.

If available, the NG-RAN node shall include the *Cell Portion ID* IE in the E-CID MEASUREMENT REPORT message. Upon reception of the *Cell Portion ID* IE, the LMF may use the value as the cell portion for the measurement.

8.2.3.3 Unsuccessful Operation

Not applicable.

8.2.3.4 Abnormal Conditions

Void.

8.2.4 E-CID Measurement Termination

8.2.4.1 General

The purpose of E-CID Measurement Termination procedure is to terminate periodical E-CID measurements for the UE performed by the NG-RAN node.

8.2.4.2 Successful Operation



Figure 8.2.4.2-1: E-CID Measurement Termination procedure, successful operation

The LMF initiates the procedure by generating an E-CID MEASUREMENT TERMINATION COMMAND message.

8.2.4.3 Unsuccessful Operation

Not applicable.

8.2.4.4 Abnormal Conditions

Void.

8.2.5 OTDOA Information Exchange

8.2.5.1 General

The purpose of the OTDOA Information Exchange procedure is to allow the LMF to request the NG-RAN node to transfer OTDOA information to the LMF.

8.2.5.2 Successful Operation

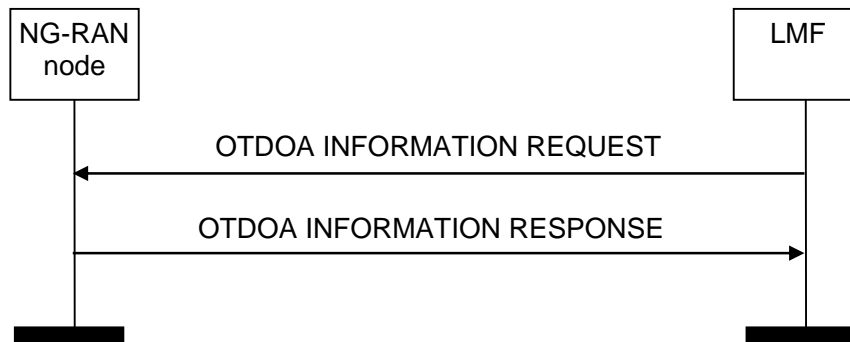


Figure 8.2.5.2-1: OTDOA Information Exchange procedure, successful operation

The LMF initiates the procedure by sending an OTDOA INFORMATION REQUEST message. The NG-RAN node responds with OTDOA INFORMATION RESPONSE message that contains the available OTDOA information applicable to the relevant cells/TPs.

8.2.5.3 Unsuccessful Operation

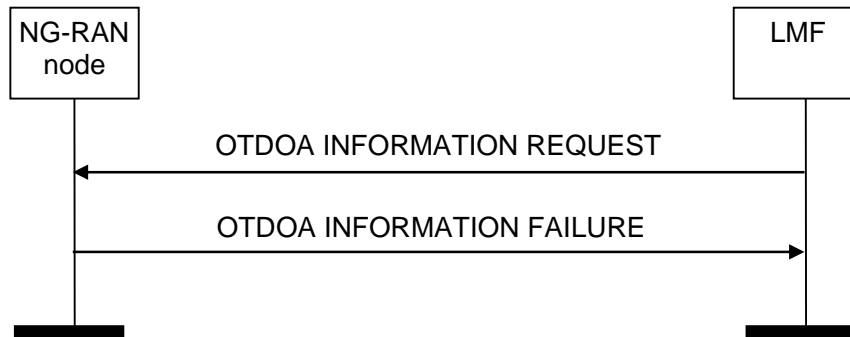


Figure 8.2.5.3-1: OTDOA Information Exchange procedure, unsuccessful operation

If the NG-RAN node does not have any OTDOA information to report, the NG-RAN node shall respond with an OTDOA INFORMATION FAILURE message.

8.2.5.4 Abnormal Conditions

Void.

8.2.6 Positioning Information Exchange

8.2.6.1 General

The Positioning Information Exchange procedure is initiated by the LMF to request to the NG-RAN node positioning information for the UE. This procedure applies only if the NG-RAN node is a gNB.

8.2.6.2 Successful Operation

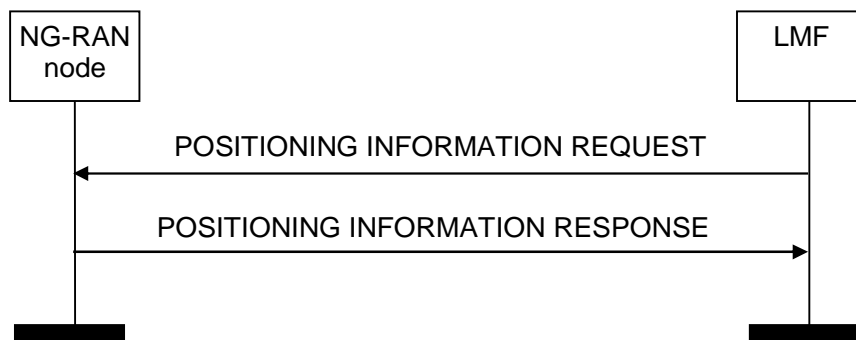


Figure 8.2.6.2-1: Positioning Information Exchange procedure, successful operation

The LMF initiates the procedure by sending a POSITIONING INFORMATION REQUEST message to the NG-RAN node.

If the *Requested SRS Transmission Characteristics* IE is included in the POSITIONING INFORMATION REQUEST message, the NG-RAN node may take this information into account when configuring SRS transmissions for the UE, and it shall include the *SRS Configuration* IE and the *SFN Initialisation Time* IE in the POSITIONING INFORMATION RESPONSE message.

If the *Spatial Relation Information per SRS Resource* IE and the *Periodicity List* IE are both included in the *Requested SRS Transmission Characteristics* IE, the NG-RAN node shall consider that the *Spatial Relation per SRS Resource Item* IE and the *Periodicity List Item* IE have one-to-one mapping relation.

If the *UE Reporting Information* IE is included in the POSITIONING INFORMATION REQUEST message, the NG-RAN node may take this information into account for allocating proper CG-SDT resources when positioning a UE.

If the *UE TEG Information Request* IE is included in the POSITIONING INFORMATION REQUEST message and set to “true”, the NG-RAN node shall, if supported, provide the UE Tx TEG association in the POSITIONING INFORMATION RESPONSE message.

8.2.6.3 Unsuccessful Operation

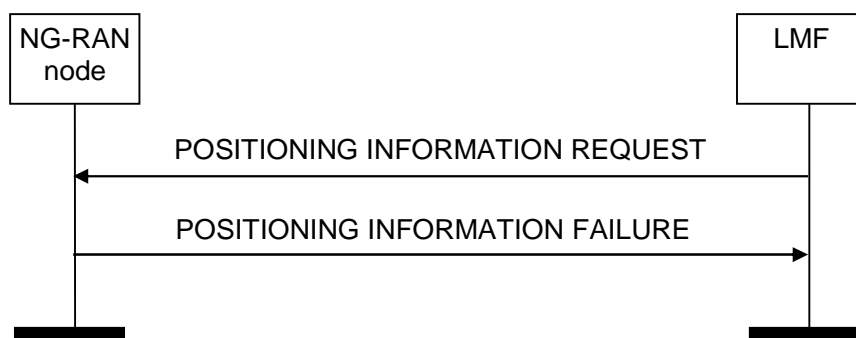


Figure 8.2.6.3-1: Positioning Information Exchange procedure, unsuccessful operation

If the *Requested SRS Transmission Characteristics* IE is included in the POSITIONING INFORMATION REQUEST message and the NG-RAN node is unable to configure any SRS transmissions for the UE, it shall respond with a POSITIONING INFORMATION FAILURE message. If a handover of the target UE has been triggered, the NG-RAN node shall send a POSITIONING INFORMATION FAILURE message with an appropriate cause value.

If the NG-RAN node is unable to provide any of the requested information, the NG-RAN node shall respond with a POSITIONING INFORMATION FAILURE message with an appropriate cause value.

8.2.6.4 Abnormal Conditions

Void.

8.2.7 Positioning Information Update

8.2.7.1 General

The Positioning Information Update procedure is initiated by the NG-RAN node to indicate to the LMF that a change has occurred in the SRS configuration or in the UE Tx TEG association. This procedure applies only if the NG-RAN node is a gNB.

8.2.7.2 Successful Operation

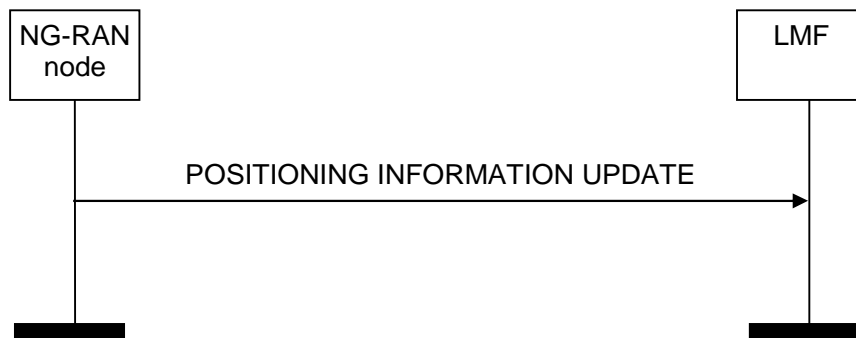


Figure 8.2.7.2-1: Positioning Information Update procedure, successful operation

The NG-RAN node initiates the procedure by sending a POSITIONING INFORMATION UPDATE message to the LMF. If the *SRS Configuration* IE is included in the POSITIONING INFORMATION UPDATE message, the LMF shall consider this information as the updated SRS Configuration for the UE. If the *SFN Initialisation Time* IE is included in the POSITIONING INFORMATION UPDATE message, the LMF shall consider this information as the SFN Initialisation Time associated to the SRS Configuration.

If the *UE Tx TEG Association* IE is included in the POSITIONING INFORMATION UPDATE message, the LMF shall consider it as the UE Tx TEG association for the SRS resources that have changed their TEG association since the last update.

8.2.7.3 Unsuccessful Operation

Not Applicable.

8.2.7.4 Abnormal Conditions

Void.

8.2.8 TRP Information Exchange

8.2.8.1 General

The purpose of the TRP Information Exchange procedure is to allow the LMF to request the NG-RAN node to provide detailed information for TRPs hosted by the NG-RAN node. This procedure applies only if the NG-RAN node is a gNB.

8.2.8.2 Successful Operation

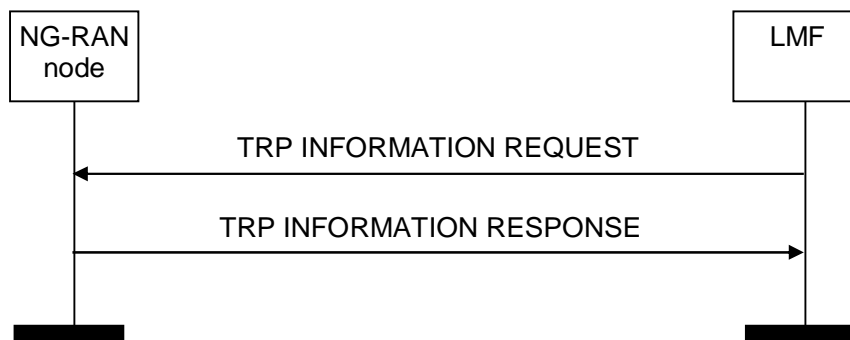


Figure 8.2.8.2-1: TRP Information Exchange procedure, successful operation

The LMF initiates the procedure by sending a TRP INFORMATION REQUEST message. The NG-RAN node responds with a TRP INFORMATION RESPONSE message that contains the requested TRP information.

If the *TRP List* IE is included in the TRP INFORMATION REQUEST message, the NG-RAN node should include in the TRP INFORMATION RESPONSE message, the requested information for all TRPs included in the *TRP List* IE.

If the *TRP List* IE is not included in the TRP INFORMATION REQUEST message, the NG-RAN node should include the requested information for all TRPs hosted by the NG-RAN node in the TRP INFORMATION RESPONSE message

If the *PRS Muting* IE is included in the *PRS Configuration* IE in the TRP INFORMATION RESPONSE message, the LMF may take it into account as the muting information for the given PRS resource set.

If the *QCL Info* IE is included in the *PRS Configuration* IE in the TRP INFORMATION RESPONSE message, the LMF may take it into account for the given PRS resource list.

If the *DL-PRS Resource Coordinates* IE is included in the *Geographical Coordinates* IE in the *TRP Information* IE in the TRP INFORMATION RESPONSE message, the LMF may take it into account as the DL PRS Resource Coordinates relative to the TRP coordinate.

8.2.8.3 Unsuccessful Operation

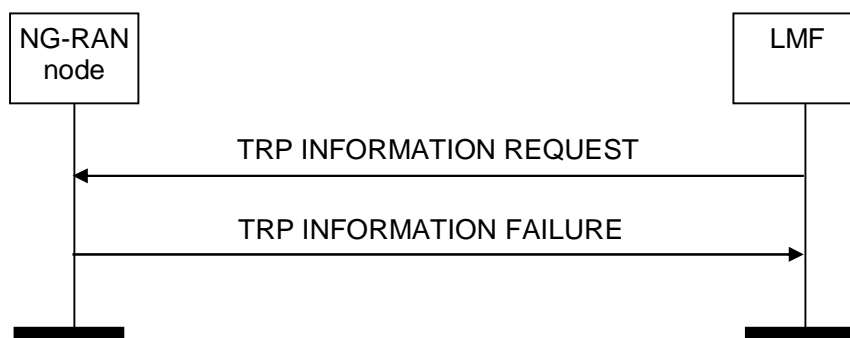


Figure 8.2.8.3-1: TRP Information Exchange procedure, unsuccessful operation

If the NG-RAN node cannot provide any of the requested information for any TRP, the NG-RAN node shall respond with a TRP INFORMATION FAILURE message.

8.2.8.4 Abnormal Conditions

Void.

8.2.9 Positioning Activation

8.2.9.1 General

The Positioning Activation procedure is initiated by the LMF to request the NG-RAN node to activate semi-persistent or trigger aperiodic UL SRS transmission by the UE. This procedure applies only if the NG-RAN node is a gNB.

8.2.9.2 Successful Operation

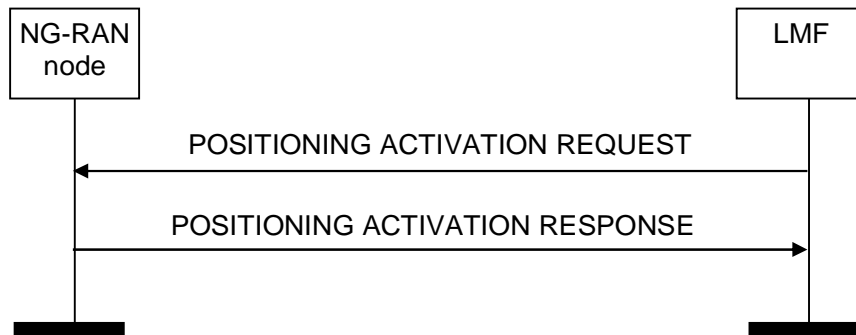


Figure 8.2.9.2-1: Positioning Activation procedure, successful operation

The LMF initiates the procedure by sending a POSITIONING ACTIVATION REQUEST message to the NG-RAN node.

For semi-persistent UL SRS, the POSITIONING ACTIVATION REQUEST message includes an indication of the UL SRS resource set to be activated and may include the spatial relation for the semi-persistent UL SRS resource to be activated. For aperiodic UL SRS, if the *SRS Resource Trigger* IE is included in the POSITIONING ACTIVATION REQUEST message, the NG-RAN node shall take the value of this IE into account when triggering aperiodic SRS transmission by the UE.

If the *Activation Time* IE is included in the POSITIONING ACTIVATION REQUEST message, the NG-RAN node shall take the indicated value as the LMF's requested time for activation of the UE's SRS transmission.

Following successful activation of UL SRS transmission in the UE, the NG-RAN node shall respond with a POSITIONING ACTIVATION RESPONSE message. If the POSITIONING ACTIVATION RESPONSE message includes the *System Frame Number* and/or the *Slot Number* IEs, the LMF shall consider that the respective information indicates the activation time of SRS transmission by the UE.

8.2.9.3 Unsuccessful Operation

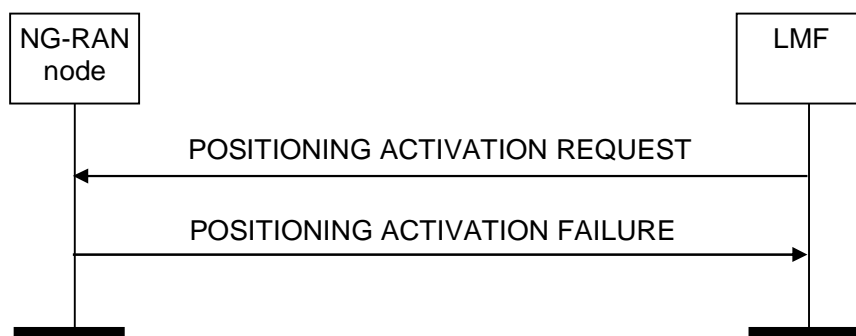


Figure 8.2.9.3-1: Positioning Activation procedure, unsuccessful operation

If the NG-RAN node is unable to activate UL SRS transmission in the UE, it shall respond with a POSITIONING ACTIVATION FAILURE message.

If the NG-RAN node is unable to trigger the aperiodic SRS transmission with the indicated *SRS Resource Trigger* IE, it shall respond with a POSITIONING ACTIVATION FAILURE message with an appropriate cause value.

8.2.9.4 Abnormal Conditions

Void.

8.2.10 Positioning Deactivation

8.2.10.1 General

The Positioning Deactivation procedure is initiated by the LMF to indicate to the NG-RAN node that UL SRS transmission should be deactivated in the UE. This procedure applies only if the NG-RAN node is a gNB.

8.2.10.2 Successful Operation



Figure 8.2.10.2-1: Positioning Deactivation procedure, successful operation

The LMF initiates the procedure by sending a POSITIONING DEACTIVATION message to the NG-RAN node. This message shall include an indication of the UL SRS resource set to be deactivated or release all the related resources.

8.2.10.3 Unsuccessful Operation

Not Applicable.

8.2.10.4 Abnormal Conditions

Void.

8.2.11 PRS Configuration Exchange

8.2.11.1 General

The PRS Configuration Exchange procedure is initiated by the LMF to request the NG-RAN node to configure or update (i.e., turn off) PRS transmission. This procedure applies only if the NG-RAN node is a gNB.

8.2.11.2 Successful Operation

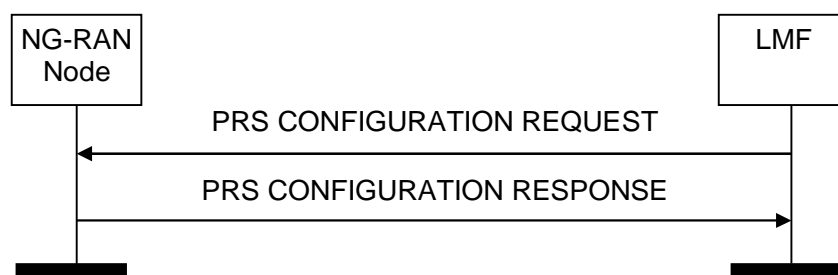


Figure 8.2.11.2-1: PRS Configuration Exchange procedure, successful operation

The LMF initiates the procedure by sending a PRS CONFIGURATION REQUEST message to the NG-RAN.

If the *PRS Configuration Request Type* IE is set to “configure”, the NG-RAN node should use the information in the *Requested DL PRS Transmission Characteristics* IE to configure DL-PRS transmission by the indicated TRP(s).

If the *PRS Configuration Request Type* IE is set to “off”, the NG-RAN node should, if supported, use the information in the *PRS Transmission Off Information* IE to turn off the DL-PRS transmission for the indicated TRP(s), PRS Resource Set(s), or PRS Resource(s).

If DL-PRS transmission is successfully configured or updated for at least one of the TRPs, the NG-RAN node shall respond with a PRS CONFIGURATION RESPONSE message.

8.2.11.3 Unsuccessful Operation

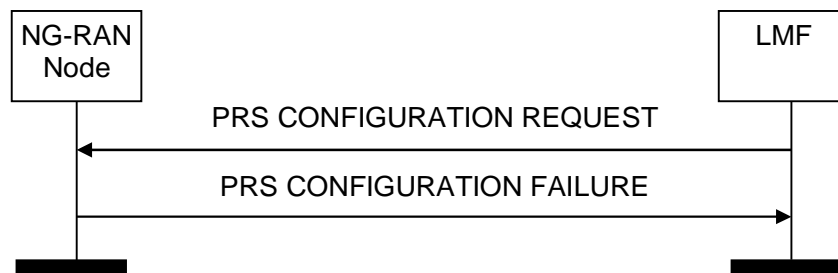


Figure 8.2.11.3-1: PRS Configuration Exchange procedure, unsuccessful operation

If the NG-RAN node cannot configure or update DL-PRS transmission for any of the TRPs in the *PRS TRP List* IE of the PRS CONFIGURATION REQUEST message, it shall respond with a PRS CONFIGURATION FAILURE message with an appropriate cause value.

8.2.11.4 Abnormal Conditions

Void.

8.2.12 Measurement Preconfiguration

8.2.12.1 General

The Measurement Preconfiguration procedure allows the LMF to provide necessary information to the serving gNB and request the gNB to preconfigure measurement gap and/or PRS processing window for the UE. This procedure applies only if the NG-RAN node is a gNB.

8.2.12.2 Successful Operation

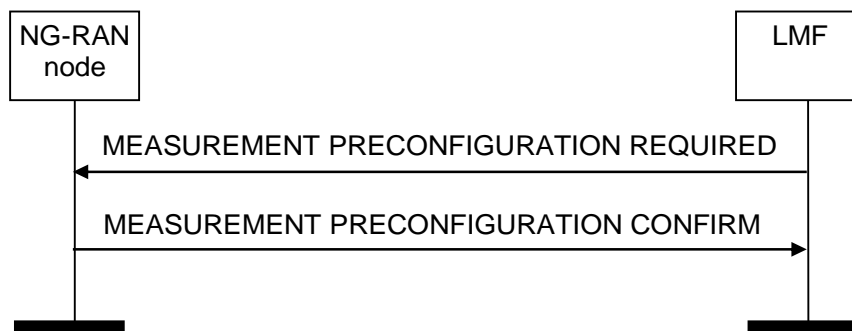


Figure 8.2.12.2-1: Measurement Preconfiguration procedure, successful operation

The LMF initiates the procedure by sending a MEASUREMENT PRECONFIGURATION REQUIRED message.

If the NG-RAN node is able to configure measurement gap or PRS processing window, it shall reply with the MEASUREMENT PRECONFIGURATION CONFIRM message.

8.2.12.3 Unsuccessful Operation

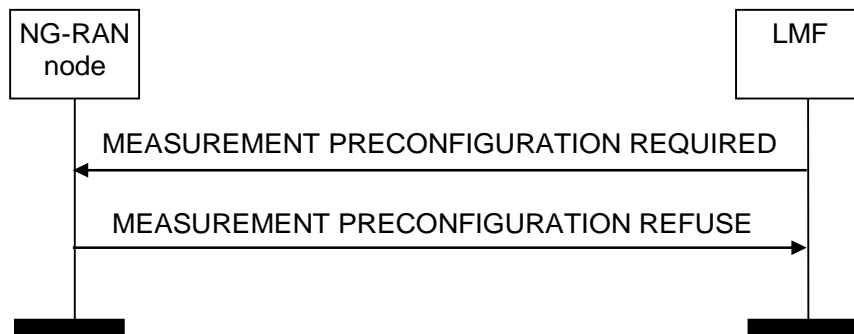


Figure 8.2.12.3-1: Measurement Preconfiguration procedure, unsuccessful operation

If the NG-RAN node cannot configure any of the measurement gap or PRS processing window, the NG-RAN node shall respond with a MEASUREMENT PRECONFIGURATION REFUSE message.

8.2.12.4 Abnormal Conditions

Void.

8.2.13 Measurement Activation

8.2.13.1 General

The Measurement Activation procedure is initiated by the LMF to request the NG-RAN node to activate or deactivate the preconfigured measurement gap or PRS processing window for the UE. This procedure applies only if the NG-RAN node is a gNB.

8.2.13.2 Successful Operation



Figure 8.2.13.2-1: Measurement Activation procedure, successful operation

The LMF initiates the procedure by sending a MEASUREMENT ACTIVATION message to the NG-RAN node.

If the *PRS Measurement Info List* IE is included in the MEASUREMENT ACTIVATION message, the NG-RAN node may take it into account when activating pre-configured measurement gap in the UE.

8.2.13.3 Unsuccessful Operation

Not Applicable.

8.2.13.4 Abnormal Conditions

Void.

8.3 Management Procedures

8.3.1 Error Indication

8.3.1.1 General

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

8.3.1.2 Successful Operation

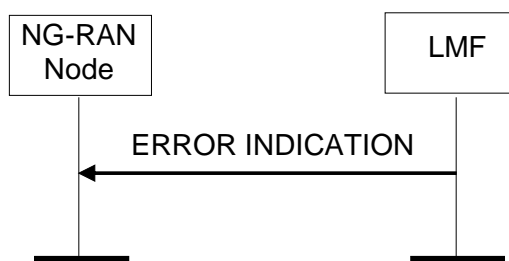


Figure 8.3.1.2-1: Error Indication procedure, LMF originated, successful operation

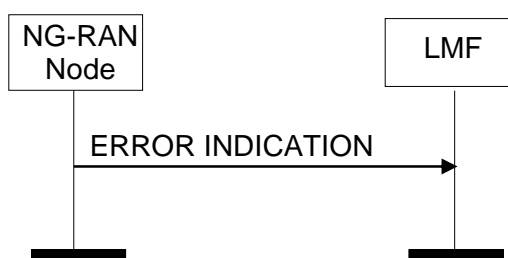


Figure 8.3.1.2-2: Error Indication procedure, NG-RAN node originated, successful operation

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.

The ERROR INDICATION message shall contain at least either the *Cause* IE or the *Criticality Diagnostics* IE.

8.3.1.3 Abnormal Conditions

Not applicable.

8.4 Assistance Information Transfer Procedures

8.4.1 Assistance Information Control

8.4.1.1 General

The purpose of the Assistance Information Control procedure is to allow the LMF to signal positioning assistance information to the NG-RAN Node for assistance information broadcasting. This procedure applies only if the NG-RAN node is a gNB.

8.4.1.2 Successful Operation



Figure 8.4.1.2-1: Assistance Information Control procedure

The LMF initiates the procedure by sending an ASSISTANCE INFORMATION CONTROL message.

If the *Assistance Information IE* is included in the ASSISTANCE INFORMATION CONTROL message, the NG-RAN Node shall, if supported, replace any previously stored assistance information and use the received information to configure assistance information broadcasting.

If the *Broadcast Priority IE* is included in the *Assistance Information IE*, the NG-RAN Node may take it into account when configuring broadcasting for the relevant information. Assistance information having the same Broadcast Priority value should receive the same treatment (i.e. broadcast by the NG-RAN Node or not broadcast).

If the *Broadcast IE* is included in the ASSISTANCE INFORMATION CONTROL message and set to "start", the NG-RAN Node may start broadcasting the assistance information. If the *Broadcast IE* is included in the ASSISTANCE INFORMATION CONTROL message and set to "stop", the NG-RAN Node may stop broadcasting the assistance information.

If the *Positioning Broadcast Cells IE* is included in the ASSISTANCE INFORMATION CONTROL message, the NG-RAN shall, if supported, consider that the received assistance information is applicable to the cells in this IE.

8.4.1.3 Abnormal Conditions

If the *Broadcast IE* is included in the ASSISTANCE INFORMATION CONTROL message and set to "start", and no assistance information is available, the NG-RAN Node shall consider the procedure as failed.

If neither the *Assistance Information IE* nor the *Broadcast IE* are included in the ASSISTANCE INFORMATION CONTROL message, the NG-RAN Node shall consider the procedure as failed.

8.4.2 Assistance Information Feedback

8.4.2.1 General

The purpose of the Assistance Information Feedback procedure is to allow the NG-RAN Node to give feedback to the LMF on assistance information broadcasting. This procedure applies only if the NG-RAN node is a gNB.

8.4.2.2 Successful Operation



Figure 8.4.2.2-1: Assistance Information Feedback procedure

If the *Assistance Information Failure List* IE is included in the ASSISTANCE INFORMATION FEEDBACK message, the LMF shall consider that assistance information broadcasting could not be configured for the relevant information.

If the *Positioning Broadcast Cells* IE is included in the ASSISTANCE INFORMATION FEEDBACK message, the LMF shall consider that the feedback provided is applicable to the cells in this IE.

8.4.2.3 Abnormal Conditions

Void.

8.5 Measurement Information Transfer

8.5.1 Measurement

8.5.1.1 General

The Measurement procedure allows the LMF to request one or more TRPs in the NG-RAN node to perform and report positioning measurements. This procedure applies only if the NG-RAN node is a gNB.

8.5.1.2 Successful Operation

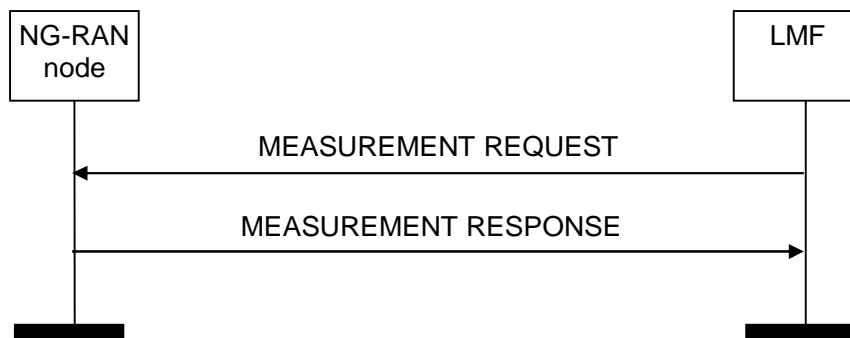


Figure 8.5.1.2.1: Measurement procedure. Successful operation.

The LMF initiates the procedure by sending a MEASUREMENT REQUEST message to the NG-RAN node, indicating in the *TRP Measurement Request List* IE the TRP(s) from which measurements are requested. The NG-RAN node shall use the included information to configure positioning measurements by the indicated TRP(s). If at least one of the requested measurements has been successful for at least one of the TRPs, the NG-RAN node shall reply with a MEASUREMENT RESPONSE message including the *TRP Measurement Response List* IE.

If the *Report Characteristics* IE is set to "OnDemand", the NG-RAN node shall return the corresponding measurement results in the MEASUREMENT RESPONSE message, and the LMF shall consider that this reporting has been terminated by the NG-RAN node. If the *Report Characteristics* IE is set to "Periodic", the NG-RAN node shall initiate the corresponding measurements, and it shall reply with the MEASUREMENT RESPONSE message without including any measurement results in the message. The NG-RAN node shall then periodically initiate the Measurement Report procedure for the corresponding measurements, with the requested reporting periodicity.

If the *Measurement Beam Information Request* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall include the *Measurement Beam Information* IE in the *TRP Measurement Result* IE of the MEASUREMENT RESPONSE message.

If the *Measurement Quality* IE is included in the *TRP Measurement Result* IE in the MEASUREMENT RESPONSE message, the LMF may take it into account as the TRP estimate of the measurement quality. If the *Measurement Quality* IE includes the *Zenith Quality* IE, the LMF may take it into account within the angle measurement quality.

If the *Timing Reporting Granularity Factor* IE is included in the *TRP Measurement Quantities* IE in the MEASUREMENT REQUEST message, the NG-RAN node may take it into account when configuring measurements including UL RTOA and gNB Rx-Tx Time Difference.

If the *System Frame Number* IE and/or the *Slot Number* IE are included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, consider that the respective information indicates the activation time of SRS transmission.

If the *Report Characteristics* IE is set to "OnDemand" and the *Response Time* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, return the corresponding measurement results in the MEASUREMENT RESPONSE message within the indicated time.

If the *Measurement Characteristics Request Indicator* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, [take the requested measurement characteristics into account when configuring measurements, and](#) include the requested information, [if available](#), in the MEASUREMENT RESPONSE message.

If the *Number of TRP Rx TEGs* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, use it to measure the same SRS resource with different TRP Rx TEGs for the indicated TRP, and report the corresponding UL-RTOA and/or gNB Rx-Tx time difference measurements.

If the *Number of TRP RxTx TEGs* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, use it to measure the same SRS resource with different TRP RxTx TEGs with the same TRP Tx TEG for the indicated TRP, and report the corresponding gNB Rx-Tx time difference measurements.

If the *Measurement Time Occasion* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node may take it into account as the number of SRS measurement time occasions for a measurement instance.

Interaction with the Measurement Report procedure:

If the *Report Characteristics* IE is set to "Periodic" and the *Measurement Amount* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, take it into account for sending the MEASUREMENT REPORT message.

8.5.1.3 Unsuccessful Operation

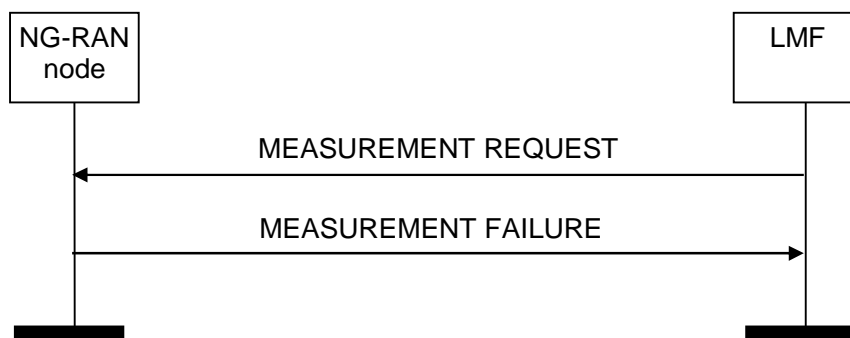


Figure 8.5.1.3.1: Measurement procedure. Unsuccessful operation.

If the NG-RAN node cannot configure any of the requested measurements for any of the TRPs in the *TRP Measurement Request List* IE of the MEASUREMENT REQUEST message, it shall respond with a MEASUREMENT FAILURE message with an appropriate cause value.

8.5.1.4 Abnormal Conditions

If the *Report Characteristics* IE is set to "OnDemand" and the *Response Time* IE is included in the MEASUREMENT REQUEST message but the NG-RAN node is unable to provide the measurement results within the indicated time, the NG-RAN node shall, if supported, respond with a MEASUREMENT FAILURE message with an appropriate cause value.

8.5.2 Measurement Report

8.5.2.1 General

The Measurement Report procedure allows the NG-RAN node to report positioning measurements to the LMF. This procedure applies only if the NG-RAN node is a gNB.

8.5.2.2 Successful Operation



Figure 8.z.2.2.1: Measurement Report procedure. Successful operation.

The NG-RAN node initiates the procedure by sending a MEASUREMENT REPORT message to the LMF. The MEASUREMENT REPORT message contains the measurement results according to the associated measurement configuration.

8.5.2.3 Abnormal Conditions

Void.

8.5.3 Measurement Update

8.5.3.1 General

The Measurement Update Procedure allows the LMF to notify the NG-RAN node of a change in a previously configured measurement. This procedure applies only if the NG-RAN node is a gNB.

8.5.3.2 Successful Operation

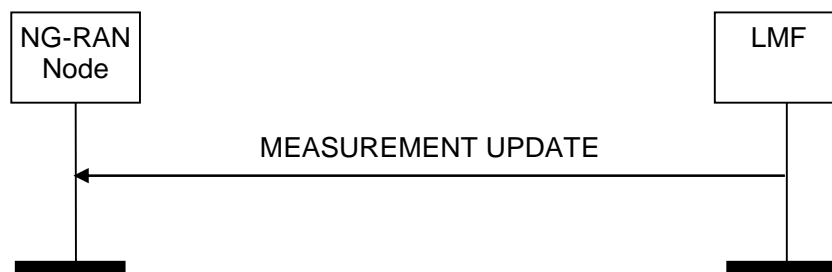


Figure 8.5.3.2.1: Measurement Update: Successful Operation.

The LMF initiates the procedure by sending a MEASUREMENT UPDATE message.

If the *SRS Configuration* IE is included in the MEASUREMENT UPDATE message, the NG-RAN node shall overwrite the previously stored SRS configuration.

If the *AoA Search Window Information* IE is included in the *TRP Measurement Update List* IE in the MEASUREMENT UPDATE message, the NG-RAN node shall clear any previously stored AoA search window information and store the newly received information.

If the *Number of TRP Rx TEGs* IE is included in the *TRP Measurement Update List* IE in the MEASUREMENT UPDATE message, the NG-RAN node shall clear any previously stored information and store the newly received information.

If the *Number of TRP RxTx TEGs* IE is included in the *TRP Measurement Update List* IE in the MEASUREMENT UPDATE message, the NG-RAN node shall clear any previously stored information and store the newly received information.

If the *Measurement Characteristics Request Indicator* IE is included in the MEASUREMENT UPDATE message, the NG-RAN node shall clear any previously stored information and store the newly received information.

8.5.3.3 Unsuccessful Operation

Not applicable.

8.5.3.4 Abnormal Conditions

If the NG-RAN node cannot identify at least one of the previously requested measurement to be modified, it shall consider the procedure as failed and initiate local error handling.

8.5.4 Measurement Abort

8.5.4.1 General

The purpose of the Measurement Abort Procedure is to enable the LMF to abort an on-going measurement. This procedure applies only if the NG-RAN node is a gNB.

8.5.4.2 Successful Operation



Figure 8.5.4.2.1: Measurement Abort Procedure: Successful Operation.

The LMF initiates the procedure by sending a MEASUREMENT ABORT message.

Upon receiving this message, the NG-RAN node shall terminate the on-going measurement identified by the *LMF Measurement ID* IE and may release any resources previously allocated for the same measurement.

8.5.4.3 Unsuccessful Operation

Not applicable.

8.5.4.4 Abnormal Conditions

If the NG-RAN node cannot identify the previously requested measurement to be aborted, it shall ignore the MEASUREMENT ABORT message.

8.5.5 Measurement Failure Indication

8.5.5.1 General

The Measurement Failure Indication procedure allows the NG-RAN node to notify the LMF that the measurements previously requested with the Measurement procedure can no longer be reported. This procedure applies only if the NG-RAN node is a gNB.

8.5.5.2 Successful Operation



Figure 8.5.5.2.1: Measurement Report procedure. Successful operation.

Upon reception of the MEASUREMENT FAILURE INDICATION message, the LMF shall consider that the indicated measurements have been terminated by the NG-RAN node.

8.5.5.3 Abnormal Conditions

Void.

9 Elements for NRPPa Communication

9.0 General

Sub clauses 9.1 and 9.2 describe the structure of the messages and information elements required for the NRPPa protocol in tabular format. Sub clause 9.3 provides the corresponding ASN.1 definition.

The following attributes are used for the tabular description of the messages and information elements: Presence, Range Criticality and Assigned Criticality. Their definition and use can be found in TS 38.413 [2].

NOTE: The messages have been defined in accordance to the guidelines specified in TR 25.921 [5].

9.1 Message Functional Definition and Content

9.1.1 Messages for Location Information Transfer Procedures

9.1.1.1 E-CID MEASUREMENT INITIATION REQUEST

This message is sent by LMF to initiate E-CID measurements.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15 ,..., 16..256)		YES	reject
Report Characteristics	M		ENUMERATED (OnDemand, Periodic,...)		YES	reject
Measurement Periodicity	C-ifReportCharacteristicsPeriodic		ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,..., 20480ms, 40960ms, extended)	The codepoint 60min applies only for ng-eNB. The codepoint "extended" is not applicable	YES	reject
Measurement Quantities		1			EACH	reject
>Measurement Quantities Item		1..<maxnoMeas>			-	
>>Measurement Quantities Value	M		ENUMERATED (Cell-ID, Angle of Arrival, Timing Advance Type 1, Timing Advance Type 2, RSRP, RSRQ,..., SS-RSRP, SS-RSRQ, CSI-RSRP, CSI-RSRQ, NR Angle of Arrival, NR Timing Advance)		-	-
Other-RAT Measurement Quantities		0			EACH	ignore
>Other-RAT Measurement Quantities Item		0 .. <maxnoMeas>			-	
>>Other-RAT Measurement Quantities Value	M		ENUMERATED (GERAN, UTRAN,..., NR, EUTRA)		-	
WLAN Measurement Quantities		0			EACH	ignore
>WLAN Measurement Quantities Item		0 .. <maxnoMeas>			-	
>>WLAN Measurement Quantities Value	M		ENUMERATED (WLAN, ...)		-	

Range bound	Explanation
maxnoMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 64.

Condition	Explanation
ifReportCharacteristicsPeriodic	This IE shall be present if the <i>Report Characteristics</i> IE is set to the value "Periodic".

9.1.1.2 E-CID MEASUREMENT INITIATION RESPONSE

This message is sent by NG-RAN node to indicate that the requested E-CID measurement is successfully initiated.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
RAN UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
E-CID Measurement Result	O		9.2.5		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore
Cell Portion ID	O		9.2.12		YES	ignore
Other-RAT Measurement Result	O		9.2.13		YES	ignore
WLAN Measurement Result	O		9.2.14		YES	ignore

9.1.1.3 E-CID MEASUREMENT INITIATION FAILURE

This message is sent by NG-RAN node to indicate that the requested E-CID measurement cannot be initiated.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.4 E-CID MEASUREMENT FAILURE INDICATION

This message is sent by NG-RAN node to indicate that the previously requested E-CID measurement can no longer be reported.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
RAN UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
Cause	M		9.2.1		YES	ignore

9.1.1.5 E-CID MEASUREMENT REPORT

This message is sent by NG-RAN node to report the results of the requested E-CID measurement.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
RAN UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
E-CID Measurement Result	M		9.2.5		YES	ignore
Cell Portion ID	O		9.2.12		YES	ignore

9.1.1.6 E-CID MEASUREMENT TERMINATION COMMAND

This message is sent by the LMF to terminate the requested E-CID measurement.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
LMF UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject
RAN UE Measurement ID	M		INTEGER (1..15,..., 16..256)		YES	reject

9.1.1.7 OTDOA INFORMATION REQUEST

This message is sent by LMF to request OTDOA information.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
OTDOA Information Type		1			EACH	reject
>OTDOA Information Type Item		1 .. <maxnoOTDOAtypes>			-	
>>OTDOA Information Item	M		ENUMERATED (pci, cellid, tac, earfcn, prsBandwidth, prsConfigIndex, cpLength, noDIFrames, noAntennaPorts, sFNInitTime, nG-RANAccessPointPosition, prsmutingconfiguration, prsid, tpid, tpType, crsCPLength, dlBandwidth, multipleprsConfigurationsperCell, prsOccasionGroup, prsFrequencyHoppingConfiguration, ..., tddConfig)		-	-

Range bound	Explanation
maxnoOTDOAtypes	Maximum no. of OTDOA information types that can be requested and reported with one message. Value is 63.

9.1.1.8 OTDOA INFORMATION RESPONSE

This message is sent by NG-RAN node to provide OTDOA information.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
OTDOA Cells		1 .. <maxCellInRANnode>	•	Served cells/TPs that broadcast PRS. May be used to signal multiple PRS configurations per cell/TPs (up to 3 are supported in this release).	GLOBAL	ignore
>OTDOA Cell Information	M		9.2.15		-	-
Criticality Diagnostics	O		9.2.2		YES	ignore

Range bound	Explanation
maxCellinRANnode	Maximum no. cells that can be served by a RAN Node. Value is 16384.

9.1.1.9 OTDOA INFORMATION FAILURE

This message is sent by NG-RAN node to indicate that the OTDOA information cannot be provided.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.10 POSITIONING INFORMATION REQUEST

This message is sent by the LMF to request positioning information.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Requested SRS Transmission Characteristics	O		9.2.27		YES	ignore
UE Reporting Information	O		9.2.70		YES	ignore
UE TEG Information Request	O		ENUMERATED (true,...)		YES	ignore

9.1.1.11 POSITIONING INFORMATION RESPONSE

This message is sent by the NG-RAN node to provide positioning information.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
SRS Configuration	O		9.2.28		YES	ignore
SFN Initialisation Time	O		Relative Time 1900 9.2.36		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore
UE Tx TEG Association	O		9.2.78		YES	ignore

9.1.1.12 POSITIONING INFORMATION FAILURE

This message is sent by the NG-RAN node to indicate that the positioning information cannot be provided.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.13 POSITIONING INFORMATION UPDATE

This message is sent by the NG-RAN node to indicate that a change in the SRS configuration or UE Tx TEG association has occurred.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
SRS Configuration	O		9.2.28		YES	ignore
SFN Initialisation Time	O		Relative Time 1900 9.2.36		YES	ignore
UE Tx TEG Association	O		9.2.78		YES	ignore

9.1.1.14 TRP INFORMATION REQUEST

This message is sent by an LMF to request information for TRPs hosted by an NG-RAN node.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
TRP List		0..1			YES	ignore
>TRP Item		1.. <maxnoTRPs>			EACH	ignore
>>TRP ID	M		9.2.24		-	
TRP Information Type List		1				
>TRP Information Type Item		1.. <maxnoTRPInfoTypes>			EACH	reject
>>TRP Information Type Item	M		ENUMERATED (nr pci, ng-ran cgi, nr arfcn, prs config, ssb config, sfn init time, spatial direction info, geo-coordinates, ..., trp type, on-demand prs, trp tx teg, beam antenna info)			

Range bound	Explanation
maxnoTRPs	Maximum no. of TRPs in a NG-RAN node. Value is 65535

maxnoTRPInfoTypes	Maximum no of TRP information types that can be requested and reported with one message. Value is 64.
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9.1.1.15 TRP INFORMATION RESPONSE

This message is sent by an NG-RAN node to convey TRP information to an LMF.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
TRP Information List		1			YES	ignore
>TRP Information Item	M	1 .. <maxnoTRPs>			EACH	ignore
>>TRP Information	M		9.2.25		-	
Criticality Diagnostics	O		9.2.2		YES	ignore

Range bound	Explanation
maxnoTRPs	Maximum no. of TRPs in a NG-RAN node. Value is 65535.

9.1.1.16 TRP INFORMATION FAILURE

This message is sent by an NG-RAN node to indicate that the requested TRP information cannot be provided to an LMF.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.17 POSITIONING ACTIVATION REQUEST

This message is sent by the LMF to cause the NG RAN node to activate/trigger UL SRS transmission by the UE.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
CHOICE SRS type	M				YES	reject
>Semi-persistent						
>>SRS Resource Set ID	M		9.2.33		-	-
>>SRS Spatial Relation	O		Spatial Relation Information 9.2.34	This IE is ignored if the <i>Spatial Relation Information per SRS Resource</i> IE is present.	YES	ignore
>>Spatial Relation Information per SRS Resource	O		9.2.60		YES	ignore
>Aperiodic						
>>Aperiodic	M		ENUMERATED (true,...)		-	-
>>SRS Resource Trigger	O		9.2.35		-	-
Activation Time	O		Relative Time 1900 9.2.36	Indicates the start time when the SRS activation is requested	YES	ignore

9.1.1.18 POSITIONING ACTIVATION RESPONSE

This message is sent by NG-RAN node to confirm successful UL SRS activation in the UE.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Criticality Diagnostics	O		9.2.2		YES	ignore
System Frame Number	O		INTEGER(0..1023)		YES	ignore
Slot Number	O		INTEGER(0..79)		YES	ignore

9.1.1.19 POSITIONING ACTIVATION FAILURE

This message is sent by NG-RAN node to indicate that activation of UL SRS transmission in the UE was unsuccessful.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.20 POSITIONING DEACTIVATION

This message is sent by the LMF to cause the NG RAN node to deactivate UL SRS transmission or release all the transmission by the UE.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
CHOICE <i>Abort Transmission</i>	M				YES	Ignore
> <i>Deactivate SRS Resource Set</i>						
>>SRS Resource Set ID	M		9.2.33		-	
> <i>Release ALL</i>			NULL	the NG-RAN node configures UE to stop transmitting SRS for the positioning purpose		

9.1.1.21 PRS CONFIGURATION REQUEST

This message is sent by the LMF to request the NG-RAN node to configure or update PRS transmission.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
PRS Configuration Request Type	M		ENUMERATED (configure, off, ...)		YES	reject
PRS TRP List		1			YES	ignore
> PRS TRP Item		1 .. <maxnoTRPs>			EACH	ignore
>>TRP ID	M		9.2.24		-	
>>Requested DL PRS Transmission Characteristics	C-ifConf		9.2.61		-	
>>PRS Transmission Off Information	C-ifOff		9.2.64		-	

Range bound	Explanation
maxnoTRPs	Maximum no. of TRPs in a NG-RAN node. Value is 65535

Condition	Explanation
ifConf	This IE shall be present if the <i>PRS Configuration Request Type</i> IE is set to the value "configure".
ifOff	This IE shall be present if the <i>PRS Configuration Request Type</i> IE is set to the value "off".

9.1.1.22 PRS CONFIGURATION RESPONSE

This message is sent by the NG-RAN node to acknowledge configuring or updating the PRS transmission.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
PRS Transmission TRP List		0..1			YES	ignore
>PRS Transmission TRP Item		1 .. <maxnoTRPs>			EACH	ignore
>>TRP ID	M		9.2.24		-	
>>PRS Configuration	M		9.2.44		-	
Criticality Diagnostics	O		9.2.2		YES	ignore

Range bound	Explanation
maxnoTRPs	Maximum no. of TRPs in a NG-RAN node. Value is 65535

9.1.1.23 PRS CONFIGURATION FAILURE

This message is sent by the NG-RAN node to indicate that it cannot configure any PRS transmission.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.24 MEASUREMENT PRECONFIGURATION REQUIRED

This message is sent by the LMF to provide the PRS configuration information of multiple TRPs to the NG-RAN node and request to configure measurement gap or PRS processing window of the UE.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
TRP PRS Information List		1			YES	ignore
>TRP PRS Information Item		1 .. <maxnoPRSTRPs>			EACH	ignore
>>TRP ID	M		9.2.24		-	
>>NR PCI	M		INTEGER (0..1007)		-	
>>NR CGI	O		9.2.9		-	
>>PRS Configuration	M		9.2.44		-	

Range bound	Explanation
maxnoPRSTRPs	Maximum no. of TRPs for on-demand PRS in a NG-RAN node. Value is 256.

9.1.1.25 MEASUREMENT PRECONFIGURATION CONFIRM

This message is sent by the NG-RAN node to the LMF to confirm successful configuration of measurement gap or PRS processing window of the UE.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Preconfiguration Result	M		BIT STRING (SIZE(8))	Indicates what has been preconfigured in the UE. first bit: measurement gaps second bit: PRS processing windows. Other bits reserved for future use. Value '1' indicates 'has been preconfigured', Value '0' indicates 'not preconfigured'.	YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.26 MEASUREMENT PRECONFIGURATION REFUSE

This message is sent by the NG-RAN node to indicate that configuration of measurement gap or PRS processing window of the UE was unsuccessful.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.1.27 MEASUREMENT ACTIVATION

This message is sent by the LMF to request the NG-RAN node to activate or deactivate the preconfigured measurement gap or PRS processing window for the UE.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
Request Type	M		ENUMERATED (activate, deactivate, ...)		YES	reject
PRS Measurement Info List		0..1			YES	Ignore
>PRS Measurement Info Item		1 .. < <i>maxFreqLayers</i> >			-	
>>Point A	M		INTEGER (0..3279165)		-	
>>MeasPRS Periodicity	M		ENUMERATED (ms20, ms40, ms80, ms160, ...)	Measurement gap periodicity in units of ms	-	
>>MeasPRS Offset	M		INTEGER (0..159, ...)	Measurement gap offset in units of subframes	-	
>>Measurement PRS Length	M		ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20}		-	

Range bound	Explanation
maxFreqLayers	Maximum no. of frequency layers. Value is 4

9.1.2 Messages for Management Procedures

9.1.2.1 ERROR INDICATION

This message is used to indicate that some error has been detected in the NG-RAN node or in the LMF.

Direction: LMF → NG-RAN node and NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
Cause	O		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.3 Messages for Assistance Information Transfer Procedures

9.1.3.1 ASSISTANCE INFORMATION CONTROL

This message is sent by the LMF to transfer assistance information.

Direction: LMF → NG-RAN Node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Assistance Information	O		9.2.19		YES	reject
Broadcast	O		ENUMERATED (start, stop, ...)		YES	reject
Positioning Broadcast Cells	O		9.2.59	The cell(s) that are requested to broadcast posSIB(s) according to the Assistance Information IE.	YES	reject

9.1.3.2 ASSISTANCE INFORMATION FEEDBACK

This message is sent by the NG-RAN Node to give feedback on assistance information broadcasting.

Direction: NG-RAN Node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
Assistance Information Failure List	O		9.2.23		YES	reject
Positioning Broadcast Cells	O		9.2.59	The cells associated to the feedback provided in the Assistance Information Failure List IE.	YES	reject
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.4 Messages for Measurement Information Transfer Procedures

9.1.4.1 MEASUREMENT REQUEST

This message is sent by the LMF to request the NG-RAN node to configure a positioning measurement.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
TRP Measurement Request List		1			YES	reject
>TRP Measurement Request Item		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>>Search Window Information	O		9.2.26		-	
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the TRP ID IE.	YES	ignore
>>AoA Search Window Information	O		UL-AoA Assistance Information 9.2.66		YES	ignore
>>Number of TRP Rx TEGs	O		ENUMERATED (2, 3, 4, 6, 8, ...)		YES	ignore
>>Number of TRP RxTx TEGs	O		ENUMERATED (2, 3, 4, 6, 8, ...)		YES	ignore
Report Characteristics	M		ENUMERATED (OnDemand, Periodic, ...)		YES	reject
Measurement Periodicity	C- ifReportCharacteristicsPeriodic		ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,..., 20480ms, 40960ms, extended)	The codepoint 120ms, 240ms, 480ms, 1024ms, 2048ms, 1min, 6min, 12min, 30min, and 60min are not applicable	YES	reject
TRP Measurement Quantities		1			YES	reject
>TRP Measurement Quantities Item		1 .. <maxnosMeas>			EACH	reject
>TRP Measurement Type	M		ENUMERATED (gNB-RxTxTimeDiff, UL-SRS-RSRP, UL-AoA, UL-RTOA,..., Multiple UL-AoA, UL SRS-RSRPP)		-	
>Timing Reporting Granularity Factor	O		INTEGER (0..5)	Value (0..5) corresponds to (k0..k5) TS 38.133 [16]	-	
SFN initialisation Time	O		Relative Time 1900 9.2.36	If this IE is not present, the TRP may assume that the value is same as its own SFN initialisation time.	YES	ignore
SRS Configuration	O		9.2.28		YES	ignore

Measurement Beam Information Request	O		ENUMERATED (true,...)	This IE is ignored when the <i>Measurement Characteristics Request Indicator</i> IE is included.	YES	ignore
System Frame Number	O		INTEGER(0..1023)		YES	ignore
Slot Number	O		INTEGER(0..79)		YES	ignore
Measurement Periodicity Extended	C-ifMeasPerExt		ENUMERATED (160ms, 320ms, 1280ms, 2560ms, 61440ms, 81920ms, 368640ms, 737280ms, 1843200ms, ...)		YES	reject
Response Time	O		9.2.68	This IE is ignored when the <i>Report Characteristics</i> IE is set to "periodic".	YES	ignore
Measurement Characteristics Request Indicator	O		9.2.81		YES	ignore
Measurement Time Occasion	O		ENUMERATED (o1, o4, ...)		YES	ignore
Measurement Amount	O		ENUMERATED (0, 1, 2, 4, 8, 16, 32, 64)	This IE is ignored if the <i>Report Characteristics</i> IE is set to 'OnDemand'. Value 0 represents an infinite number of periodic reporting.	YES	ignore

Condition	Explanation
ifReportCharacteristicsPeriodic	This IE shall be present if the <i>Report Characteristics</i> IE is set to the value "Periodic".
ifMeasPerExt	This IE shall be present if the <i>Measurement Periodicity</i> IE is set to the value "extended".

Range bound	Explanation
maxnoPosMeas	Maximum no. of measured quantities that can be configured and reported with one positioning measurement message. Value is 16384.
maxnoofMeasTRPs	Maximum no. of TRPs that can be included within one message. Value is 64.

9.1.4.2 MEASUREMENT RESPONSE

This message is sent by the NG-RAN node to report positioning measurements for the target UE.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
TRP Measurement Response List		0..1			YES	reject
>TRP Measurement Response Item		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>>TRP Measurement Result	M		9.2.37		-	
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the TRP ID IE.	YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

Range bound	Explanation
maxnoofMeasTRPs	Maximum no. of TRPs that can be included within one message. Value is 64.

9.1.4.3 MEASUREMENT FAILURE

This message is sent by the NG-RAN node to report measurement failure.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.2		YES	ignore

9.1.4.4 MEASUREMENT REPORT

This message is sent by the NG-RAN node to report positioning measurements for the target UE.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
TRP Measurement Response List		1			YES	reject
>TRP Measurement Response Item		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>>TRP Measurement Result	M		9.2.37		-	
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the TRP ID IE.	YES	ignore

Range bound	Explanation
maxnoofMeasTRPs	Maximum no. of TRPs that can be included within one message. Value is 64.

9.1.4.5 MEASUREMENT UPDATE

This message is sent by the LMF to update a previously configured measurement.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
SRS Configuration	O		9.2.28		YES	ignore
TRP Measurement Update List		0..1			YES	reject
>TRP Measurement Update Item		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>>AoA Search Window Information	O		UL-AoA Assistance Information 9.2.66		YES	ignore
>>Number of TRP Rx TEGs	O		ENUMERATED (2, 3, 4, 6, 8, ...)		YES	ignore
>>Number of TRP RxTx TEGs	O		ENUMERATED (2, 3, 4, 6, 8, ...)		YES	ignore
Measurement Characteristics Request Indicator	O		9.2.81		YES	ignore

Range bound	Explanation
maxnoofMeasTRPs	Maximum no. of TRPs that can be included within one message. Value is 64.

9.1.4.6 MEASUREMENT ABORT

This message is sent by the LMF to request the NG-RAN node to abort a measurement.

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject

9.1.4.7 MEASUREMENT FAILURE INDICATION

This message is sent by the NG-RAN node to indicate that the previously requested measurements can no longer be reported.

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
Cause	M		9.2.1		YES	ignore

9.2 Information Element definitions

9.2.0 General

When specifying information elements which are to be represented by bit strings, 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 bit strings from other specifications, the first bit of the bit string contains the first bit of the concerned information.

9.2.1 Cause

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Cause Group	M			
>Radio Network Layer				
>>Radio Network Layer Cause	M		ENUMERATED (Unspecified, Requested Item not Supported, Requested Item Temporarily not Available, ..., Serving NG-RAN node changed, Requested Item not Supported on Time)	
>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				
>>Miscellaneous Cause	M		ENUMERATED (Unspecified, ...)	

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

Radio Network Layer cause	Meaning
Unspecified	Sent when none of the above cause values applies but still the cause is Radio Network Layer related
Requested Item not Supported	The NG-RAN node does not support the requested measurement object, or cannot provide the requested information item.
Requested Item Temporarily not Available	The NG-RAN node can temporarily not provide the requested measurement object or information item.
Serving NG-RAN node changed	The UE has moved to another serving NG-RAN node.
Requested Item not Supported on Time	The NG-RAN node is unable to provide the measurement results on time.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerned criticality indicated "reject" (see sub clause 10.3 of TS 38.413)
Abstract Syntax Error (Ignore and Notify)	The received message included an abstract syntax error and the concerned criticality indicated "ignore and notify" (see sub clause 10.3 of TS 38.413)
Abstract syntax error (falsely constructed message)	The received message contained IEs or IE groups in wrong order or with too many occurrences (see sub clause 10.3 of TS 38.413)
Message not Compatible with Receiver State	The received message was not compatible with the receiver state (see sub clause 10.4 of TS 38.413)
Semantic Error	The received message included a semantic error (see sub clause 10.4 of TS 38.413)
Transfer Syntax Error	The received message included a transfer syntax error (see sub clause 10.2 of TS 38.413)
Unspecified	Sent when none of the above cause values applies but still the cause is Protocol related

Miscellaneous cause	Meaning
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 Criticality Diagnostics

The *Criticality Diagnostics* IE is sent by the NG-RAN node or LMF when parts of a received message have not been comprehended or were missing, or if the message contained logical errors. When applicable, it contains information about which IEs were not comprehended or were missing. The conditions for inclusion of the *NRPPa Transaction ID* IE are described in clause 10.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	O		INTEGER (0..255)	Procedure Code is to be used if Criticality Diagnostics is part of Error Indication procedure, and not within the response message of the same procedure that caused the error.
Triggering Message	O		ENUMERATED (initiating message, successful outcome, unsuccessful outcome)	The Triggering Message is used only if the Criticality Diagnostics is part of Error Indication procedure.
Procedure Criticality	O		ENUMERATED (reject, ignore, notify)	This Procedure Criticality is used for reporting the Criticality of the Triggering message (Procedure).
NRPPa Transaction ID	O		9.2.4	
Information Element Criticality Diagnostics		0 .. <maxNrOf Errors>		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore" shall not be used.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE.
>Type Of Error	M		ENUMERATED (not understood, missing, ...)	

Range bound	Explanation
maxNrOfErrors	Maximum no. of IE errors allowed to be reported with a single message. The value for maxNrOfErrors is 256.

9.2.3 Message Type

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Procedure Code	M		INTEGER (0..255)	
Type of Message	M		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, ...)	

9.2.4 NRPPa Transaction ID

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

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

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NRPPa Transaction ID	M		INTEGER (0..32767)	

9.2.5 E-CID Measurement Result

The purpose of the E-CID Measurement Result information element is to provide the E-CID measurement result.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Serving Cell ID	M		NG-RAN CGI 9.2.6	NG-RAN Cell Identifier of the serving cell	-	
Serving Cell TAC	M		TAC 9.2.11	Tracking Area Code of the serving cell	-	
NG-RAN Access Point Position	O		9.2.10	The configured estimated geographical position of the antenna of the cell. If the <i>Geographical Coordinates</i> IE is used, the <i>NG-RAN Access Point Position</i> IE shall be ignored.	-	
Measured Results		0..1		Measurement results of the serving RAT.	-	
>CHOICE Measured Results Value		1 ..<maxno Meas>			-	
>>Value Angle of Arrival EUTRA	M		INTEGER (0..719)	According to mapping in TS 36.133 [9]	-	
>>Value Timing Advance Type 1 EUTRA	M		INTEGER (0..7690)	As defined in TS 36.214 [17]	-	
>>Value Timing Advance Type 2 EUTRA	M		INTEGER (0..7690)	As defined in TS 36.214 [17]	-	
>>>Result RSRP EUTRA		1			-	
>>>>Result RSRP EUTRA Item		1 .. <maxCell Report>			-	
>>>>PCI EUTRA	M		INTEGER (0..503)	Physical Cell Identifier of the reported E-UTRA cell	-	
>>>>EARFCN	M		INTEGER (0..262143, ...)	Corresponds to NDL for FDD and ND/UL for TDD in ref. TS 36.104 [7]	-	
>>>>CGI EUTRA	O		9.2.7	Cell Global Identifier of the reported E-UTRA cell	-	
>>>>Value RSRP EUTRA	M		INTEGER (0..97, ...)		-	
>>>>Result RSRQ EUTRA		1			-	
>>>>>Result RSRQ EUTRA Item		1 .. <maxCell Report>			-	
>>>>>PCI EUTRA	M		INTEGER (0..503)	Physical Cell Identifier of the reported E-UTRA cell	-	
>>>>>EARFCN	M		INTEGER (0..262143, ...)	Corresponds to ND/UL for FDD and ND/UL for TDD in ref. TS 36.104 [7]	-	

>>>>CGI EUTRA	O		9.2.7	Cell Global Identifier of the reported E-UTRA cell	-	
>>>>Value RSRQ EUTRA	M		INTEGER (0..34, ...)		-	
>>>>Result SS-RSRP		1			YES	ignore
>>>>Result SS-RSRP Item		1 .. <maxCellReportNR >			-	
>>>>NR PCI	M		INTEGER (0..1007)		-	
>>>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>>>NR CGI	O		9.2.9		-	
>>>>Value SS-RSRP Cell	O		INTEGER (0..127)	SS-RSRP measurement aggregated at cell level	-	
>>>>SS-RSRP per SSB Resource		0..1			-	
>>>>>SS-RSRP per SSB Resource Item		1 .. <maxIndexesReport >			-	
>>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>>Value SS-RSRP	M		INTEGER (0..127)	SS-RSRP measurement per SSB resource	-	
>>>>>Result SS-RSRQ		1			YES	ignore
>>>>>ResultSS-RSRQ-Item		1 .. <maxCellReportNR >			-	
>>>>>NR PCI	M		INTEGER (0..1007)		-	
>>>>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>>>>NR CGI	O		9.2.9		-	
>>>>>Value SS-RSRQ Cell	O		INTEGER (0..127)	SS-RSRQ measurement aggregated at cell level	-	
>>>>>SS-RSRQ per SSB Resource		0..1			-	
>>>>>>SS-RSRQ PerSSB Resource Item		1 .. <maxIndexesReport >			-	
>>>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>>>Value SS-RSRQ	M		INTEGER (0..127)	SS-RSRQ measurement per SSB resource	-	
>>>>>>Result CSI-RSRP		1			YES	ignore
>>>>>>Result CSI-RSRP Item		1 .. <maxCellReportNR >			-	
>>>>>>NR PCI	M		INTEGER (0..1007)		-	

>>>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>>>NR CGI	O		9.2.9		-	
>>>>Value CSI-RSRP Cell	O		INTEGER (0..127)	CSI-RSRP measurement aggregated at cell level	-	
>>>>CSI-RSRP per CSI-RS Resource		0..1			-	
>>>>>CSI-RSRP per CSI-RS Resource Item		1..<maxIndexesReport>			-	
>>>>>>CSI-RS Index	M		INTEGER (0..95)		-	
>>>>>>Value CSI-RSRP	M		INTEGER (0..127)	CSI-RSRP measurement per CSI-RS resource	-	
>>Result CSI-RSRQ		1			YES	ignore
>>>Result CSI-RSRQ Item		1..<maxCellReportNR>			-	
>>>>NR PCI	M		INTEGER (0..1007)		-	
>>>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>>>NR CGI	O		9.2.9		-	
>>>>Value CSI-RSRQ Cell	O		INTEGER (0..127)	CSI-RSRQ measurement aggregated at cell level	-	
>>>>CSI-RSRQ per CSI-RS Resource		0..1			-	
>>>>>CSI-RSRQ per CSI-RS Resource Item		1..<maxIndexesReport>			-	
>>>>>>CSI-RS Index	M		INTEGER (0..95)		-	
>>>>>>Value CSI-RSRQ	M		INTEGER (0..127)	CSI-RSRQ measurement per CSI-RS resource	-	
>>Angle of Arrival NR	M		UL Angle of Arrival 9.2.38		YES	ignore
>>Value Timing Advance NR	M		INTEGER (0..7690)	As defined in TS 38.215 [19]	YES	ignore
Geographical Coordinates	O		9.2.46		YES	ignore

Range bound	Explanation
maxnoMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 64.
maxCellReport	Maximum no. of cells that can be reported with one message. Value is 9.
maxCellReportNR	Maximum no. of NR cells that can be reported with one message. Value is 9.
maxIndexesReport	Maximum no. of beam level measurement results that can be reported with one message. Value is 64.

9.2.6 NG-RAN CGI

The NG-RAN Cell Global Identifier (CGI) is used to globally identify a cell.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PLMN identity	M		9.2.8	
CHOICE <i>NG-RAN Cell</i>	M			
> <i>NR Cell</i>				
NR Cell Identifier	M		BIT STRING (36)	
> <i>E-UTRAN Cell</i>				
E-UTRAN Cell Identifier	M		BIT STRING (28)	

9.2.7 CGI EUTRA

The Cell Global Identifier EUTRA is used to globally identify an E-UTRA cell.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PLMN identity	M		9.2.8	
E-UTRA Cell Identifier	M		BIT STRING (28)	

9.2.8 PLMN Identity

This IE indicates the PLMN Identity.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		OCTET STRING (SIZE(3))	<p>Digits 0 to 9 encoded 0000 to 1001, 1111 used as filler digit.</p> <p>Two digits per octet:</p> <ul style="list-style-type: none"> - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n <p>PLMN Identity consists of 3 digits from MCC followed by either:</p> <ul style="list-style-type: none"> - a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or - 3 digits from MNC (in case of 3 digit MNC).

9.2.9 NR CGI

The Cell Global Identifier NR is used to globally identify an NR cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PLMN Identity	M		9.2.8	
NR Cell Identity	M		BIT STRING (SIZE(36))	

9.2.10 NG-RAN Access Point Position

The *NG-RAN Access Point Position* IE is used to identify the geographical position of an NG-RAN Access Point. It is expressed as ellipsoid point with altitude and uncertainty ellipsoid according to TS 23.032 [8].

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 degrees (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 degrees (-180°..+180°).
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).
Uncertainty semi-major	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k-1})$.
Uncertainty semi-minor	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10x(1.1^{k-1})$.
Orientation of major axis	M		INTEGER (0..179)	
Uncertainty Altitude	M		INTEGER (0..127)	The uncertainty altitude "h" expressed in metres is derived from the "uncertainty code" k, by: $h=45x(1.025^{k-1})$.
Confidence	M		INTEGER (0..100)	In percentage

9.2.11 TAC

This information element is used to uniquely identify a Tracking Area Code.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TAC	M		OCTET STRING (SIZE (3))	

9.2.12 Cell Portion ID

This parameter gives the current Cell Portion associated with the target UE. The Cell Portion ID is the unique identifier for a cell portion within a cell.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Cell Portion ID	M		INTEGER (0..4095,...)	

9.2.13 Other-RAT Measurement Result

The purpose of the Other-RAT Measurement Result information element is to provide the measurement results of RATs other than the serving RAT.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Other-RAT Measured Results		1			-	
>CHOICE Other-RAT Measured Results Value		1..<maxnoMeas>			-	
>> Result GERAN		1			-	
>>>Result GERAN Item		1..<maxGERANMeas>			-	
>>>>ARFCN of BCCH	M		INTEGER (0..1023, ...)		-	
>>>>Physical CellId GERAN	M		INTEGER (0..63, ...)		-	
>>>>RSSI	M		INTEGER (0..63, ...)		-	
>> Result UTRAN		1			-	
>>>Result UTRAN Item		1..<maxUTRANMeas>			-	
>>>>UARFCN	M		INTEGER (0..16383, ...)		-	
>>>>CHOICE Physical CellId UTRA	M				-	
>>>>>Physical CellId UTRA FDD	M		INTEGER (0..511, ...)		-	
>>>>>Physical CellId UTRA TDD	M		INTEGER (0..127, ...)		-	
>>>>UTRA RSCP	O		INTEGER (-5..91, ...)		-	
>>>>UTRA EcNo	O		INTEGER (0..49, ...)	This IE applies to FDD only.	-	
>> Result NR		1			YES	ignore
>>>Result NR Item		1..<maxNRMeas>			-	
>>>>NR PCI	M		INTEGER (0..1007)		-	
>>>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>>>SS-RSRP Cell	O		INTEGER (0..127)	SS-RSRP measurement aggregated at cell level	-	
>>>>SS-RSRQ Cell	O		INTEGER (0..127)	SS-RSRQ measurement aggregated at cell level	-	
>>>> SS-RSRP per SSB Resource		0..1			-	
>>>>>Result SS-RSRP Per SSB Item		1..<maxIndicesReport>			-	
>>>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>>>Value SS-RSRP	M		INTEGER (0..127)	SS-RSRP measurement per SSB resource	-	
>>>> SS-RSRQ per SSB Resource		0..1			-	

>>>>Result SS-RSRQ Per SSB Item		1..<maxIn dexesRep ort>			-	
>>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>>Value SS-RSRQ	M		INTEGER (0..127)	SS-RSRQ measurement per SSB resource	-	
>>>>CGI NR	O		9.2.9	Cell Global Identifier of the reported NR cell	-	
>>Result EUTRA		1			YES	ignore
>>>Result EUTRA Item		1..<maxE UTRAMea s>			-	
>>>>PCI EUTRA	M		INTEGER (0..503)		-	
>>>>EARFCN	M		INTEGER (0..262143)		-	
>>>>RSRP EUTRA	O		INTEGER (0..97)		-	
>>>>RSRQ EUTRA	O		INTEGER (0..34)		-	
>>>>CGI EUTRA	O		9.2.7	Cell Global Identifier of the reported E-UTRA cell	-	

Range bound	Explanation
maxnoMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 64.
maxGERANMeas	Maximum no. of GERAN cells that can be reported with one message. Value is 8.
maxUTRANMeas	Maximum no. of UTRAN cells that can be reported with one message. Value is 8.
maxNRMeas	Maximum no. of NR cells that can be reported with one message. Value is 8.
maxEUTRAMeas	Maximum no. of EUTRA cells that can be reported with one message. Value is 8.
maxIndexesReport	Maximum no. of beam level measurement results that can be reported with one message. Value is 64.

9.2.14 WLAN Measurement Result

The WLAN Measurement Result information element provides the WLAN measurement results.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
WLAN Measured Results		1		
>WLAN Measurement Result Item		1.. <maxnoMeas>		
>>WLAN RSSI	M		INTEGER (0..141, ...)	
>>SSID	O		OCTET STRING (SIZE(1..32))	Includes the SSID field as defined in subclause 8.4.2.2 of IEEE 802.11™ [11].
>>BSSID	M		OCTET STRING (SIZE(6))	Includes the BSSID field as defined in subclause 8.2.4.3.4 of IEEE 802.11™ [11].
>>HESSID	O		OCTET STRING (SIZE(6))	Includes the HESSID field as defined in subclause 8.4.2.94 of IEEE 802.11™ [11].
>>Operating Class	O		INTEGER (0..255)	Indicates the WLAN Operating Class as defined in IEEE 802.11™ [11].
>>Country Code	O		ENUMERATED (unitedStates, europe, japan, global, ...)	Indicates the WLAN country code as defined in IEEE 802.11™ [11].
>>WLAN Channel List		0..1		
>>>WLAN Channel List Item		1..<maxWLANchannels>		
>>>>WLAN Channel	M		INTEGER (0..255)	Indicates the WLAN channel number as defined in IEEE 802.11™ [11].
>>WLAN Band	O		ENUMERATED (band2dot4, band5, ...)	Indicates the WLAN band as defined in IEEE 802.11™ [11].

Range bound	Explanation
maxnoMeas	Maximum no. of measured quantities that can be configured and reported with one message. Value is 63.
maxWLANchannels	Maximum no. of WLAN channels that can be reported within one list. Value is 16.

9.2.15 OTDOA Cell Information

This IE contains OTDOA information of a cell/TP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned criticality
CHOICE OTDOA Cell Information item		1 <maxnoO TDOAtype S>				
>>PCI EUTRA	M		INTEGER (0..503, ...)	Physical Cell ID of the reported E-UTRA cell.		
>>CGI EUTRA	M		9.2.7	Cell Global Identifier of the E-UTRA cell.		
>>TAC	M		9.2.11	Tracking Area Code		
>>EARFCN	M		INTEGER (0..262143, ...)	Corresponds to N _{DL} for FDD and N _{DL/UL} for TDD in ref. TS 36.104 [7].		
>>PRS Bandwidth EUTRA	M		ENUMERATED (bw6, bw15, bw25, bw50, bw75, bw100, ...)	Transmission bandwidth of PRS		
>>PRS Configuration Index EUTRA	M		INTEGER (0..4095, ...)	PRS Configuration Index, ref TS 36.211 [10]		
>>CP Length EUTRA	M		ENUMERATED (Normal, Extended, ...)	Cyclic prefix length of the PRS		
>>Number of DL Frames EUTRA	M		ENUMERATED (sf1, sf2, sf4, sf6, ...)	Number of consecutive downlink subframes N _{PRS} with PRS, ref TS 36.211 [10]		
>>Number of Antenna Ports EUTRA	M		ENUMERATED (n1-or-n2, n4, ...)	Number of used antenna ports, where n1-or-n2 corresponds to 1 or 2 ports, n4 corresponds to 4 ports		
>>SFN Initialisation Time EUTRA	M		BIT STRING (64)	Time in seconds relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of 1 /2**32 second.		

>>NG-RAN Access Point Position	M		9.2.10	The configured estimated geographical position of the antenna of the cell/TP.		
>>PRS Muting Configuration EUTRA	M		9.2.16	The configuration of positioning reference signals muting pattern.		
>>PRS-ID EUTRA	M		INTEGER (0..4095, ...)	PRS ID, ref TS 36.211 [10].		
>>TP-ID EUTRA	M		INTEGER (0..4095, ...)	Identity of the transmission point. This IE together with the <i>PCI</i> and/or <i>PRS-ID</i> may be used to identify the transmission point in case the same physical cell ID is shared by multiple transmission points.		
>>TP Type EUTRA	M		ENUMERATED (prs-only-tp, ...)	A TP which transmits PRS only.		
>>Number of DL Frames-Extended EUTRA	M		INTEGER (1..160, ...)	Number of consecutive downlink subframes N_{PRS} with PRS, ref TS 36.211 [10].		
>>CRS CP Length EUTRA	M		ENUMERATED (Normal, Extended, ...)	Cyclic prefix length of the CRS.		
>>DL Bandwidth EUTRA	M		ENUMERATED (bw6, bw15, bw25, bw50, bw75, bw100, ...)	DL transmission bandwidth expressed in units of resource blocks N_{RB} , ref TS 36.104 [7].		
>>PRS Occasion Group EUTRA	M		ENUMERATED (og2, og4, og8, og16, og32, og64, og128, ...)	PRS occasion group in a PRS period, ref TS 36.211 [10].		
>>PRS Frequency Hopping Configuration EUTRA	M		9.2.17	PRS frequency hopping configuration.		
>>TDD Configuration EUTRA	M		9.2.18	TDD specific physical channel configuration.	YES	ignore
>>NR CGI	M		9.2.9	Cell Global Identifier of the NR cell.	YES	ignore

>>SFN Initialisation Time NR	M		BIT STRING (64)	Time in seconds relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of $1/2^{**32}$ second.	YES	ignore
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Range bound	Explanation
maxnoOTDOAtypes	Maximum no. of OTDOA information types that can be requested and reported with one message. Value is 63.

9.2.16 PRS Muting Configuration EUTRA

The *PRS Muting Configuration EUTRA* IE is used to describe the configuration of PRS muting patterns for the concerned cell/TP, according to TS 36.211 [10] and TS 36.133 [9].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>PRS Muting Configuration</i>	M			
>Two	M		BIT STRING (2)	If a bit is set to "0", it indicates that the PRS is muted in the corresponding PRS positioning occasion (numbering from any sub frame for which SFN=0) in a periodic cycle of length equal to the length of the bit string
>Four	M		BIT STRING (4)	Same as above
>Eight	M		BIT STRING (8)	Same as above
>Sixteen	M		BIT STRING (16)	Same as above
>thirty-two	M		BIT STRING (32)	Same as above
>sixty-four	M		BIT STRING (64)	Same as above
>one-hundred-and-twenty-eight	M		BIT STRING (128)	Same as above
>two-hundred-and-fifty-six	M		BIT STRING (256)	Same as above
>five-hundred-and-twelve	M		BIT STRING (512)	Same as above
>one-thousand-and-twenty-four	M		BIT STRING (1024)	Same as above

9.2.17 PRS Frequency Hopping Configuration EUTRA

The *PRS Frequency Hopping Configuration EUTRA* IE is used to describe the configuration of PRS frequency hopping for the concerned cell/TP, according to TS 36.211 [10].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Number of Frequency Hopping Bands	M		ENUMERATED (twobands, fourbands, ...)	Number of bands for frequency hopping.
Band Positions		1..<maxnoFreqHoppingBandsMinusOne,>		
>NarrowBand Index	M		INTEGER (0..15, ...)	Narrowband Index

Range bound	Explanation
maxnoFreqHoppingBandsMinusOne	Maximum no. of frequency hopping bands minus one. Value is 7.

9.2.18 TDD Configuration EUTRA

The *TDD Configuration EUTRA* IE is used to specify the TDD specific physical channel configuration.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Subframe Assignment	M		ENUMERATED (sa0, sa1, sa2, sa3, sa4, sa5, sa6, ...)	sa0 points to Configuration 0, sa1 to Configuration 1 etc. as specified in TS 36.211 [6, table 4.2-2].

9.2.19 Assistance Information

This IE contains the assistance information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Assistance Information	M			
>System Information		1..<maxNrOfPosSImessage>		Corresponds to the number of SI messages with posSIBs to be scheduled
>>Broadcast Periodicity	M		ENUMERATED (ms80, ms160, ms320, ms640, ms1280, ms2560, ms5120, ...)	Broadcast Periodicity for the Pos SIBs, see TS 38.331 [13]
>>Pos SIBs		1..<maxNrOfPosSIBs>		Number of posSIBs in the System Information.
>>>PosSIB-Type	M		9.2.22	
>>>PosSIB Segments	M		9.2.20	
>>>Assistance Information Meta Data	O		9.2.21	
>>>Broadcast Priority	O		INTEGER (1..16, ...)	The priority of the assistance Information where 1 represents the highest priority and 16 the lowest priority

Range bound	Explanation
maxNrOfPosSImessage	Maximum number of positioning system information messages. Value is 32.
maxNrOfPosSIBs	Maximum number of positioning system information blocks included in the message. Value is 32.

9.2.20 PosSIB Segments

This IE provides one posSIB or two or more posSIB segments which must be scheduled in series in consecutive transmissions of the same SI message.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
PosSIB Segments		1..<maxNr OfSegmen ts>		
>Assistance Data SIB Element	M		OCTET STRING	TS 37.355 [14]

Range bound	Explanation
maxNrOfSegments	Maximum number of positioning SIB segments (in case of <i>Assistance Information Element</i> contains segmented data according to TS 37.355 [14]). Value is 64.

9.2.21 Assistance Information Meta Data

This parameter contains meta data for an assistance information element.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Encrypted	O		ENUMERATED (true, ...)	TS 38.331 [13]
GNSS ID	O		ENUMERATED (gps, sbas, qzss, galileo, glonass, bds, navic ...)	TS 38.331 [13]
SBAS ID	O		ENUMERATED (waas, egnos, msas, gagan, ...)	TS 38.331 [13]

9.2.22 Positioning SIB Type

This parameter defines a specific positioning SIB, as defined in TS 37.355 [14].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Positioning SIB Type	M		ENUMERATED (posSibType1-1, posSibType1-2, posSibType1-3, posSibType1-4, posSibType1-5, posSibType1-6, posSibType1-7, posSibType1-8, posSibType2-1, posSibType2-2, posSibType2-3, posSibType2-4, posSibType2-5, posSibType2-6, posSibType2-7, posSibType2-8, posSibType2-9, posSibType2-10, posSibType2-11, posSibType2-12, posSibType2-13, posSibType2-14, posSibType2-15, posSibType2-16, posSibType2-17, posSibType2-18, posSibType2-19, posSibType2-20, posSibType2-21, posSibType2-22, posSibType2-23, posSibType2-24, posSibType2-25, posSibType3-1, posSibType4-1, posSibType5-1, posSibType6-1, posSibType6-2, posSibType6-3, ..., posSibType1-9, posSibType1-10, posSibType6-4, posSibType6-5, posSibType6-6)	

9.2.23 Assistance Information Failure List

This parameter identifies the assistance information for which the NG-RAN Node failed to configure broadcasting.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Assistance Information Failure List		<i>1..<maxno AssistInfo FailureList Items></i>		
>PosSIB-Type	M		9.2.22	
>Outcome	M		ENUMERATED (failed, ...)	

Range bound	Explanation
maxnoAssistInfoFailureListItems	Maximum no. of assistance information failure list items that can be signaled with one message. Value is 32.

9.2.24 TRP ID

The *TRP ID* IE is used to identify a TRP uniquely within an NG-RAN node.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
TRP Identifier	M		INTEGER (1..65535,...)	Identifies a TRP within an NG-RAN node

9.2.25 TRP Information

The *TRP Information* IE contains information for one TRP within an NG-RAN node.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
TRP ID	M		9.2.24		-	
TRP Information Type		1 .. <maxnoTRPInfoTypes>			-	
>CHOICE <i>TRP Information Item</i>	M				-	
>>NR PCI	M		INTEGER (0..1007)	NR Physical Cell ID	-	
>>NR CGI	M		9.2.9		-	
>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>PRS Configuration	M		9.2.44		-	
>>SSB Information	M		9.2.54		-	
>>SFN Initialisation Time	M		Relative Time 1900 9.2.36		-	
>>Spatial Direction Information	M		9.2.45		-	
>>Geographical Coordinates	M		9.2.46		-	
>>TRP type	M		ENUMERATED (prs-only-tp, srs-only-rp, tp, rp, trp...)	TS 38.305 [18]	YES	reject
>>On-demand PRS TRP Information	M		9.2.65		YES	reject
>>TRP Tx TEG Association	M		9.2.79		YES	reject
>>TRP Beam Antenna Information	M		9.2.82		YES	reject

Range bound	Explanation
maxnoTRPInfoTypes	Maximum no of TRP information types that can be requested and reported with one message. Value is 64.

9.2.26 Search Window Information

This information element contains search window information for the TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Expected Propagation Delay	M		INTEGER (-3841..3841,...)	Indicates when the SRS is expected to arrive in time at the TRP relative to the UL RTOA Reference Time. The UL RTOA Reference Time for a target SRS is defined as $T_0 + t_{SRS}$, where - T_0 is the SFN Initialisation Time - $t_{SRS} = (10n_f + n_{sf}) \times 10^{-3}$, where n_f and n_{sf} are the system frame number and the subframe number of the SRS, respectively. Granularity 4Ts, where $T_s = 1/(15 \cdot 10^3 \cdot 2048)$ seconds. Centre of the search window.
Delay Uncertainty	M		INTEGER (1..246,...)	Indicates the uncertainty of the expected SRS arrival time at the TRP Granularity 4Ts, where $T_s = 1/(15 \cdot 10^3 \cdot 2048)$ seconds. Single-sided search window.

9.2.27 Requested SRS Transmission Characteristics

This IE contains the requested SRS configuration for the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Number Of Periodic Transmissions	C-ifResource TypePeriodic		INTEGER (0..500,...)	The number of periodic SRS transmissions requested. The value of '0' represents an infinite number of periodic SRS transmissions.		
Resource Type	M		ENUMERATED (periodic, semi-persistent, aperiodic, ...)			
CHOICE <i>Bandwidth</i>	M					
>FR1			ENUMERATED (5mHz, 10mHz, 20mHz, 40mHz, 50mHz, 80mHz, 100mHz, ...)			
>FR2			ENUMERATED (50mHz, 100mHz, 200mHz, 400mHz,...)			
SRS Resource Set List		<i>0.. 1</i>				
>SRS Resource Set Item		<i>1..<maxnoSRS-Resource Sets></i>				
>>Number of SRS Resources Per Set	O		INTEGER (1..16,...)	The number of SRS Resources per resource set for SRS transmission.		
>>Periodicity List		<i>0.. 1</i>				
>>>Periodicity List Item		<i>1..<maxno SRS-Resource PerSet></i>				
>>>>PeriodicitySRS	M		ENUMERATED (0.125, 0.25, 0.5, 0.625, 1, 1.25, 2, 2.5, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240, ...)	Milli-seconds		
>>Spatial Relation Information	O		9.2.34	This IE is ignored if the <i>Spatial Relation Information per SRS Resource</i> IE is present.		
>>Pathloss Reference Information	O		9.2.53			
>>Spatial Relation Information per SRS Resource	O		9.2.60			
SSB Information	O		9.2.54			

SRS Frequency	O		INTEGER(0..3279165)	NR ARFCN The carrier frequency of SRS transmission bandwidth.	YES	ignore
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Condition	Explanation
ifResourceTypePeriodic	This IE shall be present if the <i>Resource Type</i> IE is set to the value "Periodic".

Range bound	Explanation
maxnoSRS-ResourceSets	Maximum no of requested SRS Resource Sets for SRS transmission. Value is 16.
maxnoSRS-ResourcePerSet	Maximum no of SRS Resources per set. Value is 16.

9.2.28 SRS Configuration

This information element contains the SRS configuration configured by the NG-RAN node for the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SRS Carrier List		1		
>SRS Carrier List Item		1..<maxno SRS-Carriers>		
>>Point A	M		INTEGER (0..3279165)	NR ARFCN
>>Uplink Channel BW-PerSCS-List		1		SCS-SpecificCarrier TS 38.331 [13]
>>>SCS Specific Carrier		1..<maxnoSCSs>		
>>>>Offset To Carrier	M		INTEGER(0..2199,...)	First usable RB to Point A in the number of PRBs
>>>>Subcarrier Spacing	M		ENUMERATED(kHz15, kHz30, kHz60, kHz120,...)	
>>>>Carrier Bandwidth	M		INTEGER(1..275,...)	
>>Active UL BWP	M			Only the configuration in the active UL BWP is needed.
>>>Location And Bandwidth	M		INTEGER(0..37949,...)	BWP TS 38.331 [13]
>>>>Subcarrier Spacing	M		ENUMERATED(kHz15, kHz30, kHz60, kHz120,...)	
>>>>Cyclic Prefix	M		ENUMERATED(Normal, Extended)	
>>>>Tx Direct Current Location	M		INTEGER(0..3301,...)	
>>>>Shift7dot5kHz	O		ENUMERATED(true,...)	
>>>>SRS Config	M			SRS-Config as defined in TS 38.331 [13]
>>>>SRS Resource List		0..<maxno SRS-Resources >		
>>>>>SRS Resource	M		9.2.29	SRS-Resource as defined in TS 38.331 [13]
>>>>Positioning SRS Resource List		0..<maxnoSR S-PosResources>		
>>>>>Positioning SRS Resource	M		9.2.30	SRS-PosResource-r16 as defined in TS 38.331 [13]
>>>>SRS Resource Set List		0..<maxno SRS-Resource Sets>		
>>>>>SRS Resource Set	M		9.2.31	SRS-ResourceSet as defined in TS 38.331 [13]
>>>>Positioning SRS Resource Set List		0..<maxno SRS-PosResourceSets>		
>>>>>Positioning SRS Resource Set	M		9.2.32	SRS-PosResourceSet-r16 as defined in TS 38.331 [13]
>>NR PCI	O		INTEGER (0..1007)	Physical Cell ID of the cell that contains the SRS carrier

Range bound	Explanation
maxnoSRS-Carriers	Maximum no of carriers for SRS. Value is 32.
maxnoSCSs	Maximum no of SCS spacings for a carrier. Value is 5.
maxnoSRS-Resources	Maximum no of SRS resources per UL BWP. Value is 64.
maxnoSRS-PosResources	Maximum no of positioning SRS resources per UL BWP. Value is 64.
maxnoSRS-ResourceSets	Maximum no of SRS resource sets per UL BWP. Value is 16.

maxnoSRS-PosResourceSets	Maximum no of positioning SRS resource sets per UL BWP. Value is 16.
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9.2.29 SRS Resource

This information element contains the SRS resource.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SRS Resource ID	M		INTEGER(0..63)	
Number of Ports	M		ENUMERATED(port1, ports2, ports4)	
CHOICE <i>Transmission Comb</i>	M			
> <i>Comb Two</i>				
>>Comb Offset	M		INTEGER(0..1)	
>>Cyclic Shift	M		INTEGER(0..7)	
> <i>Comb Four</i>				
>>Comb Offset	M		INTEGER(0..3)	
>>Cyclic Shift	M		INTEGER(0..11)	
Start Position	M		INTEGER(0..13)	
Number of Symbols	M		ENUMERATED(n1,n2,n4)	
Repetition Factor	M		ENUMERATED(r1,r2,r4)	
Frequency Domain Position	M		INTEGER(0..67)	
Frequency Domain Shift	M		INTEGER(0..268)	
C-SRS	M		INTEGER(0..63)	
B-SRS	M		INTEGER(0..3)	
B-Hop	M		INTEGER(0..3)	
Group or Sequence Hopping	M		ENUMERATED(neither, groupHopping, sequenceHopping)	
CHOICE <i>Resource Type</i>	M			
> <i>Periodic</i>				
>>Periodicity	M		ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, ...)	
>>Offset	M		INTEGER(0..2559, ...)	
> <i>Semi-persistent</i>				
>>Periodicity	M		ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, ...)	
>>Offset	M		INTEGER(0..2559, ...)	
> <i>Aperiodic</i>				
>>Aperiodic Resource Type	M		ENUMERATED(true,...)	
Sequence ID	M		INTEGER(0..1023)	

9.2.30 Positioning SRS Resource

This information element contains the SRS resource for positioning.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Positioning SRS Resource ID	M		INTEGER(0..63)	
CHOICE <i>Transmission Comb</i>	M			
> <i>Comb Two</i>				
>>Comb Offset	M		INTEGER(0..1)	
>>Cyclic Shift	M		INTEGER(0..7)	
> <i>Comb Four</i>				
>>Comb Offset	M		INTEGER(0..3)	
>>Cyclic Shift	M		INTEGER(0..11)	
> <i>Comb Eight</i>				
>>Comb Offset	M		INTEGER(0..7)	
>>Cyclic Shift	M		INTEGER(0..5)	
Start Position	M		INTEGER(0..13)	
Number of Symbols	M		ENUMERATED(n1,n2,n4, n8, n12)	
Frequency Domain Shift	M		INTEGER(0..268)	
C-SRS	M		INTEGER(0..63)	
Group or Sequence Hopping	M		ENUMERATED(Neither, groupHopping, sequenceHopping)	
CHOICE <i>Resource Type Positioning</i>	M			
> <i>periodic</i>				
>>Periodicity	M		ENUMERATED(slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920,...)	
>>Offset	M		INTEGER(0..81919,...)	
> <i>semi-persistent</i>				
>>Periodicity	M		ENUMERATED(slot 1, slot 2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920,...)	
>>Offset	M		INTEGER(0..81919,...)	
> <i>aperiodic</i>				
>>slot offset	M		INTEGER(0..32)	
Sequence ID	M		INTEGER(0..65535)	
CHOICE <i>Spatial Relation Positioning</i>	O			
> <i>SSB</i>				
>>NR PCI	M		INTEGER (0..1007)	
>>SSB index	O		INTEGER(0..63)	
> <i>PRS</i>				
>>PRS ID	M		INTEGER(0..255)	
>>PRS Resource Set ID	M		INTEGER(0..7)	
>>PRS Resource ID	O		INTEGER(0..63)	

9.2.31 SRS Resource Set

This information element indicates an SRS resource set in the UE for UL SRS transmission.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SRS Resource Set ID	M		INTEGER(0..15)	
SRS Resource ID List		<i>1..<maxno SRS-ResourcePerSet></i>		
>SRS Resource ID	M		INTEGER(0..63)	
CHOICE <i>Resource Set Type</i>	M			
> <i>periodic</i>				
>>periodicSet	M		ENUMERATED(true,...)	
> <i>semi-persistent</i>				
>>semi-persistentSet	M		ENUMERATED(true,...)	
> <i>aperiodic</i>				
>>SRS Resource Trigger	M		INTEGER(1..3)	
>>Slot offset	M		INTEGER(0..32)	Offset in number of slots, where value 0 indicates no offset.

Range bound	Explanation
maxnoSRS-ResourcePerSet	Maximum no of SRS resources per SRS resource set. Value is 16.

9.2.32 Positioning SRS Resource Set

This information element indicates a positioning SRS resource set in the UE for UL SRS transmission.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Positioning SRS Resource Set ID	M		INTEGER(0..15)	
Positioning SRS Resource ID List		<i>1..<maxno SRS-PosResourcePerSet></i>		
>Positioning SRS Resource ID	M		INTEGER(0..63)	
CHOICE <i>Resource Type</i>	M			
> <i>periodic</i>				
>>PosperiodicSet	M		ENUMERATED(true,...)	
> <i>semi-persistent</i>				
>>Possemi-persistentSet	M		ENUMERATED(true,...)	
> <i>aperiodic</i>				
>>SRS Resource Trigger	M		INTEGER(1..3)	

Range bound	Explanation
maxnoSRS-PosResourcePerSet	Maximum no of positioning SRS resources per positioning SRS resource set. Value is 16.

9.2.33 SRS Resource Set ID

This information element indicates a resource set in the UE for UL SRS transmission.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SRS Resource Set ID	M		INTEGER (0..15)	According to TS 38.331 [13]

9.2.34 Spatial Relation Information

This information element indicates a spatial relation for transmission of UL SRS by a UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Spatial Relation for Resource ID		<i>1..<maxno SpatialRelations></i>		According to TS 38.321 [15] and TS 38.331 [13]
CHOICE <i>Reference Signal</i>	M			
>N-ZP CSI-RS				
>>N-ZP CSI-RS Resource ID	M		INTEGER (0..191)	
>SSB				
>>NR PCI	M		INTEGER (0..1007)	
>>SSB Index	O		INTEGER (0..63)	
>SRS				
>>SRS Resource ID	M		INTEGER (0..63)	
>Positioning SRS				
>>Positioning SRS Resource ID	M		INTEGER (0..63)	
>DL-PRS				
>>DL-PRS ID	M		INTEGER (0..255)	
>>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>>DL-PRS Resource ID	O		INTEGER (0..63)	

Range bound	Explanation
maxnoSpatialRelations	Maximum no. of Spatial Relations that can be configured. Value is 64.

9.2.35 SRS Resource Trigger

This information element indicates a DCI code point according to a SRS resource set configuration.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Aperiodic SRS Resource Trigger List		<i>1..<maxno SRS-TriggerStates></i>		According to TS 38.331 [13]
>Aperiodic SRS Resource Trigger			INTEGER (1..3)	

Range bound	Explanation
maxnoSRSTriggerStates	Maximum no. of SRS trigger states. Value is 3.

9.2.36 Relative Time 1900

This information element indicates the initialisation time (e.g. SFN Initialisation Time for a cell, requested time for an action, etc).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Relative Time 1900	M		BIT STRING (SIZE(64))	Time in seconds relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of $1/2^{**32}$ second

9.2.37 TRP Measurement Result

This information element contains the measurement result.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Measured Result Item		1 .. <i><maxnoPosMeas></i>				
>CHOICE <i>Measured Results Value</i>	M					
>>UL Angle of Arrival	M		9.2.38		-	
>>UL SRS-RSRP	M		INTEGER (0..126)		-	
>>UL RTOA	M		9.2.39		-	
>>gNB Rx-Tx Time Difference	M		9.2.40		-	
>>Z-AoA	M		9.2.67		YES	reject
>>Multiple UL-AoA	M		9.2.71		YES	reject
>>UL SRS-RSRPP	M		9.2.72		YES	reject
>Time Stamp	M		9.2.42		-	
>Measurement Quality	O		9.2.43		-	
>Measurement Beam Information	O		9.2.57		-	
>SRS Resource type	O		9.2.73		YES	ignore
>ARP ID	O		9.2.75		YES	ignore
>LoS/NLoS Information	O		9.2.77		YES	ignore

Range bound	Explanation
maxnoPosMeas	Maximum no. of measured quantities that can be configured and reported with one positioning measurement message. Value is 16384.

9.2.38 UL Angle of Arrival

This information element contains the uplink Angle of Arrival measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Azimuth Angle of Arrival	M		INTEGER(0..3599)	TS 38.133 [16]
Zenith Angle of Arrival	O		INTEGER(0..1799)	TS 38.133 [16]
LCS to GCS Translation	O		9.2.69	If absent, the azimuth and zenith are provided in GCS.

9.2.39 UL RTOA Measurement

This information element contains the uplink RTOA measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE <i>UL RTOA Measurement</i>	M				-	
>k0	M		INTEGER (0..1970049)	TS 38.133 [16]	-	
>k1	M		INTEGER (0..985025)	TS 38.133 [16]	-	
>k2	M		INTEGER (0..492513)	TS 38.133 [16]	-	
>k3	M		INTEGER (0..246257)	TS 38.133 [16]	-	
>k4	M		INTEGER (0..123129)	TS 38.133 [16]	-	
>k5	M		INTEGER (0..61565)	TS 38.133 [16]	-	
Additional Path List	O		9.2.41	This IE is ignored if the <i>Extended Additional Path List</i> IE is included	-	
Extended Additional Path List	O		9.2.74		YES	ignore
TRP Rx TEG ID	O		INTEGER (0..31)		YES	ignore

9.2.40 gNB Rx-Tx Time Difference

This information element contains the gNB Rx-Tx Time Difference measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE <i>gNB Rx-Tx Time Difference Measurement</i>	M				-	
>k0	M		INTEGER (0..1970049)	TS 38.133 [16]	-	
>k1	M		INTEGER (0..985025)	TS 38.133 [16]	-	
>k2	M		INTEGER (0..492513)	TS 38.133 [16]	-	
>k3	M		INTEGER (0..246257)	TS 38.133 [16]	-	
>k4	M		INTEGER (0..123129)	TS 38.133 [16]	-	
>k5	M		INTEGER (0..61565)	TS 38.133 [16]	-	
Additional Path List	O		9.2.41	This IE is ignored if the <i>Extended Additional Path List</i> IE is included	-	
Extended Additional Path List	O		9.2.74		YES	ignore
TRP TEG ID Information	O		9.2.80		YES	ignore

9.2.41 Additional Path List

This information element contains the additional path results of time measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Additional Path Item		<i>1..<maxno path></i>			-	
>CHOICE <i>Relative Path Delay</i>	M				-	
>>k0	M		INTEGER(0..16351)		-	
>>k1	M		INTEGER(0..8176)		-	
>>k2	M		INTEGER(0..4088)		-	
>>k3	M		INTEGER(0..2044)		-	
>>k4	M		INTEGER(0..1022)		-	
>>k5	M		INTEGER(0..511)		-	
>Path Quality	O		Measurement Quality 9.2.43		-	
>Multiple UL-AoA	O		9.2.71		YES	ignore
>Path Power	O		UL SRS-RSRPP 9.2.72		YES	ignore

Range bound	Explanation
maxnopath	Maximum no. of additional path measurement. Value is 2.

9.2.42 Time Stamp

This information element contains the time stamp associated with the measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
System Frame Number	M		INTEGER(0..1023)	
CHOICE <i>Slot Index</i>	M			
>SCS-15	M		INTEGER(0..9)	
>SCS-30	M		INTEGER(0..19)	
>SCS-60	M		INTEGER(0..39)	
>SCS-120	M		INTEGER(0..79)	
Measurement time	O		Relative Time 1900 9.2.36	

9.2.43 Measurement Quality

This information element contains the TRP's best estimate of the quality of the measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Measurement Quality</i>	M			
>Timing Measurement Quality				
>>Measurement Quality	M		INTEGER(0..31)	TS 37.355 [14]
>>Resolution	M		ENUMERATED(0.1m, 1m, 10m, 30m, ...)	TS 37.355 [14]
>Angle Measurement Quality				
>>Azimuth Quality	M		INTEGER(0..255)	
>>Zenith Quality	O		INTEGER(0..255)	
>>Resolution	M		ENUMERATED(0.1deg, ...)	

9.2.44 PRS Configuration

This information element contains the DL PRS configuration for the TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PRS Resource Set List		1		
>PRS Resource Set Item		<i>1..<maxno of PRSresourceSet></i>		
>>PRS Resource Set ID	M		INTEGER(0..7)	
>>Subcarrier Spacing	M		ENUMERATED(kHz15, kHz30, kHz60, kHz120, ...)	
>>PRS bandwidth	M		INTEGER(1..63)	24,28,...,272 PRBs
>>Start PRB	M		INTEGER(0..2176)	Starting PRB to Point A
>>Point A	M		INTEGER (0..3279165)	NR ARFCN
>>Comb Size	M		ENUMERATED(2, 4, 6, 12, ...)	
>>CP Type	M		ENUMERATED(normal, extended, ...)	
>>Resource Set Periodicity	M		ENUMERATED(4,5,8,10,16,20,32,40,64,80,160,320,640,1280,2560,5120,10240,20480,40960,81920,...)	
>>Resource Set Slot Offset	M		INTEGER(0..81919,...)	
>>Resource Repetition Factor	M		ENUMERATED(rf1,rf2,rf4,rf6,rf8,rf16,rf32,...)	
>>Resource Time Gap	M		ENUMERATED(tg1,tg2,tg4,tg8,tg16,tg32,...)	
>>Resource Number of Symbols	M		ENUMERATED(n2,n4,n6,n12,...)	
>>PRS Muting	O			
>>>Option1	O			
>>>>Muting Pattern	M		DL-PRS Muting Pattern 9.2.56	Muting pattern option 1 is used to mute the whole PRS resource set (within a period)
>>>>Muting Bit Repetition Factor	M		ENUMERATED(1,2,4,8,...)	
>>>>Option2	O			
>>>>Muting Pattern	M		DL-PRS Muting Pattern 9.2.56	Muting pattern option 2 is used to mute the selected repetition of the resource set (within the period)
>>PRS Resource Transmit Power	M		INTEGER(-60..50)	
>>PRS Resource List		1		<i>NR-DL-PRS-Resource-r16</i> as defined in TS 37.355 [14]
>>>PRS Resource Item		<i>1..<maxno of PRSresources></i>		
>>>>PRS Resource ID	M		INTEGER(0..63)	
>>>>Sequence ID	M		INTEGER(0..4095)	
>>>>RE Offset	M		INTEGER(0..11,...)	
>>>>Resource Slot Offset	M		INTEGER(0..511)	
>>>>Resource Symbol Offset	M		INTEGER(0..12)	
>>>>CHOICE QCL Info	O			
>>>>>SSB				
>>>>>>NR PCI	M		INTEGER(0..1007)	
>>>>>>SSB Index	O		INTEGER(0..63)	
>>>>>>DL-PRS				
>>>>>>>QCL Source PRS Resource Set ID	M		INTEGER(0..7)	

>>>>>QCL Source PRS Resource ID	O		INTEGER(0..63)	If it is absent, the QCL source PRS resource ID is the same as the PRS resource ID
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Range bound	Explanation
maxnoofPRSresourceSet	Maximum no of PRS resources set. Value is 8.
maxnoofPRSresource	Maximum no of PRS resources per PRS resource set. Value is 64.

9.2.45 Spatial Direction Information

This information element contains the spatial direction information of the DL PRS resources for the TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
NR-PRS Beam Information	M		9.2.58	The spatial directions of DL-PRS Resources for TRP

9.2.46 Geographical Coordinates

This information element contains the geographical coordinates for the TRP and any associated ARP(s).

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
CHOICE TRP Position Definition Type	M				-	
>Direct						
>>CHOICE Accuracy	M					
>>>normal accuracy						
>>>>TRP Position	M		NG-RAN Access Point Position 9.2.10	The configured estimated geographical position of the antenna of the cell/TRP.		
>>>>high accuracy						
>>>>>TRP High Accuracy Access Position	M		NG-RAN High Accuracy Access Point Position 9.2.49	The configured estimated geographical high accuracy position of the antenna of the cell/TRP.		
>Referenced						
>>Reference Point	M		9.2.51	The reference point is used to derive the TRP position		
>>CHOICE Type	M					
>>>Geodetic						
>>>>TRP Position Relative Geodetic	M		Relative Geodetic Location 9.2.48	The configured estimated relative geodetic coordinate of the antenna of the cell/TRP		
>>>>Cartesian						
>>>>>TRP Position Relative Cartesian	M		Relative Cartesian Location 9.2.50	The configured estimated relative Cartesian coordinate of the antenna of the cell/TRP		
DL-PRS Resource Coordinates	O		9.2.47	DL-PRS Resource Coordinates relative to the TRP coordinate	-	
ARP Location Information	O		9.2.76		Yes	ignore

9.2.47 DL-PRS Resource Coordinates

This information element contains the geographical coordinates of the antenna reference points (ARP) for the DL-PRS Resources of a TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
DL-PRS Resource Set ARP List	M	1..<maxP RS- Resource Sets>		
>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>CHOICE <i>DL-PRS Resource Set ARP Location</i>	M			Relative to the geographical coordinates for the TRP. If this IE is absent, the Relative Location is zero for the indicated DL-PRS Resource Set ID.
>>Geodetic				
>>>TRP Position Relative Geodetic	M		Relative Geodetic Location 9.2.48	
>>>Cartesian				
>>>TRP Position Relative Cartesian	M		Relative Cartesian Location 9.2.50	
>DL-PRS Resource ARP List	M	1..<maxP RS- Resources PerSet>		
>>DL-PRS Resource ID	M		INTEGER (0..63)	
>>CHOICE <i>DL-PRS Resource ARP Location</i>	M			Relative to the DL-PRS Resource Set ARP Location. If this IE is absent, the Relative Location is zero for the indicated DL-PRS Resource ID.
>>>Geodetic				
>>>TRP Position Relative Geodetic	M		Relative Geodetic Location 9.2.48	
>>>Cartesian				
>>>TRP Position Relative Cartesian	M		Relative Cartesian Location 9.2.50	

Range bound	Explanation
maxPRS-ResourceSets	Maximum no of DL-PRS resource sets per TRP. Value is 2.
maxPRS-ResourcesPerSet	Maximum no of DL-PRS resources of the DL-PRS resource set of the TRP. Value is 64.

9.2.48 Relative Geodetic Location

This information element provides a location relative to some known reference location in a relative geodetic coordinate system.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Milli-Arc-Second Units	M		ENUMERATED (0.03, 0.3, 3, ...)	Units and scale factor for the delta-latitude and delta-longitude fields. 0.03, 0.3, 3, milliarcseconds. TS 37.355 [14].
Height Units	M		ENUMERATED (mm, cm, m, ...)	Units and scale factor for the delta-height field. 10^{-3} metre, 10^{-2} metre, TS 37.355 [14].
Delta Latitude	M		INTEGER (-1024..1023)	Delta value in latitude in the unit provided in Milli-Arc-Second Units. TS 37.355 [14].
Delta Longitude	M		INTEGER (-1024..1023)	Delta value in longitude in the unit provided in Milli-Arc-Second Units. TS 37.355 [14].
Delta Height	M		INTEGER (-1024..1023)	Delta value in ellipsoidal height in the unit provided in Height Units. TS 37.355 [14].
Location uncertainty	M		9.2.52	

9.2.49 NG-RAN High Accuracy Access Point Position

The *NG-RAN High Accuracy Access Point Position* IE is used to identify the geographical position of an NG-RAN Access Point. It is expressed as High Accuracy Ellipsoid point with altitude and uncertainty ellipsoid according to TS 23.032 [8].

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Degrees of Latitude	M		INTEGER(-2147483648..2147483647)	
Degrees of Longitude	M		INTEGER(-2147483648..2147483647)	
Altitude	M		INTEGER(-64000..1280000)	
Uncertainty Semi Major	M		INTEGER (0..255)	
Uncertainty Semi Minor	M		INTEGER (0..255)	
Orientation Major Axis	M		INTEGER (0..179)	
Horizontal Confidence	M		INTEGER (0..100)	
Uncertainty Altitude	M		INTEGER (0..255)	
Vertical Confidence	M		INTEGER (0..100)	

9.2.50 Relative Cartesian Location

This information element provides a location relative to some known reference location in a relative Cartesian coordinate system.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
XYZ unit	M		ENUMERATED (mm, cm, dm,...)	
X value	M		INTEGER (- 2^{16} .. $2^{16}-1$)	Positive value represents easting from reference point, in units of <i>XYZ Unit</i> IE.
Y value	M		INTEGER (- 2^{16} .. $2^{16}-1$)	Positive value represents northing from reference point in units of <i>XYZ Unit</i> IE.
Z value	M		INTEGER (- 2^{15} .. $2^{15}-1$)	Height with respect to reference point in units of <i>XYZ Unit</i> IE, where the XY-plane is horizontal and the Z-axis points up.
Location uncertainty	M		9.2.52	

9.2.51 Reference Point

This information element provides a reference point information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>ReferencePoint</i>	M			Reference point to which relative location information is related to
>Coordinate ID				
>>Coordinate ID	M		INTEGER(0.. 2 ⁹ -1,..)	Referential ID mapped via OAM
>Reference Point Coordinates				
>>Reference Point Position	M		NG-RAN Access Point Position 9.2.10	
>Reference Point Coordinates High Accuracy				
>>Reference Point High Accuracy Access Position	M		NG-RAN High Accuracy Access Point Position 9.2.49	

9.2.52 Location Uncertainty

This information element provides the location uncertainty information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>Horizontal Uncertainty	M		INTEGER (0..255)	Horizontal uncertainty of the ARP latitude/longitude. Corresponds to the encoded high accuracy uncertainty as defined in TS 23.032 [8]
>Horizontal Confidence	M		INTEGER (0..100)	Corresponds to confidence as defined in TS 23.032 [8].
>Vertical Uncertainty	M		INTEGER (0..255)	Vertical uncertainty of the ARP altitude. Corresponds to the encoded high accuracy uncertainty as defined in TS 23.032 [8]
>Vertical Confidence	M		INTEGER (0..100)	Corresponds to confidence as defined in TS 23.032 [8].

9.2.53 Pathloss Reference Information

This information element indicates a pathloss reference for transmission of UL SRS by a UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE Pathloss Reference Signal	M			
>SSB				
>>NR PCI	M		INTEGER (0..1007)	
>>SSB Index	O		INTEGER (0..63)	
>DL-PRS				
>>DL-PRS ID	M		INTEGER (0..255)	
>>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>>DL PRS Resource ID	O		INTEGER (0..63)	

9.2.54 SSB Information

This information element contains the SSB time/frequency information for the TRPs.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SSB Info List		1		
>SSB Info Item		1...<maxN oSSBs>		
>>SSB Configuration	M		SSB Time/Frequency Configuration 9.2.55	
>>NR PCI	M		INTEGER (0..1007)	

Range bound	Explanation
maxNoSSBs	Maximum no of SSBs for which the configuration can be provided. Value is 255.

9.2.55 SSB Time/Frequency Configuration

This information element contains the time and frequency configuration of an SSB.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
SSB frequency	M		INTEGER (0..3279165)	ARFCN
SSB subcarrier spacing	M		ENUMERATED(15kHz, 30kHz, 60kHz, 120kHz, 240kHz,...)	
SSB Transmit power	M		INTEGER (-60..50)	EPRE of SSS
SSB periodicity	M		ENUMERATED(5ms, 10ms, 20ms, 40ms, 80ms, 160ms, ...)	
SSB half frame index	M		INTEGER(0..1)	
SSB SFN offset	M		INTEGER(0..15)	
CHOICE SSB Position in Burst	O			
>Short Bitmap			BIT STRING (SIZE(4))	
>Medium Bitmap			BIT STRING (SIZE(8))	
>Long Bitmap			BIT STRING (SIZE(64))	
SFN initialisation time	O		Relative Time 1900 9.2.36	

9.2.56 DL-PRS Muting Pattern

This information element contains the DL-PRS muting pattern.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE DL-PRS Muting Pattern	M			
>Two	M		BIT STRING (SIZE(2))	
>Four	M		BIT STRING (SIZE(4))	
>Six	M		BIT STRING (SIZE(6))	
>Eight	M		BIT STRING (SIZE(8))	
>Sixteen	M		BIT STRING (SIZE(16))	
>Thirty-two	M		BIT STRING (SIZE(32))	

9.2.57 Measurement Beam Information

This information element contains the receiving beam information when measuring UL signals.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
PRS Resource ID	O		INTEGER(0..63)	
PRS Resource Set ID	O		INTEGER(0..7)	
SSB Index	O		INTEGER(0..63)	

9.2.58 NR-PRS Beam Information

This IE contains spatial direction information of the DL-PRS Resources.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
NR-PRS Beam Information		1				
>NR-PRS Beam Information Item		1.. < <i>maxPRS-Resource Sets</i> >				
>>PRS Resource Set ID	M		INTEGER (0..7)	The resource set in which the resources are associated with the angle.		
>>>PRS Angle		1				
>>>>PRS Angle Item		1.. ..< <i>maxPRS-Resources PerSet</i> >				
>>>>>NR PRS Azimuth	M		INTEGER (0..359)		-	
>>>>>NR PRS Azimuth fine	O		INTEGER (0..9)	Fine angles	-	
>>>>>NR PRS Elevation	O		INTEGER (0..180)		-	
>>>>>NR PRS Elevation fine	O		INTEGER (0..9)	Fine angles	-	
>>>>>PRS Resource ID	O		INTEGER(0..63)		YES	ignore
LCS to GCS Translation List		0..1		If absent, the azimuth and elevation are provided in GCS.		
>LCS to GCS Translation Item		1..< <i>maxno lcs-gcs-translation</i> >				
>>Alpha	M		INTEGER (0..359)			
>>Alpha-fine	O		INTEGER (0..9)	Fine angles		
>>Beta	M		INTEGER (0..359)			
>>Beta-fine	O		INTEGER (0..9)	Fine angles		
>>Gamma	M		INTEGER (0..359)			
>>Gamma-fine	O		INTEGER (0..9)	Fine angles		

Range bound	Explanation
maxPRS-ResourceSets	Maximum no of DL-PRS resource sets per TRP. Value is 2.
maxPRS-ResourcesPerSet	Maximum no of DL-PRS resources of the DL-PRS resource set of the TRP. Value is 64.
maxnolcs-gcs-translation	Maximum no. of LCS-GS-Translation-Parameters that can reported with one message. Value is 3. The current version of the specification supports 1.

9.2.59 Positioning Broadcast Cells

This IE is used to indicate the cells that are requested to broadcast, or failed to broadcast, the associated posSIB(s).

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Positioning Broadcast Cells		1 .. <maxnoBroadcastCell>		
>NG-RAN-CGI	M		9.2.6	

Range bound	Explanation
maxnoBroadcastCells	Maximum no. of cells broadcasting a posSIB in a NG-RAN node. Value is 16384.

9.2.60 Spatial Relation Information per SRS Resource

This information element indicates a spatial relation for transmission of each UL SRS resource recommended by LMF.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Spatial Relation per SRS Resource List		1		
>Spatial Relation per SRS Resource Item		1..<maxnoSRS-ResourcePerSet>		
>CHOICE Reference Signal	M			
>NRP CSI-RS				
>>NRP CSI-RS Resource ID	M		INTEGER (0..191)	
>SSB				
>>NR PCI	M		INTEGER (0..1007)	
>>SSB Index	O		INTEGER (0..63)	
>SRS				
>>SRS Resource ID	M		INTEGER (0..63)	
>Positioning SRS				
>>Positioning SRS Resource ID	M		INTEGER (0..63)	
>DL-PRS				
>>DL-PRS ID	M		INTEGER (0..255)	
>>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>>DL-PRS Resource ID	O		INTEGER (0..63)	

Range bound	Explanation
maxnoSRS-ResourcePerSet	Maximum no of SRS resources per SRS resource set. Value is 16.

9.2.61 Requested DL PRS Transmission Characteristics

This IE contains the requested PRS configuration for transmission by the LMF.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Requested DL-PRS Resource Set List		1		
>Requested DL-PRS Resource Set Item		1..<maxno of PRSresourceSet>		
>>PRS bandwidth	O		INTEGER(1..63)	24,28,...,272 PRBs
>>Comb Size	O		ENUMERATED(2, 4, 6, 12, ...)	
>>Resource Set Periodicity	O		ENUMERATED(4,5,8,10,16,20,32,40,64,80,160,320,640,1280,2560,5120,10240,20480,40960,81920,...)	
>>Resource Repetition Factor	O		ENUMERATED(rf1,rf2,rf4,rf6,rf8,rf16,rf32,...)	
>>Resource Number of Symbols	O		ENUMERATED(n2,n4,n6,n12,...)	
>>Requested DL-PRS Resource List	O		9.2.62	
>>Resource Set Start Time and Duration	O		Start Time and Duration 9.2.63	This IE is ignored if the <i>Start Time and Duration</i> IE is present
Number of Frequency Layers	O		INTEGER(1..4)	
Start Time and Duration	O		9.2.63	

Range bound	Explanation
maxnoofPRSresourceSet	Maximum no of PRS resources set. Value is 8.

9.2.62 Requested DL-PRS Resource List

This IE contains the requested DL-PRS resource list.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Requested DL-PRS Resource List		1		<i>NR-DL-PRS-Resource-r16</i> as defined in TS 37.355 [14]
>Requested DL-PRS Resource Item		1..<maxno of PRSresource>		
>>CHOICE QCL Info	O			
>>>SSB				
>>>>NR PCI	M		INTEGER(0..1007)	
>>>>SSB Index	O		INTEGER(0..63)	
>>>DL-PRS				
>>>>QCL Source PRS Resource Set ID	M		INTEGER(0..7)	
>>>>QCL Source PRS Resource ID	O		INTEGER(0..63)	

Range bound	Explanation
maxnoofPRSresource	Maximum no of PRS resources per PRS resource set. Value is 64.

9.2.63 Start Time and Duration

This IE contains the start time and/or duration for the on-demand DL-PRS.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Start Time	O		Relative Time 1900 9.2.36	
Duration	O		INTEGER (0..90060, ...)	Unit: seconds

9.2.64 PRS Transmission Off Information

This IE contains the information to turn off particular PRS transmissions.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>level</i>	M			
>TRP <i>level</i>			NULL	
>PRS <i>resource set level</i>				
>>PRS Resource Set List		1		
>>>PRS Resource Set Item		1..<maxno ofPRSresourceSet>		
>>>>PRS Resource Set ID	M		INTEGER(0..7)	
>PRS <i>resource level</i>				
>>PRS Resource Set List		1		
>>>PRS Resource Set Item		1..<maxno ofPRSresourceSet>		
>>>>PRS Resource Set ID	M		INTEGER(0..7)	
>>>>PRS Resource List		1		
>>>>>PRS Resource Item		1..<maxno ofPRSresourceSet>		
>>>>>PRS Resource ID	M		INTEGER(0..63)	

Range bound	Explanation
maxnoofPRSresourceSet	Maximum no of PRS resources set. Value is 8.
maxnoofPRSresource	Maximum no of PRS resources per PRS resource set. Value is 64.

9.2.65 On-demand PRS TRP Information

This IE contains on-demand PRS information for the TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
On-demand PRS Request Allowed	M		BIT STRING (SIZE(16))	Each position in the bitmap represents an on-demand PRS transmission parameter: first bit: Resource Set Periodicity second bit: PRS Bandwidth third bit: Resource Repetition Factor fourth bit: Resource Number of Symbols fifth bit: Comb Size sixth bit: Number of Frequency Layers seventh bit: Start Time and Duration eighth bit: Off Indication ninth bit: QCL Information Other bits reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'.
Allowed Resource Set Periodicity Values	O		BIT STRING (SIZE(24))	This IE applies only if the first bit of the On-demand PRS Request Allowed IE is set to '1'. Each position in the bitmap represents a value of the Resource Set Periodicity IE defined in subclause 9.2.61, first bit = 4 and so on. Bits 21-24 are reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'. If this IE is absent, all Resource Set Periodicity values are allowed to be requested.
Allowed PRS Bandwidth Values	O		BIT STRING (SIZE(64))	This IE applies only if the second bit of the On-demand PRS Request Allowed IE is set to '1'. Each position in the bitmap represents a value of the PRS Bandwidth IE defined in subclause 9.2.61, first bit = 1 and so on. Bit 64 is reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'. If this IE is absent, all PRS Bandwidth values are allowed to be requested.
Allowed Resource Repetition Factor Values	O		BIT STRING (SIZE(8))	This IE applies only if the third bit of the On-demand PRS Request Allowed IE is set to '1'. Each position in the bitmap represents a value of the Resource Repetition Factor IE defined in subclause 9.2.61, first bit = rf1 and so on. Bit 8 is reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'. If this IE is absent, all Resource Repetition Factor values are allowed to be requested.

Allowed Resource Number of Symbols Values	O		BIT STRING (SIZE(8))	<p>This IE applies only if the fourth bit of the On-demand PRS Request Allowed IE is set to '1'.</p> <p>Each position in the bitmap represents a value of the Resource Number of Symbols IE defined in subclause 9.2.61, first bit = n2 and so on. Bits 5-8 are reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'. If this IE is absent, all Resource Number of Symbols values are allowed to be requested.</p>
Allowed Comb Size Values	O		BIT STRING (SIZE(8))	<p>This IE applies only if the fifth bit of the On-demand PRS Request Allowed IE is set to '1'.</p> <p>Each position in the bitmap represents a value of the Comb Size IE defined in subclause 9.2.61, first bit = 2 and so on. Bits 5-8 are reserved for future use. Value '1' indicates 'request allowed', Value '0' indicates 'request not allowed'. If this IE is absent, all Comb Size values are allowed to be requested.</p>

9.2.66 UL-AoA assistance information

This information element contains the expected uplink Angle of Arrival and uncertainty range.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>AngleMeasurement</i>	M			
>Expected UL Angle of Arrival				
>>Expected Azimuth AoA		1		Defined as ($\varphi_{AOA} - \Delta\varphi_{AOA}/2, \varphi_{AOA} + \Delta\varphi_{AOA}/2$)
>>>Expected Azimuth AoA Value	M		INTEGER(0..3599)	φ_{AOA} component of Expected Azimuth AoA
>>>Expected Azimuth AoA Uncertainty Range	M		INTEGER(0..3599)	$\Delta\varphi_{AOA}$ component of Expected Azimuth AoA
>>Expected Zenith AoA		0..1		Defined as ($\theta_{ZOA} - \Delta\theta_{ZOA}/2, \theta_{ZOA} + \Delta\theta_{ZOA}/2$)
>>>Expected Zenith AoA Value	M		INTEGER(0..1799)	θ_{ZOA} component of Expected Zenith AoA
>>>Expected Zenith AoA Uncertainty Range	M		INTEGER(0..1799)	$\Delta\theta_{ZOA}$ component of Expected Zenith AoA
>Expected UL Angle of Arrival Zenith Only				Defined as ($\theta_{ZOA} - \Delta\theta_{ZOA}/2, \theta_{ZOA} + \Delta\theta_{ZOA}/2$)
>>Expected Zenith AoA Value	M		INTEGER(0..1799)	θ_{ZOA} component of Expected Zenith AoA
>>Expected Zenith AoA Uncertainty Range	M		INTEGER(0..1799)	$\Delta\theta_{ZOA}$ component of Expected Zenith AoA
LCS to GCS Translation	O		9.2.69	If absent, the azimuth and zenith are provided in GCS. In case of zenith only, the z-axis of LCS is defined along the linear array axis.

9.2.67 Z-AoA

This information element contains the Zenith Angle of Arrival information, which can correspond to linear array measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Zenith Angle of Arrival	M		INTEGER(0..1799)	TS 38.133 [16]
LCS to GCS Translation	O		9.2.69	If absent, the zenith is provided in GCS. the z-axis of LCS is defined along the linear array axis

9.2.68 Response Time

This information element contains the response time of the measurement results reporting.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Time	M		INTEGER(1..128,...)	
Time Unit	M		ENUMERATED (second, ten-seconds, ten-milliseconds, ...)	

9.2.69 LCS to GCS Translation

This information element contains the LCS to GCS Translation information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Alpha	M		INTEGER (0..3599)	
Beta	M		INTEGER (0..3599)	
Gamma	M		INTEGER (0..3599)	

9.2.70 UE Reporting Information

This IE contains the UE Reporting Information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Reporting Amount	M		ENUMERATED (0, 1, 2, 4, 8, 16, 32, 64)	Value 0 represents an infinite number of periodic reporting
Reporting Interval	M		ENUMERATED (none, 1, 2, 4, 8, 10, 16, 20, 32, 64)	Unit: seconds

9.2.71 Multiple UL-AoA

This information element contains the list of the multiple UL-AOAs values.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
UL AoA List		1		
>UL AoA item		1..<maxnoofULAoAs >		
>>CHOICE <i>AngleMeasurement</i>	M			
>>>UL Angle of Arrival				
>>>>UL Angle of Arrival	M		9.2.38	
>>>UL Zenith Angle of Arrival				
>>>>UL Zenith Angle of Arrival	M		Z-AoA 9.2.67	

Range bound	Explanation
maxnoofULAoAs	Maximum no of UL-AoAs values (pair of AOA & ZOA values) that can be reported. Value is 8

9.2.72 UL SRS-RSRPP

This information element contains the UL SRS RSRPP measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
First Path RSRP Power	M		INTEGER (0..126)	

9.2.73 SRS Resource type

This IE contains the SRS resource type.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Reference Signal</i>	M			
>SRS				
>>SRS Resource ID	M		INTEGER(0..63)	
>Positioning SRS				
>>Positioning SRS Resource ID	M		INTEGER(0..63)	

9.2.74 Extended Additional Path List

This IE contains the extended additional path results of time measurement.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Additional Path Item		<i>1..<maxNoPathExtended></i>		
>CHOICE <i>Relative Path Delay</i>	M			
>>k0	M		INTEGER(0..16351)	
>>k1	M		INTEGER(0..8176)	
>>k2	M		INTEGER(0..4088)	
>>k3	M		INTEGER(0..2044)	
>>k4	M		INTEGER(0..1022)	
>>k5	M		INTEGER(0..511)	
>Path Quality	O		Measurement Quality 9.2.43	
>Multiple UL-AoA	O		9.2.71	
>Path Power	O		UL SRS-RSRPP 9.2.72	

Range bound	Explanation
maxNoPathExtended	Maximum no. of additional path measurement. Value is 8.

9.2.75 ARP ID

This IE is used to uniquely identify an ARP associated with a TRP.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
ARP Identifier	M		INTEGER (1..16, ...)	

9.2.76 ARP Location Information

This IE contains the relative position of ARP(s) to the TRP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
ARP Location Information		<i>1</i>		
>ARP Location Information Item		<i>1..<maxnoARPs></i>		
>>ARP ID	M		9.2.75	
>>CHOICE <i>ARP Location Type</i>	M			
>>> <i>geodetic</i>				
>>>>ARP Position Relative Geodetic	M		Relative Geodetic Location 9.2.48	
>>>> <i>cartesian</i>				
>>>>ARP Position Relative Cartesian	M		Relative Cartesian Location 9.2.50	

Range bound	Explanation
maxnoARPs	Maximum no. of ARPs associated with a TRP. Value is 16.

9.2.77 LoS/NLoS Information

This IE contains the LoS/NLoS information for UL measurement.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>LoS/NLoS Indicator</i>	M			
> <i>Soft Indicator</i>				
>> <i>LoS/NLoS Indicator Soft</i>	M		INTEGER (0..10)	Values provide the likelihood of a LOS propagation path in the range between 0 and 1 with 0.1 steps resolution. Value '0' indicates NLOS and value '1' indicates LOS.
> <i>Hard Indicator</i>				
>> <i>LoS/NLoS Indicator Hard</i>	M		ENUMERATED (NLoS, LoS)	

9.2.78 UE Tx TEG Association

This information element contains the UE Tx TEG association.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UE Tx TEG Association item		<i>1..<maxnoUETEGs></i>		
>UE Tx TEG ID	M		INTEGER (0..7)	
> Positioning SRS Resource ID List		<i>1</i>		
>> Positioning SRS Resource ID Item		<i>1..<maxnoSRS-PosResourcePerSet></i>		
>>>Positioning SRS Resource ID	M		INTEGER(0..63)	

Range bound	Explanation
maxnoUETEGs	Maximum no of reported UE Tx TEG association. Value is 8.
maxnoSRS-PosResourcePerSet	Maximum no of positioning SRS resources per positioning SRS resource set. Value is 16.

9.2.79 TRP Tx TEG Association

This information element contains the TRP Tx TEG information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TRP TEG item		<i>1..<maxnoTRPTEGs></i>		
>TRP Tx TEG ID	M		INTEGER (0..7)	
>DL-PRS Resource Set ID	M		INTEGER (0..7)	
> DL-PRS Resource ID List		<i>0..1</i>		
>> DL-PRS Resource ID Item		<i>1..<maxPRS-ResourcesPerSet></i>		
>>>DL-PRS Resource ID	M		INTEGER (0..63)	

Range bound	Explanation
maxnoTRPTEGs	Maximum no of reported TRP Tx TEG association. Value is 8.
maxPRS-ResourcesPerSet	Maximum no of DL-PRS resources of the DL-PRS resource set of the TRP. Value is 64.

9.2.80 TRP TEG ID Information

This information element contains the TRP RxTx TEG ID group information.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>TRP TEG ID</i>	M			
> <i>RxTx TEG</i>				
>>TRP RxTx TEG ID	M		INTEGER (0..255)	
>>TRP Tx TEG ID	O		INTEGER (0..7)	
> <i>Rx TEG</i>				
>>TRP Rx TEG ID	M		INTEGER (0..31)	
>>TRP Tx TEG ID	M		INTEGER (0..7)	

9.2.81 Measurement Characteristics Request Indicator

This IE contains the measurement characteristic information requested by LMF.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Measurement characteristic request indicator	M		BIT STRING (SIZE(16))	<p>Each position in the bitmap represents a requested measurement characteristic:</p> <p>first bit: Measurement Beam Information</p> <p>Second bit: Extended Additional Path List</p> <p>Third bit: Additional Path Power</p> <p>Fourth Bit: Multiple UL AoA of Additional Path</p> <p>Fifth bit: LoS/NLoS Information</p> <p>Sixth bit: TRP Rx TEG association for UL-TDOA</p> <p>Seventh bit: TRP RxTxTEG-ID information for DL+UL positioning.</p> <p>Eighth bit: SRS Resource Type</p> <p>Ninth bit: Multiple Measurement Instances</p> <p>Other bits reserved for future use. Value '1' indicates 'requested measurement characteristic', Value '0' indicates 'not requested'.</p>

9.2.82 TRP Beam Antenna Information

The IE provides the beam antenna information of the TRP. It includes either the explicit beam antenna information, or a reference to another TRP's signalled configuration, or the indication that no change has occurred with respect to previously signalled configuration.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
CHOICE <i>TRP Beam Antenna Info Item</i>	M			
>Reference				
>>Associated TRP ID	M		TRP ID 9.2.24	This IE specifies the <i>TRP ID</i> of the associated TRP from which the beam information parameters are adopted in Local Coordinate System (LCS).
>Explicit				
>>TRP Beam Antenna Angles	M		9.2.83	
>>LCS to GCS Translation	O		9.2.69	Included if the azimuth and elevation are not provided in GCS.
>No Change			NULL	No change compared to the previously signalled configuration for this TRP.

9.2.83 TRP Beam Antenna Angles

The IE provides the beam antenna information of the TRP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
TRP Beam Antenna Angles Item		1..<maxnoAzimuthAngles>		
>TRP Azimuth Angle	M		INTEGER (0..359)	For GCS, the azimuth angle is measured counter-clockwise from geographical North. For LCS, the azimuth angle is measured counter-clockwise from the x-axis of the LCS.
>TRP Azimuth Angle fine	O		INTEGER (0..9)	Fine angle
>TRP Elevation Angle List		1		
>>TRP Elevation Angle Item		1..<maxnoElevationAngles>		
>>>TRP Elevation Angle	M		INTEGER (0..180)	For GCS, the elevation angle is measured relative to zenith and positive to the horizontal direction (elevation 0 deg. points to zenith, 90 deg to the horizon). For LCS, the elevation angle is measured relative to the z-axis of the LCS (elevation 0 deg. points to the z-axis, 90 deg to the x-y plane).
>>>TRP Elevation Angle fine	O		INTEGER (0..9)	Fine angle
>>>TRP Beam Power List		1		Relative power between DL-PRS Resources for the given Azimuth and Elevation Angle. The first Relative Power element in this list provides the peak power for this Azimuth/Elevation angle and is defined as 0dB power. All the remaining Relative Power Element's in this list provide the relative DL-PRS Resource power relative to this first element in the list.
>>>>TRP Beam Power Item		2..<maxNumResourcesPerAngle>		
>>>>>PRS Resource Set ID	O		INTEGER (0..7)	DL-PRS Resource Set ID of the DL-PRS Resource for which the Relative Power is provided. If this field is absent, the DL-PRS Resource Set ID for this instance of the Beam Power List is the same as the DL-PRS Resource Set ID of the previous instance in the Beam Power List. This field shall be included at least in the first instance of the Beam Power List.
>>>>>PRS Resource ID	M		INTEGER (0..63)	DL-PRS Resource for which the Relative Power is provided.
>>>>>TRP Beam Relative Power	M		INTEGER (0..30)	The power values span from -30 to 0dB
>>>>>TRP Beam Relative Power "fine"	O		INTEGER (0..9)	Relative Power with 0.1dB resolution. The power spans from -0.9 to 0dB

Range bound	Explanation
maxNumResourcesPerAngle	Maximum number of DL-PRS Resources per angle per TRP. Value is 24.
maxnoAzimuthAngles	Maximum number of azimuth angles per TRP. Value is 3600.
maxnoElevationAngles	Maximum number of elevation angles per azimuth angle/TRP. Value is 1801.

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

9.3.1 General

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

The ASN.1 definition specifies the structure and content of NRPPa messages. NRPPa 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 an NRPPa 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 needs 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 in which 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 an NRPPa 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.

9.3.2 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 inter-operability.
- 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.

9.3.3 Elementary Procedure Definitions

```
-- ASN1START
-- *****
--
-- Elementary Procedure definitions
--
-- *****
```

```
NRPPA-PDU-Descriptions {  
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)  
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-PDU-Descriptions (0) }
```

```
DEFINITIONS AUTOMATIC TAGS ::=
```

```
BEGIN
```

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

```
IMPORTS
```

```
    Criticality,  
    ProcedureCode,  
    NRPPATransactionID
```

```
FROM NRPPA-CommonDataTypes
```

```
    ErrorIndication,  
    PrivateMessage,  
    E-CIDMeasurementInitiationRequest,  
    E-CIDMeasurementInitiationResponse,  
    E-CIDMeasurementInitiationFailure,  
    E-CIDMeasurementFailureIndication,  
    E-CIDMeasurementReport,  
    E-CIDMeasurementTerminationCommand,  
    OTDOAInformationRequest,  
    OTDOAInformationResponse,  
    OTDOAInformationFailure,  
    AssistanceInformationControl,  
    AssistanceInformationFeedback,  
    PositioningInformationRequest,  
    PositioningInformationResponse,  
    PositioningInformationFailure,  
    PositioningInformationUpdate,  
    MeasurementRequest,  
    MeasurementResponse,  
    MeasurementFailure,  
    MeasurementReport,  
    MeasurementUpdate,  
    MeasurementAbort,  
    MeasurementFailureIndication,  
    TRPInformationRequest,  
    TRPInformationResponse,  
    TRPInformationFailure,  
    PositioningActivationRequest,  
    PositioningActivationResponse,  
    PositioningActivationFailure,  
    PositioningDeactivation,
```



```

PRSConfigurationRequest,
PRSConfigurationResponse,
PRSConfigurationFailure,
MeasurementPreconfigurationRequired,
MeasurementPreconfigurationConfirm,
MeasurementPreconfigurationRefuse,
MeasurementActivation

```

FROM NRPPA-PDU-Contents

```

id-errorIndication,
id-privateMessage,
id-e-CIDMeasurementInitiation,
id-e-CIDMeasurementFailureIndication,
id-e-CIDMeasurementReport,
id-e-CIDMeasurementTermination,
id-oTDOAInformationExchange,
id-assistanceInformationControl,
id-assistanceInformationFeedback,
id-positioningInformationExchange,
id-positioningInformationUpdate,
id-Measurement,
id-MeasurementReport,
id-MeasurementUpdate,
id-MeasurementAbort,
id-MeasurementFailureIndication,
id-tRPInformationExchange,
id-positioningActivation,
id-positioningDeactivation,
id-pRSConfigurationExchange,
id-measurementPreconfiguration,
id-measurementActivation

```

FROM NRPPA-Constants;

```

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

NRPPA-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage          ,
    &SuccessfulOutcome          OPTIONAL,
    &UnsuccessfulOutcome        OPTIONAL,
    &procedureCode              ProcedureCode UNIQUE,
    &criticality                 Criticality DEFAULT ignore
}
WITH SYNTAX {
    INITIATING MESSAGE          &InitiatingMessage
    [SUCCESSFUL OUTCOME        &SuccessfulOutcome]

```

```

    [UNSUCCESSFUL OUTCOME      &UnsuccessfulOutcome]
    PROCEDURE CODE            &procedureCode
    [CRITICALITY              &criticality]
}

-- *****
--
-- Interface PDU Definition
--
-- *****

NRPPA-PDU ::= CHOICE {
    initiatingMessage      InitiatingMessage,
    successfulOutcome      SuccessfulOutcome,
    unsuccessfulOutcome    UnsuccessfulOutcome,
    ...
}

InitiatingMessage ::= SEQUENCE {
    procedureCode          NRPPA-ELEMENTARY-PROCEDURE.&procedureCode      ({NRPPA-ELEMENTARY-PROCEDURES}),
    criticality            NRPPA-ELEMENTARY-PROCEDURE.&criticality          ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    nrppatransactionID    NRPPATransactionID,
    value                 NRPPA-ELEMENTARY-PROCEDURE.&InitiatingMessage    ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode          NRPPA-ELEMENTARY-PROCEDURE.&procedureCode      ({NRPPA-ELEMENTARY-PROCEDURES}),
    criticality            NRPPA-ELEMENTARY-PROCEDURE.&criticality          ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    nrppatransactionID    NRPPATransactionID,
    value                 NRPPA-ELEMENTARY-PROCEDURE.&SuccessfulOutcome    ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}

UnsuccessfulOutcome ::= SEQUENCE {
    procedureCode          NRPPA-ELEMENTARY-PROCEDURE.&procedureCode      ({NRPPA-ELEMENTARY-PROCEDURES}),
    criticality            NRPPA-ELEMENTARY-PROCEDURE.&criticality          ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode}),
    nrppatransactionID    NRPPATransactionID,
    value                 NRPPA-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome  ({NRPPA-ELEMENTARY-PROCEDURES}{@procedureCode})
}

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

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

NRPPA-ELEMENTARY-PROCEDURES-CLASS-1 NRPPA-ELEMENTARY-PROCEDURE ::= {
    e-CIDMeasurementInitiation |

```

```

oTDOAInformationExchange |
positioningInformationExchange |
measurement |
tRPInformationExchange |
positioningActivation |
pRSConfigurationExchange |
measurementPreconfiguration,
...
}

NRPPA-ELEMENTARY-PROCEDURES-CLASS-2 NRPPA-ELEMENTARY-PROCEDURE ::= {
e-CIDMeasurementFailureIndication |
e-CIDMeasurementReport |
e-CIDMeasurementTermination |
errorIndication |
privateMessage |
assistanceInformationControl |
assistanceInformationFeedback |
positioningInformationUpdate |
measurementReport |
measurementUpdate |
measurementAbort |
measurementFailureIndication |
positioningDeactivation |
measurementActivation,
...
}

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

e-CIDMeasurementInitiation NRPPA-ELEMENTARY-PROCEDURE ::= {
INITIATING MESSAGE E-CIDMeasurementInitiationRequest
SUCCESSFUL OUTCOME E-CIDMeasurementInitiationResponse
UNSUCCESSFUL OUTCOME E-CIDMeasurementInitiationFailure
PROCEDURE CODE id-e-CIDMeasurementInitiation
CRITICALITY reject
}

e-CIDMeasurementFailureIndication NRPPA-ELEMENTARY-PROCEDURE ::= {
INITIATING MESSAGE E-CIDMeasurementFailureIndication
PROCEDURE CODE id-e-CIDMeasurementFailureIndication
CRITICALITY ignore
}

e-CIDMeasurementReport NRPPA-ELEMENTARY-PROCEDURE ::= {
INITIATING MESSAGE E-CIDMeasurementReport
PROCEDURE CODE id-e-CIDMeasurementReport
CRITICALITY ignore
}

```

```
}  
  
e-CIDMeasurementTermination NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      E-CIDMeasurementTerminationCommand  
    PROCEDURE CODE          id-e-CIDMeasurementTermination  
    CRITICALITY             reject  
}  
  
oTDOAInformationExchange NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      OTDOAInformationRequest  
    SUCCESSFUL OUTCOME      OTDOAInformationResponse  
    UNSUCCESSFUL OUTCOME    OTDOAInformationFailure  
    PROCEDURE CODE          id-oTDOAInformationExchange  
    CRITICALITY             reject  
}  
  
assistanceInformationControl NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      AssistanceInformationControl  
    PROCEDURE CODE          id-assistanceInformationControl  
    CRITICALITY             reject  
}  
  
assistanceInformationFeedback NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      AssistanceInformationFeedback  
    PROCEDURE CODE          id-assistanceInformationFeedback  
    CRITICALITY             reject  
}  
  
errorIndication NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      ErrorIndication  
    PROCEDURE CODE          id-errorIndication  
    CRITICALITY             ignore  
}  
  
privateMessage NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      PrivateMessage  
    PROCEDURE CODE          id-privateMessage  
    CRITICALITY             ignore  
}  
  
positioningInformationExchange NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      PositioningInformationRequest  
    SUCCESSFUL OUTCOME      PositioningInformationResponse  
    UNSUCCESSFUL OUTCOME    PositioningInformationFailure  
    PROCEDURE CODE          id-positioningInformationExchange  
    CRITICALITY             reject  
}  
  
positioningInformationUpdate NRPPA-ELEMENTARY-PROCEDURE ::= {  
    INITIATING MESSAGE      PositioningInformationUpdate
```

```

    PROCEDURE CODE          id-positioningInformationUpdate
    CRITICALITY             ignore
}

measurement NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MeasurementRequest
    SUCCESSFUL OUTCOME      MeasurementResponse
    UNSUCCESSFUL OUTCOME    MeasurementFailure
    PROCEDURE CODE          id-Measurement
    CRITICALITY             reject
}

measurementReport NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MeasurementReport
    PROCEDURE CODE          id-MeasurementReport
    CRITICALITY             ignore
}

measurementUpdate NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MeasurementUpdate
    PROCEDURE CODE          id-MeasurementUpdate
    CRITICALITY             ignore
}

measurementAbort NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MeasurementAbort
    PROCEDURE CODE          id-MeasurementAbort
    CRITICALITY             ignore
}

measurementFailureIndication NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      MeasurementFailureIndication
    PROCEDURE CODE          id-MeasurementFailureIndication
    CRITICALITY             ignore
}

trpInformationExchange NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      TRPInformationRequest
    SUCCESSFUL OUTCOME      TRPInformationResponse
    UNSUCCESSFUL OUTCOME    TRPInformationFailure
    PROCEDURE CODE          id-trpInformationExchange
    CRITICALITY             reject
}

positioningActivation NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositioningActivationRequest
    SUCCESSFUL OUTCOME      PositioningActivationResponse
    UNSUCCESSFUL OUTCOME    PositioningActivationFailure
    PROCEDURE CODE          id-positioningActivation
    CRITICALITY             reject
}

positioningDeactivation NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE      PositioningDeactivation

```

```

    PROCEDURE CODE      id-positioningDeactivation
    CRITICALITY         ignore
}

PRSCONFIGURATIONEXCHANGE NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  PRSCONFIGURATIONREQUEST
    SUCCESSFUL OUTCOME  PRSCONFIGURATIONRESPONSE
    UNSUCCESSFUL OUTCOME PRSCONFIGURATIONFAILURE
    PROCEDURE CODE      id-PRSCONFIGURATIONEXCHANGE
    CRITICALITY         reject
}

MEASUREMENTPRECONFIGURATION NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  MEASUREMENTPRECONFIGURATIONREQUIRED
    SUCCESSFUL OUTCOME  MEASUREMENTPRECONFIGURATIONCONFIRM
    UNSUCCESSFUL OUTCOME MEASUREMENTPRECONFIGURATIONREFUSE
    PROCEDURE CODE      id-MEASUREMENTPRECONFIGURATION
    CRITICALITY         reject
}

MEASUREMENTACTIVATION NRPPA-ELEMENTARY-PROCEDURE ::= {
    INITIATING MESSAGE  MEASUREMENTACTIVATION
    PROCEDURE CODE      id-MEASUREMENTACTIVATION
    CRITICALITY         ignore
}

END
-- ASN1STOP

```

9.3.4 PDU Definitions

```

-- ASN1START
-- *****
--
-- PDU definitions for NRPPa
--
-- *****

NRPPA-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

```

IMPORTS

Cause,
CriticalityDiagnostics,
E-CID-MeasurementResult,
OTDOACells,
OTDOA-Information-Item,
Measurement-ID,
UE-Measurement-ID,
MeasurementPeriodicity,
MeasurementQuantities,
ReportCharacteristics,
RequestedSRSTransmissionCharacteristics,
Cell-Portion-ID,
OtherRATMeasurementQuantities,
OtherRATMeasurementResult,
WLANMeasurementQuantities,
WLANMeasurementResult,
Assistance-Information,
Broadcast,
AssistanceInformationFailureList,
SRSConfiguration,
TRPMeasurementQuantities,
TrpMeasurementResult,
TRP-ID,
TRPInformationTypeListTRPReq,
TRPInformationListTRPResp,
TRP-MeasurementRequestList,
TRP-MeasurementResponseList,
TRP-MeasurementUpdateList,
MeasurementBeamInfoRequest,
PositioningBroadcastCells,
SRSResourceSetID,
SpatialRelationInfo,
SRSResourceTrigger,
TRPList,
AbortTransmission,
SystemFrameNumber,
SlotNumber,
RelativeTime1900,
SpatialRelationPerSRSResource,
MeasurementPeriodicityExtended,
PRSTRPList,
PRSTransmissionTRPList,
ResponseTime,
UEReportingInformation,
UETxTEGAssociation,
TRP-PRS-Information-List,
PRS-Measurements-Info-List,
UE-TEG-Info-Request,
MeasurementCharacteristicsRequestIndicator,
MeasurementTimeOccasion,
PRSConfigRequestType,
MeasurementAmount,

```
PreconfigurationResult,  
RequestType
```

```
FROM NRPPA-IEs
```

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

```
FROM NRPPA-Containers
```

```
maxnoOTDOAtypes,  
id-Cause,  
id-CriticalityDiagnostics,  
id-LMF-Measurement-ID,  
id-LMF-UE-Measurement-ID,  
id-OTDOACells,  
id-OTDOA-Information-Type-Group,  
id-OTDOA-Information-Type-Item,  
id-ReportCharacteristics,  
id-MeasurementPeriodicity,  
id-MeasurementQuantities,  
id-RAN-Measurement-ID,  
id-RAN-UE-Measurement-ID,  
id-E-CID-MeasurementResult,  
id-RequestedSRSTransmissionCharacteristics,  
id-Cell-Portion-ID,  
id-OtherRATMeasurementQuantities,  
id-OtherRATMeasurementResult,  
id-WLANMeasurementQuantities,  
id-WLANMeasurementResult,  
id-Assistance-Information,  
id-Broadcast,  
id-AssistanceInformationFailureList,  
id-SRSConfiguration,  
id-TRPMeasurementQuantities,  
id-MeasurementResult,  
id-TRP-ID,  
id-TRPInformationTypeListTRPReq,  
id-TRPInformationListTRPResp,  
id-TRP-MeasurementRequestList,  
id-TRP-MeasurementResponseList,  
id-TRP-MeasurementReportList,  
id-TRP-MeasurementUpdateList,  
id-MeasurementBeamInfoRequest,  
id-PositioningBroadcastCells,  
id-SRSType,  
id-ActivationTime,
```



```

id-SRSResourceSetID,
id-TRPList,
id-SRSSpatialRelation,
id-AbortTransmission,
id-SystemFrameNumber,
id-SlotNumber,
id-SRSResourceTrigger,
id-SFNInitialisationTime,
id-SRSSpatialRelationPerSRSResource,
id-MeasurementPeriodicityExtended,
id-PRSTRPList,
id-PRSTransmissionTRPList,
id-ResponseTime,
id-UEReportingInformation,
id-UETxTEGAssociation,
id-TRP-PRS-Information-List,
id-PRS-Measurements-Info-List,
id-UE-TEG-Info-Request,
id-MeasurementCharacteristicsRequestIndicator,
id-MeasurementTimeOccasion,
id-PRSConfigRequestType,
id-MeasurementAmount,
id-PreconfigurationResult,
id-RequestType

FROM NRPPA-Constants;

-- *****
--
-- E-CID MEASUREMENT INITIATION REQUEST
--
-- *****

E-CIDMeasurementInitiationRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{E-CIDMeasurementInitiationRequest-IEs}},
    ...
}

E-CIDMeasurementInitiationRequest-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory} |
    { ID id-ReportCharacteristics          CRITICALITY reject TYPE ReportCharacteristics PRESENCE mandatory} |
    { ID id-MeasurementPeriodicity         CRITICALITY reject TYPE MeasurementPeriodicity PRESENCE conditional} |
-- The IE shall be present if the Report Characteristics IE is set to "periodic" --
    { ID id-MeasurementQuantities          CRITICALITY reject TYPE MeasurementQuantities PRESENCE mandatory} |
    { ID id-OtherRATMeasurementQuantities CRITICALITY ignore TYPE OtherRATMeasurementQuantities PRESENCE optional} |
    { ID id-WLANMeasurementQuantities     CRITICALITY ignore TYPE WLANMeasurementQuantities PRESENCE optional},
    ...
}

-- *****
--

```

```

-- E-CID MEASUREMENT INITIATION RESPONSE
--
-- *****
E-CIDMeasurementInitiationResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{E-CIDMeasurementInitiationResponse-IEs}},
    ...
}

E-CIDMeasurementInitiationResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory}|
    { ID id-E-CID-MeasurementResult        CRITICALITY ignore  TYPE E-CID-MeasurementResult        PRESENCE optional}|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore  TYPE CriticalityDiagnostics         PRESENCE optional}|
    { ID id-Cell-Portion-ID                CRITICALITY ignore  TYPE Cell-Portion-ID                PRESENCE optional}|
    { ID id-OtherRATMeasurementResult      CRITICALITY ignore  TYPE OtherRATMeasurementResult      PRESENCE optional}|
    { ID id-WLANMeasurementResult          CRITICALITY ignore  TYPE WLANMeasurementResult          PRESENCE optional},
    ...
}

-- *****
--
-- E-CID MEASUREMENT INITIATION FAILURE
--
-- *****
E-CIDMeasurementInitiationFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{E-CIDMeasurementInitiationFailure-IEs}},
    ...
}

E-CIDMeasurementInitiationFailure-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory}|
    { ID id-Cause                          CRITICALITY ignore TYPE Cause                          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics         CRITICALITY ignore TYPE CriticalityDiagnostics         PRESENCE optional},
    ...
}

-- *****
--
-- E-CID MEASUREMENT FAILURE INDICATION
--
-- *****
E-CIDMeasurementFailureIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{E-CIDMeasurementFailureIndication-IEs}},
    ...
}

E-CIDMeasurementFailureIndication-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-UE-Measurement-ID          CRITICALITY reject TYPE UE-Measurement-ID          PRESENCE mandatory}|

```

```

    { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE mandatory},
    ...
}

-- *****
--
-- E-CID MEASUREMENT REPORT
--
-- *****

E-CIDMeasurementReport ::= SEQUENCE {
    protocolIEs                ProtocolIE-Container    {{E-CIDMeasurementReport-IEs}},
    ...
}

E-CIDMeasurementReport-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID    CRITICALITY reject  TYPE UE-Measurement-ID    PRESENCE mandatory}|
    { ID id-RAN-UE-Measurement-ID    CRITICALITY reject  TYPE UE-Measurement-ID    PRESENCE mandatory}|
    { ID id-E-CID-MeasurementResult  CRITICALITY ignore  TYPE E-CID-MeasurementResult  PRESENCE mandatory}|
    { ID id-Cell-Portion-ID          CRITICALITY ignore  TYPE Cell-Portion-ID        PRESENCE optional},
    ...
}

-- *****
--
-- E-CID MEASUREMENT TERMINATION
--
-- *****

E-CIDMeasurementTerminationCommand ::= SEQUENCE {
    protocolIEs                ProtocolIE-Container    {{E-CIDMeasurementTerminationCommand-IEs}},
    ...
}

E-CIDMeasurementTerminationCommand-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-UE-Measurement-ID    CRITICALITY reject  TYPE UE-Measurement-ID    PRESENCE mandatory}|
    { ID id-RAN-UE-Measurement-ID    CRITICALITY reject  TYPE UE-Measurement-ID    PRESENCE mandatory},
    ...
}

-- *****
--
-- OTDOA INFORMATION REQUEST
--
-- *****

OTDOAInformationRequest ::= SEQUENCE {
    protocolIEs                ProtocolIE-Container    {{OTDOAInformationRequest-IEs}},
    ...
}

OTDOAInformationRequest-IEs NRPPA-PROTOCOL-IES ::= {

```

```

    { ID id-OTDOA-Information-Type-Group          CRITICALITY reject  TYPE OTDOA-Information-Type          PRESENCE mandatory},
    ...
}

OTDOA-Information-Type ::= SEQUENCE (SIZE(1..maxnoOTDOAtypes)) OF ProtocolIE-Single-Container { { OTDOA-Information-Type-ItemIEs } }

OTDOA-Information-Type-ItemIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-OTDOA-Information-Type-Item          CRITICALITY reject  TYPE OTDOA-Information-Type-Item          PRESENCE mandatory},
    ...
}

OTDOA-Information-Type-Item ::= SEQUENCE {
    oTDOA-Information-Item          OTDOA-Information-Item,
    iE-Extensions                    ProtocolExtensionContainer { { OTDOA-Information-Type-ItemExtIEs } } OPTIONAL,
    ...
}

OTDOA-Information-Type-ItemExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- OTDOA INFORMATION RESPONSE
--
-- *****

OTDOAInformationResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{OTDOAInformationResponse-IEs}},
    ...
}

OTDOAInformationResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-OTDOACells          CRITICALITY ignore  TYPE OTDOACells          PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics          PRESENCE optional},
    ...
}

-- *****
--
-- OTDOA INFORMATION FAILURE
--
-- *****

OTDOAInformationFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{OTDOAInformationFailure-IEs}},
    ...
}

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

```

```

}
-- *****
--
-- ASSISTANCE INFORMATION CONTROL
--
-- *****

AssistanceInformationControl ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{AssistanceInformationControl-IEs}},
    ...
}

AssistanceInformationControl-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-Assistance-Information  CRITICALITY reject  TYPE Assistance-Information    PRESENCE optional}|
    { ID id-Broadcast                CRITICALITY reject  TYPE Broadcast                PRESENCE optional}|
    { ID id-PositioningBroadcastCells CRITICALITY reject  TYPE PositioningBroadcastCells          PRESENCE optional},
    ...
}

-- *****
--
-- ASSISTANCE INFORMATION FEEDBACK
--
-- *****

AssistanceInformationFeedback ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{AssistanceInformationFeedback-IEs}},
    ...
}

AssistanceInformationFeedback-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-AssistanceInformationFailureList  CRITICALITY reject  TYPE AssistanceInformationFailureList  PRESENCE optional}|
    { ID id-PositioningBroadcastCells         CRITICALITY reject  TYPE PositioningBroadcastCells         PRESENCE optional}|
    { ID id-CriticalityDiagnostics            CRITICALITY ignore  TYPE CriticalityDiagnostics            PRESENCE optional},
    ...
}

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

ErrorIndication ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{ErrorIndication-IEs}},
    ...
}

ErrorIndication-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-Cause                CRITICALITY ignore  TYPE Cause                PRESENCE optional}|
    { ID id-CriticalityDiagnostics CRITICALITY ignore  TYPE CriticalityDiagnostics PRESENCE optional},

```

```

}
...
}
-- *****
--
-- PRIVATE MESSAGE
--
-- *****

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

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

-- *****
--
-- POSITIONING INFORMATION REQUEST
--
-- *****

PositioningInformationRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container {{PositioningInformationRequest-IEs}},
    ...
}

PositioningInformationRequest-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-RequestedSRSTransmissionCharacteristics CRITICALITY ignore TYPE RequestedSRSTransmissionCharacteristics PRESENCE optional}|
    { ID id-UEReportingInformation CRITICALITY ignore TYPE UEReportingInformation PRESENCE optional}|
    { ID id-UE-TEG-Info-Request CRITICALITY ignore TYPE UE-TEG-Info-Request PRESENCE optional},
    ...
}

-- *****
--
-- POSITIONING INFORMATION RESPONSE
--
-- *****

PositioningInformationResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container {{PositioningInformationResponse-IEs}},
    ...
}

PositioningInformationResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-SRSConfiguration CRITICALITY ignore TYPE SRSConfiguration PRESENCE optional}|
    { ID id-SFNInitialisationTime CRITICALITY ignore TYPE RelativeTime1900 PRESENCE optional}|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional}|
    { ID id-UEtxTEGAssociation CRITICALITY ignore TYPE UETxTEGAssociation PRESENCE optional},
    ...
}

```

```

-- *****
--
-- POSITIONING INFORMATION FAILURE
--
-- *****

PositioningInformationFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{PositioningInformationFailure-IEs}},
    ...
}

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

-- *****
--
-- POSITIONING INFORMATION UPDATE
--
-- *****

PositioningInformationUpdate ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{PositioningInformationUpdate-IEs}},
    ...
}

PositioningInformationUpdate-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-SRSConfiguration  CRITICALITY ignore  TYPE SRSConfiguration        PRESENCE optional}|
    { ID id-SFNInitialisationTime  CRITICALITY ignore  TYPE RelativeTime1900        PRESENCE optional}|
    { ID id-UETxTEGAssociation  CRITICALITY ignore  TYPE UETxTEGAssociation      PRESENCE optional},
    ...
}

-- *****
--
-- MEASUREMENT REQUEST
--
-- *****

MeasurementRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{MeasurementRequest-IEs}},
    ...
}

MeasurementRequest-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-TRP-MeasurementRequestList  CRITICALITY reject  TYPE TRP-MeasurementRequestList  PRESENCE mandatory}|
    { ID id-ReportCharacteristics      CRITICALITY reject  TYPE ReportCharacteristics      PRESENCE mandatory}|
    { ID id-MeasurementPeriodicity      CRITICALITY reject  TYPE MeasurementPeriodicity      PRESENCE conditional}|
-- The IE shall be present if the Report Characteristics IE is set to "periodic" -
    { ID id-TRPMeasurementQuantities  CRITICALITY reject  TYPE TRPMeasurementQuantities  PRESENCE mandatory}|
}

```

```

    { ID id-SFNInitialisationTime          CRITICALITY ignore TYPE RelativeTime1900          PRESENCE optional} |
    { ID id-SRSConfiguration                CRITICALITY ignore TYPE SRSConfiguration          PRESENCE optional} |
    { ID id-MeasurementBeamInfoRequest      CRITICALITY ignore TYPE MeasurementBeamInfoRequest PRESENCE optional} |
    { ID id-SystemFrameNumber              CRITICALITY ignore TYPE SystemFrameNumber          PRESENCE optional} |
    { ID id-SlotNumber                      CRITICALITY ignore TYPE SlotNumber                PRESENCE optional} |
    { ID id-MeasurementPeriodicityExtended CRITICALITY reject TYPE MeasurementPeriodicityExtended PRESENCE conditional} |
-- The IE shall be present the MeasurementPeriodicity IE is set to the value "extended"
    { ID id-ResponseTime                   CRITICALITY ignore TYPE ResponseTime              PRESENCE optional} |
    { ID id-MeasurementCharacteristicsRequestIndicator CRITICALITY ignore TYPE MeasurementCharacteristicsRequestIndicator PRESENCE optional} |
optional} |
    { ID id-MeasurementTimeOccasion        CRITICALITY ignore TYPE MeasurementTimeOccasion    PRESENCE optional} |
    { ID id-MeasurementAmount              CRITICALITY ignore TYPE MeasurementAmount          PRESENCE optional} |
    ...
}

-- *****
--
-- MEASUREMENT RESPONSE
--
-- *****

MeasurementResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{MeasurementResponse-IEs}},
    ...
}

MeasurementResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject TYPE Measurement-ID          PRESENCE mandatory} |
    { ID id-RAN-Measurement-ID          CRITICALITY reject TYPE Measurement-ID          PRESENCE mandatory} |
    { ID id-TRP-MeasurementResponseList CRITICALITY reject TYPE TRP-MeasurementResponseList PRESENCE optional} |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore TYPE CriticalityDiagnostics    PRESENCE optional} |
    ...
}

-- *****
--
-- MEASUREMENT FAILURE
--
-- *****

MeasurementFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{MeasurementFailure-IEs}},
    ...
}

MeasurementFailure-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject TYPE Measurement-ID          PRESENCE mandatory} |
    { ID id-Cause                       CRITICALITY ignore TYPE Cause                    PRESENCE mandatory} |
    { ID id-CriticalityDiagnostics      CRITICALITY ignore TYPE CriticalityDiagnostics    PRESENCE optional} |
    ...
}

-- *****
--

```



```

-- MEASUREMENT REPORT
--
-- *****
MeasurementReport ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{MeasurementReport-IEs}},
    ...
}

MeasurementReport-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-TRP-MeasurementReportList   CRITICALITY reject  TYPE TRP-MeasurementResponseList PRESENCE mandatory},
    ...
}

-- *****
--
-- MEASUREMENT UPDATE
--
-- *****
MeasurementUpdate ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{MeasurementUpdate-IEs}},
    ...
}

MeasurementUpdate-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-SRSConfiguration            CRITICALITY ignore  TYPE SRSConfiguration        PRESENCE optional}|
    { ID id-TRP-MeasurementUpdateList   CRITICALITY reject  TYPE TRP-MeasurementUpdateList PRESENCE optional}|
    { ID id-MeasurementCharacteristicsRequestIndicator CRITICALITY ignore  TYPE MeasurementCharacteristicsRequestIndicator PRESENCE optional},
    ...
}

-- *****
--
-- MEASUREMENT ABORT
--
-- *****
MeasurementAbort ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{MeasurementAbort-IEs}},
    ...
}

MeasurementAbort-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory},
    ...
}

```

```

-- *****
--
-- MEASUREMENT FAILURE INDICATION
--
-- *****

MeasurementFailureIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{MeasurementFailureIndication-IEs}},
    ...
}

MeasurementFailureIndication-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-LMF-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-RAN-Measurement-ID          CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
    { ID id-Cause                        CRITICALITY ignore  TYPE Cause                    PRESENCE mandatory},
    ...
}

-- *****
--
-- TRP INFORMATION REQUEST
--
-- *****

TRPInformationRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{TRPInformationRequest-IEs}},
    ...
}

TRPInformationRequest-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-TRPList                      CRITICALITY ignore  TYPE TRPList                  PRESENCE optional}|
    { ID id-TRPInformationTypeListTRPReq CRITICALITY reject  TYPE TRPInformationTypeListTRPReq PRESENCE mandatory},
    ...
}

-- *****
--
-- TRP INFORMATION RESPONSE
--
-- *****

TRPInformationResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container    {{TRPInformationResponse-IEs}},
    ...
}

TRPInformationResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-TRPInformationListTRPResp     CRITICALITY ignore  TYPE TRPInformationListTRPResp PRESENCE mandatory}|
    { ID id-CriticalityDiagnostics        CRITICALITY ignore  TYPE CriticalityDiagnostics   PRESENCE optional},
    ...
}

-- *****

```

```

--
-- TRP INFORMATION FAILURE
--
-- *****
TRPInformationFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      {{TRPInformationFailure-IEs}},
    ...
}

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

-- *****
--
-- POSITIONING ACTIVATION REQUEST
--
-- *****

PositioningActivationRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container      { { PositioningActivationRequestIEs } },
    ...
}

PositioningActivationRequestIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-SRSType        CRITICALITY reject  TYPE SRSType          PRESENCE mandatory } |
    { ID id-ActivationTime  CRITICALITY ignore  TYPE RelativeTime1900  PRESENCE optional },
    ...
}

SRSType ::= CHOICE {
    semipersistentSRS          SemipersistentSRS,
    aperiodicSRS              AperiodicSRS,
    choice-Extension          ProtocolIE-Single-Container { { SRSType-ExtIEs } }
}

SRSType-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

SemipersistentSRS ::= SEQUENCE {
    sRSResourceSetID          SRSResourceSetID,
    iE-Extensions            ProtocolExtensionContainer { {SemipersistentSRS-ExtIEs} } OPTIONAL,
    ...
}

SemipersistentSRS-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-SRSSpatialRelation  CRITICALITY ignore  EXTENSION SpatialRelationInfo          PRESENCE optional}|
    { ID id-SRSSpatialRelationPerSRSResource  CRITICALITY ignore  EXTENSION SpatialRelationPerSRSResource  PRESENCE optional},
}

```

```

}
...
}
AperiodicSRS ::= SEQUENCE {
    aperiodic          ENUMERATED{true,...},
    sRSResourceTrigger SRSResourceTrigger OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { {AperiodicSRS-ExtIEs} } OPTIONAL,
    ...
}

AperiodicSRS-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- POSITIONING ACTIVATION RESPONSE
--
-- *****

PositioningActivationResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container   { { PositioningActivationResponseIEs} },
    ...
}

PositioningActivationResponseIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-CriticalityDiagnostics      CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional }|
    { ID id-SystemFrameNumber          CRITICALITY ignore TYPE SystemFrameNumber PRESENCE optional }|
    { ID id-SlotNumber                 CRITICALITY ignore TYPE SlotNumber PRESENCE optional },
    ...
}

-- *****
--
-- POSITIONING ACTIVATION FAILURE
--
-- *****

PositioningActivationFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container   { { PositioningActivationFailureIEs} },
    ...
}

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

```

```

-- *****
--
-- POSITIONING DEACTIVATION
--
-- *****

PositioningDeactivation ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      { { PositioningDeactivationIEs } },
    ...
}

PositioningDeactivationIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-AbortTransmission      CRITICALITY ignore  TYPE AbortTransmission      PRESENCE mandatory } ,
    ...
}

-- *****
--
-- PRS CONFIGURATION REQUEST
--
-- *****

PRSConfigurationRequest ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      {{PRSConfigurationRequest-IEs}},
    ...
}

PRSConfigurationRequest-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-PRSConfigRequestType    CRITICALITY reject  TYPE PRSConfigRequestType    PRESENCE mandatory}|
    { ID id-PRSTRPLList             CRITICALITY ignore  TYPE PRSTRPLList             PRESENCE mandatory},
    ...
}

-- *****
--
-- PRS CONFIGURATION RESPONSE
--
-- *****

PRSConfigurationResponse ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container      {{ PRSConfigurationResponse-IEs}},
    ...
}

PRSConfigurationResponse-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-PRSTransmissionTRPList  CRITICALITY ignore  TYPE PRSTransmissionTRPList  PRESENCE optional}|
    { ID id-CriticalityDiagnostics  CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional},
    ...
}

-- *****
--
-- PRS CONFIGURATION FAILURE
--

```

```

-- *****
PRSConfigurationFailure ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{ PRSConfigurationFailure-IEs}},
    ...
}

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

-- *****
--
-- MEASUREMENT PRECONFIGURATION REQUIRED
--
-- *****

MeasurementPreconfigurationRequired ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{ MeasurementPreconfigurationRequired-IEs}},
    ...
}

MeasurementPreconfigurationRequired-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-TRP-PRS-Information-List CRITICALITY ignore TYPE TRP-PRS-Information-List PRESENCE mandatory},
    ...
}

-- *****
--
-- MEASUREMENT PRECONFIGURATION CONFIRM
--
-- *****

MeasurementPreconfigurationConfirm ::= SEQUENCE {
    protocolIEs      ProtocolIE-Container    {{ MeasurementPreconfigurationConfirm-IEs}},
    ...
}

MeasurementPreconfigurationConfirm-IEs NRPPA-PROTOCOL-IES ::= {
    { ID id-PreconfigurationResult CRITICALITY ignore TYPE PreconfigurationResult PRESENCE mandatory }|
    { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional },
    ...
}

-- *****
--
-- MEASUREMENT PRECONFIGURATION REFUSE
--
-- *****

MeasurementPreconfigurationRefuse ::= SEQUENCE {

```

```

    protocolIEs      ProtocolIE-Container      {{ MeasurementPreconfigurationRefuse-IEs}},
  ...
}

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

-- *****
--
-- MEASUREMENT ACTIVATION
--
-- *****

MeasurementActivation ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { { MeasurementActivation-IEs} },
  ...
}

MeasurementActivation-IEs NRPPA-PROTOCOL-IES ::= {
  { ID id-RequestType          CRITICALITY reject  TYPE RequestType          PRESENCE mandatory}|
  { ID id-PRS-Measurements-Info-List CRITICALITY ignore  TYPE PRS-Measurements-Info-List PRESENCE optional},
  ...
}

END
-- ASN1STOP

```

9.3.5 Information Element definitions

```

-- ASN1START
-- *****
--
-- Information Element Definitions
--
-- *****

NRPPA-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    id-MeasurementQuantities-Item,
    id-CGI-NR,
    id-SFNInitialisationTime-NR,

```

id-GeographicalCoordinates,
id-ResultSS-RSRP,
id-ResultSS-RSRQ,
id-ResultCSI-RSRP,
id-ResultCSI-RSRQ,
id-AngleOfArrivalNR,
id-ResultNR,
id-ResultEUTRA,
maxCellinRANnode,
maxCellReport,
maxNrOfErrors,
maxNoMeas,
maxnoOTDOAtypes,
maxServCell,
id-OtherRATMeasurementQuantities-Item,
id-WLANMeasurementQuantities-Item,
maxGERANMeas,
maxUTRANMeas,
maxWLANchannels,
maxnoFreqHoppingBandsMinusOne,
id-TDD-Config-EUTRA-Item,
maxNrOfPosSImessage,
maxnoAssistInfoFailureListItems,
maxNrOfSegments,
maxNrOfPosSIBs,
maxnoPosMeas,
maxnoTRPs,
maxnoTRPInfoTypes,
maxNoOfMeasTRPs,
maxNoPath,
maxnoofAngleInfo,
maxnolcs-gcs-translation,
maxnoBcastCell,
maxnoSRSTriggerStates,
maxnoSpatialRelations,
maxNRMeas,
maxEUTRAMEas,
maxIndexesReport,
maxCellReportNR,
maxnoSRS-Carriers,
maxnoSCSs,
maxnoSRS-Resources,
maxnoSRS-PosResources,
maxnoSRS-ResourceSets,
maxnoSRS-ResourcePerSet,
maxnoSRS-PosResourceSets,
maxnoSRS-PosResourcePerSet,
maxPRS-ResourceSets,
maxPRS-ResourcesPerSet,
maxNoSSBs,
maxnoofPRSresourceSet,
maxnoofPRSresource,
maxnoofULAOAs,
maxNoPathExtended,


```
maxnoARPs,  
maxnoTRPTEGs,  
maxnoUETEGs,  
maxFreqLayers,  
maxnoPRSTRPs,  
maxNumResourcesPerAngle,  
maxnoAzimuthAngles,  
maxnoElevationAngles,  
id-Cell-ID,  
id-TRPInformationTypeItem,  
id-SrsFrequency,  
id-TRPType,  
id-SRSSpatialRelationPerSRSResource,  
id-PRS-Resource-ID,  
id-OnDemandPRS,  
id-AoA-SearchWindow,  
id-ZoA,  
id-MultipleULAoA,  
id-UL-SRS-RSRPP,  
id-SRSResourcetype,  
id-ExtendedAdditionalPathList,  
id-ARPLocationInfo,  
id-ARP-ID,  
id-LoS-NLoSInformation,  
id-NumberOfTRPRxTEG,  
id-NumberOfTRPRxTxTEG,  
id-TRPTxTEGAssociation,  
id-TRPTEGIDInformation,  
id-TRPRXTEGID,  
id-TRPBeamAntennaInformation,  
id-NR-TADV,  
id-pathPower
```

```
FROM NRPPA-Constants
```

```
Criticality,  
NRPPATransactionID,  
ProcedureCode,  
ProtocolIE-ID,  
TriggeringMessage
```

```
FROM NRPPA-CommonDataTypes
```

```
ProtocolExtensionContainer{},  
ProtocolIE-Single-Container{},
```

```
NRPPA-PROTOCOL-EXTENSION,  
NRPPA-PROTOCOL-IES
```

```
FROM NRPPA-Containers;
```

```
-- A
```

```

AbortTransmission ::= CHOICE {
    deactivateSRSResourceSetID    SRSResourceSetID,
    releaseALL                     NULL,
    choice-extension               ProtocolIE-Single-Container { { AbortTransmission-ExtIEs } }
}

AbortTransmission-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

ActiveULBWP ::= SEQUENCE {
    locationAndBandwidth          INTEGER (0..37949,...),
    subcarrierSpacing             ENUMERATED {kHz15, kHz30, kHz60, kHz120,...},
    cyclicPrefix                  ENUMERATED {normal, extended},
    txDirectCurrentLocation       INTEGER (0..3301,...),
    shift7dot5kHz                 ENUMERATED {true, ...} OPTIONAL,
    sRSConfig                     SRSConfig,
    iE-Extensions                 ProtocolExtensionContainer { { ActiveULBWP-ExtIEs } } OPTIONAL,
    ...
}

ActiveULBWP-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

AdditionalPathList ::= SEQUENCE (SIZE (1.. maxNoPath)) OF AdditionalPathListItem

AdditionalPathListItem ::= SEQUENCE {
    relativeTimeOfPath            RelativePathDelay,
    pathQuality                   TrpMeasurementQuality OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { { AdditionalPathListItem-ExtIEs } } OPTIONAL,
    ...
}

AdditionalPathListItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-MultipleULAoA         CRITICALITY ignore EXTENSION MultipleULAoA PRESENCE optional}|
    { ID id-pathPower            CRITICALITY ignore EXTENSION UL-SRS-RSRPP PRESENCE optional},
    ...
}

ExtendedAdditionalPathList ::= SEQUENCE (SIZE (1.. maxNoPathExtended)) OF ExtendedAdditionalPathList-Item

ExtendedAdditionalPathList-Item ::= SEQUENCE {
    relativeTimeOfPath            RelativePathDelay,
    pathQuality                   TrpMeasurementQuality OPTIONAL,
    multipleULAoA                 MultipleULAoA OPTIONAL,
    pathPower                     UL-SRS-RSRPP OPTIONAL,
    iE-Extensions                 ProtocolExtensionContainer { { ExtendedAdditionalPathList-Item-ExtIEs } } OPTIONAL,
    ...
}

```

```

ExtendedAdditionalPathList-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

AoA-AssistanceInfo ::= SEQUENCE {
    angleMeasurement      AngleMeasurementType,
    lcs-to-GCS-Translation LCS-to-GCS-Translation      OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { { AoA-AssistanceInfo-ExtIEs } } OPTIONAL,
    ...
}

AoA-AssistanceInfo-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

AperiodicSRSResourceTriggerList ::= SEQUENCE (SIZE(1..maxnoSRSTriggerStates)) OF AperiodicSRSResourceTrigger

AperiodicSRSResourceTrigger ::= INTEGER (1..3)

AngleMeasurementType ::= CHOICE {
    expected-ULAoA      Expected-UL-AoA,
    expected-ZoA        Expected-ZoA-only,
    choice-extension   ProtocolIE-Single-Container { { AngleMeasurementType-ExtIEs } }
}

AngleMeasurementType-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

Expected-UL-AoA ::= SEQUENCE {
    expected-Azimuth-AoA      Expected-Azimuth-AoA,
    expected-Zenith-AoA      Expected-Zenith-AoA      OPTIONAL,
    iE-extensions            ProtocolExtensionContainer { { Expected-UL-AoA-ExtIEs } }      OPTIONAL,
    ...
}

Expected-UL-AoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

Expected-ZoA-only ::= SEQUENCE {
    expected-ZoA-only      Expected-Zenith-AoA,
    iE-extensions         ProtocolExtensionContainer { { Expected-ZoA-only-ExtIEs } } OPTIONAL,
    ...
}

Expected-ZoA-only-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

Expected-Azimuth-AoA ::= SEQUENCE {
    expected-Azimuth-AoA-value      Expected-Value-AoA,
    expected-Azimuth-AoA-uncertainty      Uncertainty-range-AoA,
}

```

```

    iE-extensions      ProtocolExtensionContainer { { Expected-Azimuth-AoA-ExtIEs } } OPTIONAL,
    ...
}

Expected-Azimuth-AoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

Expected-Zenith-AoA ::= SEQUENCE {
    expected-Zenith-AoA-value      Expected-Value-ZoA,
    expected-Zenith-AoA-uncertainty  Uncertainty-range-ZoA,
    iE-extensions      ProtocolExtensionContainer { { Expected-Zenith-AoA-ExtIEs } } OPTIONAL,
    ...
}

Expected-Zenith-AoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ARP-ID ::= INTEGER (1..16, ...)

ARPLocationInformation ::= SEQUENCE (SIZE (1..maxnoARPs)) OF ARPLocationInformation-Item

ARPLocationInformation-Item ::= SEQUENCE {
    aRP-ID      ARP-ID,
    aRPLocationType      ARPLocationType,
    iE-Extensions      ProtocolExtensionContainer { { ARPLocationInformation-ExtIEs } } OPTIONAL,
    ...
}

ARPLocationInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ARPLocationType ::= CHOICE {
    aRPPositionRelativeGeodetic      RelativeGeodeticLocation,
    aRPPositionRelativeCartesian      RelativeCartesianLocation,
    choice-extension      ProtocolIE-Single-Container { { ARPLocationType-ExtIEs } }
}

ARPLocationType-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

Assistance-Information ::= SEQUENCE {
    systemInformation      SystemInformation,
    iE-Extensions      ProtocolExtensionContainer { { Assistance-Information-ExtIEs } } OPTIONAL,
    ...
}

Assistance-Information-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

AssistanceInformationFailureList ::= SEQUENCE (SIZE (1..maxnoAssistInfoFailureListItems)) OF SEQUENCE {
    possIB-Type      PosSIB-Type,
    outcome          Outcome,
    iE-Extensions   ProtocolExtensionContainer { {AssistanceInformationFailureList-ExtIEs} } OPTIONAL,
    ...
}

AssistanceInformationFailureList-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

AssistanceInformationMetaData ::= SEQUENCE {
    encrypted        ENUMERATED {true, ...} OPTIONAL,
    gNSSID           ENUMERATED {gps, sbas, qzss, galileo, glonass, bds, navic, ...} OPTIONAL,
    sBASID           ENUMERATED {waas, egnos, msas, gagan, ...} OPTIONAL,
    iE-Extensions   ProtocolExtensionContainer { { AssistanceInformationMetaData-ExtIEs} } OPTIONAL,
    ...
}

AssistanceInformationMetaData-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

-- B

BandwidthSRS ::= CHOICE {
    fR1      ENUMERATED {mHz5, mHz10, mHz20, mHz40, mHz50, mHz80, mHz100, ...},
    fR2      ENUMERATED {mHz50, mHz100, mHz200, mHz400, ...},
    choice-extension      ProtocolIE-Single-Container { { BandwidthSRS-ExtIEs } }
}

BandwidthSRS-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

BCCH ::= INTEGER (0..1023, ...)

Broadcast ::= ENUMERATED {
    start,
    stop,
    ...
}

BroadcastPeriodicity ::= ENUMERATED {
    ms80,
    ms160,
    ms320,
    ms640,
    ms1280,
    ms2560,
    ms5120,
    ...
}

```

```
}
PositioningBroadcastCells ::= SEQUENCE (SIZE (1..maxnoBcastCell)) OF NG-RAN-CGI
BSSID ::= OCTET STRING (SIZE(6))
-- C
Cause ::= CHOICE {
    radioNetwork      CauseRadioNetwork,
    protocol          CauseProtocol,
    misc              CauseMisc,
    choice-Extension  ProtocolIE-Single-Container {{ Cause-ExtensionIE }}
}
Cause-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    ...
}
CauseMisc ::= ENUMERATED {
    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,
    ...
}
CauseRadioNetwork ::= ENUMERATED {
    unspecified,
    requested-item-not-supported,
    requested-item-temporarily-not-available,
    ...,
    serving-NG-RAN-node-changed,
    requested-item-not-supported-on-time
}
Cell-Portion-ID ::= INTEGER (0..4095,...)
CGI-EUTRA ::= SEQUENCE {
    pLMN-Identity      PLMN-Identity,
    eUTRACellIdentifier EUTRACellIdentifier,
    iE-Extensions     ProtocolExtensionContainer { {CGI-EUTRA-ExtIEs} } OPTIONAL,
    ...
}
```

```

CGI-EUTRA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

CGI-NR ::= SEQUENCE {
    plmn-Identity          PLMN-Identity,
    nRcellIdentifier      NRCellIdentifier,
    iE-Extensions         ProtocolExtensionContainer { {CGI-NR-ExtIEs} } OPTIONAL,
    ...
}

CGI-NR-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

CPLength-EUTRA ::= ENUMERATED {
    normal,
    extended,
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode          ProcedureCode          OPTIONAL,
    triggeringMessage      TriggeringMessage      OPTIONAL,
    procedureCriticality   Criticality             OPTIONAL,
    nrppatransactionID    NRPPATransactionID     OPTIONAL,
    iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

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

CriticalityDiagnostics-IE-List ::= SEQUENCE (SIZE (1..maxNrOfErrors)) OF
    SEQUENCE {
        iECriticality      Criticality,
        iE-ID              ProtocolIE-ID,
        typeOfError        TypeOfError,
        iE-Extensions     ProtocolExtensionContainer { {CriticalityDiagnostics-IE-List-ExtIEs} } OPTIONAL,
        ...
    }

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

-- D

```

```

DL-Bandwidth-EUTRA ::= ENUMERATED {
    bw6,
    bw15,
    bw25,
    bw50,
    bw75,
    bw100,
    ...
}

DL-PRS ::= SEQUENCE {
    prsid                INTEGER (0..255),
    dl-PRSResourceSetID PRS-Resource-Set-ID,
    dl-PRSResourceID    PRS-Resource-ID OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { {DL-PRS-ExtIEs} } OPTIONAL,
    ...
}

DL-PRS-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

DL-PRSMutingPattern ::= CHOICE {
    two                BIT STRING (SIZE(2)),
    four               BIT STRING (SIZE(4)),
    six                BIT STRING (SIZE(6)),
    eight              BIT STRING (SIZE(8)),
    sixteen            BIT STRING (SIZE(16)),
    thirty-two        BIT STRING (SIZE(32)),
    choice-extension   ProtocolIE-Single-Container { { DL-PRSMutingPattern-ExtIEs } }
}

DL-PRSMutingPattern-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

DLPRSResourceCoordinates ::= SEQUENCE {
    listOfDL-PRSResourceSetARP SEQUENCE (SIZE(1.. maxPRS-ResourceSets)) OF DLPRSResourceSetARP,
    iE-Extensions              ProtocolExtensionContainer { { DLPRSResourceCoordinates-ExtIEs } } OPTIONAL,
    ...
}

DLPRSResourceCoordinates-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

DLPRSResourceSetARP ::= SEQUENCE {
    dl-PRSResourceSetID PRS-Resource-Set-ID,
    dl-PRSResourceSetARPLocation DL-PRSResourceSetARPLocation,
    listOfDL-PRSResourceARP SEQUENCE (SIZE(1.. maxPRS-ResourcesPerSet)) OF DLPRSResourceARP,
    iE-Extensions          ProtocolExtensionContainer { { DLPRSResourceSetARP-ExtIEs } } OPTIONAL,
    ...
}

```



```

DLPRSResourceSetARP-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

DL-PRSResourceSetARPLocation ::= CHOICE {
  relativeGeodeticLocation      RelativeGeodeticLocation,
  relativeCartesianLocation     RelativeCartesianLocation,
  choice-Extension              ProtocolIE-Single-Container { { DL-PRSResourceSetARPLocation-ExtIEs } }
}

DL-PRSResourceSetARPLocation-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

DLPRSResourceARP ::= SEQUENCE {
  dl-PRSResourceID              PRS-Resource-ID,
  dl-PRSResourceARPLocation     DL-PRSResourceARPLocation,
  iE-Extensions                 ProtocolExtensionContainer { { DLPRSResourceARP-ExtIEs } } OPTIONAL,
  ...
}

DLPRSResourceARP-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

DL-PRSResourceARPLocation ::= CHOICE {
  relativeGeodeticLocation      RelativeGeodeticLocation,
  relativeCartesianLocation     RelativeCartesianLocation,
  choice-Extension              ProtocolIE-Single-Container { { DL-PRSResourceARPLocation-ExtIEs } }
}

DL-PRSResourceARPLocation-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

-- E

E-CID-MeasurementResult ::= SEQUENCE {
  servingCell-ID                NG-RAN-CGI,
  servingCellTAC                TAC,
  nG-RANAccessPointPosition     NG-RANAccessPointPosition OPTIONAL,
  measuredResults               MeasuredResults OPTIONAL,
  iE-Extensions                 ProtocolExtensionContainer { { E-CID-MeasurementResult-ExtIEs } } OPTIONAL,
  ...
}

E-CID-MeasurementResult-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  { ID id-GeographicalCoordinates CRITICALITY ignore EXTENSION GeographicalCoordinates PRESENCE optional},
  ...
}

EUTRACellIdentifier ::= BIT STRING (SIZE (28))

```

```

EARFCN ::= INTEGER (0..262143, ...)

Expected-Value-AoA ::= INTEGER (0..3599)

Expected-Value-ZoA ::= INTEGER (0..1799)

-- F

-- G

GeographicalCoordinates ::= SEQUENCE {
    trPPositionDefinitionType TRPPositionDefinitionType,
    dlPRSResourceCoordinates DLPRSResourceCoordinates OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { GeographicalCoordinates-ExtIEs } } OPTIONAL,
    ...
}

GeographicalCoordinates-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-ARPLocationInfo     CRITICALITY ignore EXTENSION ARPLocationInformation     PRESENCE optional},
    ...
}

GNB-RxTxTimeDiff ::= SEQUENCE {

    rxTxTimeDiff             GNBxTxTimeDiffMeas,
    additionalPathList       AdditionalPathList OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { GNB-RxTxTimeDiff-ExtIEs } } OPTIONAL,
    ...
}

GNB-RxTxTimeDiff-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-ExtendedAdditionalPathList CRITICALITY ignore EXTENSION ExtendedAdditionalPathList PRESENCE optional}|
    { ID id-TRPTEGIDInformation       CRITICALITY ignore EXTENSION TRPTEGIDInformation     PRESENCE optional },
    ...
}

GNBRxTxTimeDiffMeas ::= CHOICE {
    k0             INTEGER (0.. 1970049),
    k1             INTEGER (0.. 985025),
    k2             INTEGER (0.. 492513),
    k3             INTEGER (0.. 246257),
    k4             INTEGER (0.. 123129),
    k5             INTEGER (0.. 61565),
    choice-extension ProtocolIE-Single-Container { { GNBRxTxTimeDiffMeas-ExtIEs } }
}

GNBRxTxTimeDiffMeas-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

```

```
-- H
HESSID ::= OCTET STRING (SIZE(6))

-- I

-- J

-- K

-- L

LCS-to-GCS-Translation ::= SEQUENCE {
    alpha          INTEGER (0..3599),
    beta           INTEGER (0..3599),
    gamma          INTEGER (0..3599),
    iE-Extensions  ProtocolExtensionContainer { { LCS-to-GCS-Translation-ExtIEs } } OPTIONAL,
    ...
}

LCS-to-GCS-Translation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

LCS-to-GCS-TranslationItem ::= SEQUENCE {
    alpha          INTEGER (0..359),
    alphaFine      INTEGER (0..9)    OPTIONAL,
    beta           INTEGER (0..359),
    betaFine       INTEGER (0..9)    OPTIONAL,
    gamma          INTEGER (0..359),
    gammaFine      INTEGER (0..9)    OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { { LCS-to-GCS-TranslationItem-ExtIEs } } OPTIONAL,
    ...
}

LCS-to-GCS-TranslationItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

LocationUncertainty ::= SEQUENCE {
    horizontalUncertainty  INTEGER (0..255),
    horizontalConfidence  INTEGER (0..100),
    verticalUncertainty    INTEGER (0..255),
    verticalConfidence     INTEGER (0..100),
    iE-Extensions         ProtocolExtensionContainer { { LocationUncertainty-ExtIEs } } OPTIONAL,
    ...
}

LocationUncertainty-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

LoS-NLoSIndicatorHard ::= ENUMERATED {nlos, los}
```

```
LoS-NLoSIndicatorSoft ::= INTEGER (0..10)

LoS-NLoSInformation ::= CHOICE {
    loS-NLoSIndicatorSoft      LoS-NLoSIndicatorSoft,
    loS-NLoSIndicatorHard      LoS-NLoSIndicatorHard,
    choice-Extension           ProtocolIE-Single-Container {{ LoS-NLoSInformation-ExtIEs}}
}

LoS-NLoSInformation-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

-- M

Measurement-ID ::= INTEGER (1.. 65536, ...)

MeasurementAmount ::= ENUMERATED {ma0, ma1, ma2, ma4, ma8, ma16, ma32, ma64}

MeasurementBeamInfoRequest ::= ENUMERATED {true, ...}

MeasurementBeamInfo ::= SEQUENCE {
    pRS-Resource-ID           PRS-Resource-ID     OPTIONAL,
    pRS-Resource-Set-ID       PRS-Resource-Set-ID  OPTIONAL,
    sSB-Index                 SSB-Index           OPTIONAL,
    iE-Extensions             ProtocolExtensionContainer { { MeasurementBeamInfo-ExtIEs } } OPTIONAL,
    ...
}

MeasurementBeamInfo-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

MeasurementPeriodicity ::= ENUMERATED {
    ms120,
    ms240,
    ms480,
    ms640,
    ms1024,
    ms2048,
    ms5120,
    ms10240,
    min1,
    min6,
    min12,
    min30,
    min60,
    ...,
    ms20480,
    ms40960,
    extended
}
```

```
}
MeasurementPeriodicityExtended ::= ENUMERATED {
    ms160,
    ms320,
    ms1280,
    ms2560,
    ms61440,
    ms81920,
    ms368640,
    ms737280,
    ms1843200,
    ...
}
MeasurementQuantities ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF ProtocolIE-Single-Container { {MeasurementQuantities-ItemIEs} }
MeasurementQuantities-ItemIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-MeasurementQuantities-Item CRITICALITY reject TYPE MeasurementQuantities-Item PRESENCE mandatory}
}
MeasurementQuantities-Item ::= SEQUENCE {
    measurementQuantitiesValue MeasurementQuantitiesValue,
    iE-Extensions ProtocolExtensionContainer { { MeasurementQuantitiesValue-ExtIEs} } OPTIONAL,
    ...
}
MeasurementQuantitiesValue-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}
MeasurementQuantitiesValue ::= ENUMERATED {
    cell-ID,
    angleOfArrival,
    timingAdvanceType1,
    timingAdvanceType2,
    rSRP,
    rSRQ,
    ... ,
    sS-RSRP,
    sS-RSRQ,
    cSI-RSRP,
    cSI-RSRQ,
    angleOfArrivalNR,
    timingAdvanceNR
}
MeasurementTimeOccasion ::= ENUMERATED {o1, o4, ...}
MeasurementCharacteristicsRequestIndicator ::= BIT STRING (SIZE (16))
MeasuredResults ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF MeasuredResultsValue
```

```

MeasuredResultsValue ::= CHOICE {
  valueAngleOfArrival-EUTRA          INTEGER (0..719),
  valueTimingAdvanceType1-EUTRA      INTEGER (0..7690),
  valueTimingAdvanceType2-EUTRA      INTEGER (0..7690),
  resultRSRP-EUTRA                   ResultRSRP-EUTRA,
  resultRSRQ-EUTRA                   ResultRSRQ-EUTRA,
  choice-Extension                    ProtocolIE-Single-Container {{ MeasuredResultsValue-ExtensionIE }}
}

MeasuredResultsValue-ExtensionIE NRPPA-PROTOCOL-IES ::= {
  { ID id-ResultSS-RSRP      CRITICALITY ignore TYPE ResultSS-RSRP      PRESENCE mandatory } |
  { ID id-ResultSS-RSRQ      CRITICALITY ignore TYPE ResultSS-RSRQ      PRESENCE mandatory } |
  { ID id-ResultCSI-RSRP     CRITICALITY ignore TYPE ResultCSI-RSRP     PRESENCE mandatory } |
  { ID id-ResultCSI-RSRQ     CRITICALITY ignore TYPE ResultCSI-RSRQ     PRESENCE mandatory } |
  { ID id-AngleOfArrivalNR   CRITICALITY ignore TYPE UL-AoA           PRESENCE mandatory } |
  { ID id-NR-TADV            CRITICALITY ignore TYPE NR-TADV            PRESENCE mandatory } |
  ...
}

MultipleULAoA ::= SEQUENCE {
  multipleULAoA          MultipleULAoA-List,
  iE-Extensions          ProtocolExtensionContainer { { MultipleULAoA-ExtIEs } } OPTIONAL,
  ...
}

MultipleULAoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

MultipleULAoA-List ::= SEQUENCE (SIZE(1.. maxnoofULAoAs)) OF MultipleULAoA-Item

MultipleULAoA-Item ::= CHOICE {
  uL-AoA      UL-AoA,
  ul-ZoA      ZoA,
  choice-extension ProtocolIE-Single-Container { { MultipleULAoA-Item-ExtIEs } }
}

MultipleULAoA-Item-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

-- N

NarrowBandIndex ::= INTEGER (0..15,...)

NG-RANAccessPointPosition ::= SEQUENCE {
  latitudeSign      ENUMERATED {north, south},
  latitude          INTEGER (0..8388607),
  longitude         INTEGER (-8388608..8388607),
  directionOfAltitude ENUMERATED {height, depth},
  altitude          INTEGER (0..32767),
  uncertaintySemi-major INTEGER (0..127),
  uncertaintySemi-minor INTEGER (0..127),
}

```

```

orientationOfMajorAxis    INTEGER (0..179),
uncertaintyAltitude       INTEGER (0..127),
confidence                 INTEGER (0..100),
iE-Extensions             ProtocolExtensionContainer { { NG-RANAccessPointPosition-ExtIEs} } OPTIONAL,
...
}

NG-RANAccessPointPosition-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}

NGRANHighAccuracyAccessPointPosition ::= SEQUENCE {
latitude                   INTEGER (-2147483648.. 2147483647),
longitude                  INTEGER (-2147483648.. 2147483647),
altitude                   INTEGER (-64000..1280000),
uncertaintySemi-major     INTEGER (0..255),
uncertaintySemi-minor     INTEGER (0..255),
orientationOfMajorAxis    INTEGER (0..179),
horizontalConfidence       INTEGER (0..100),
uncertaintyAltitude       INTEGER (0..255),
verticalConfidence        INTEGER (0..100),
iE-Extensions             ProtocolExtensionContainer { { NGRANHighAccuracyAccessPointPosition-ExtIEs} } OPTIONAL,
...
}

NGRANHighAccuracyAccessPointPosition-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}

NG-RAN-CGI ::= SEQUENCE {
pLMN-Identity             PLMN-Identity,
nG-RANcell                NG-RANCell,
iE-Extensions             ProtocolExtensionContainer { {NG-RAN-CGI-ExtIEs} } OPTIONAL,
...
}

NG-RAN-CGI-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}

NG-RANCell ::= CHOICE {
eUTRA-CellID             EUTRACellIdentifier,
nR-CellID                NRCellIdentifier,
choice-Extension         ProtocolIE-Single-Container {{ NG-RANCell-ExtensionIE }}
}

NG-RANCell-ExtensionIE NRPPA-PROTOCOL-IES ::= {
...
}

NR-ARFCN ::= INTEGER (0..3279165)

NRCellIdentifier ::= BIT STRING (SIZE (36))

```

```

NR-PCI ::= INTEGER (0..1007)

NR-PRS-Beam-Information ::= SEQUENCE {
    nR-PRS-Beam-InformationList SEQUENCE (SIZE(1.. maxPRS-ResourceSets)) OF NR-PRS-Beam-InformationItem,
    lCS-to-GCS-TranslationList SEQUENCE (SIZE(1..maxnolcs-gcs-translation)) OF LCS-to-GCS-TranslationItem    OPTIONAL,
    iE-Extensions    ProtocolExtensionContainer { { NR-PRS-Beam-Information-IEs } } OPTIONAL,
    ...
}

NR-PRS-Beam-Information-IEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

NR-PRS-Beam-InformationItem ::= SEQUENCE {
    pRSresourceSetID    PRS-Resource-Set-ID,
    pRSAngle            SEQUENCE (SIZE(1..maxPRS-ResourcesPerSet)) OF PRSAngleItem,
    iE-Extensions    ProtocolExtensionContainer { { NR-PRS-Beam-InformationItem-ExtIEs } } OPTIONAL,
    ...
}

NR-PRS-Beam-InformationItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

NR-TADV ::= INTEGER (0.. 7690)

NumberOfAntennaPorts-EUTRA ::= ENUMERATED {
    n1-or-n2,
    n4,
    ...
}

NumberOfDlFrames-EUTRA ::= ENUMERATED {
    sf1,
    sf2,
    sf4,
    sf6,
    ...
}

NumberOfDlFrames-Extended-EUTRA ::= INTEGER (1..160,...)

NumberOfFrequencyHoppingBands ::= ENUMERATED {
    twobands,
    fourbands,
    ...
}

NumberOfTRPRxTEG ::= ENUMERATED {two, three, four, six, eight, ...}

NumberOfTRPRxTxTEG ::= ENUMERATED {two, three, four, six, eight, ...}

NZP-CSI-RS-ResourceID ::= INTEGER (0..191)

```



```

-- 0
OnDemandPRS-Info ::= SEQUENCE {
    onDemandPRSRequestAllowed          BIT STRING (SIZE (16)),
    allowedResourceSetPeriodicityValues BIT STRING (SIZE (24)) OPTIONAL,
    allowedPRSBandwidthValues          BIT STRING (SIZE (64)) OPTIONAL,
    allowedResourceRepetitionFactorValues BIT STRING (SIZE (8)) OPTIONAL,
    allowedResourceNumberOfSymbolsValues BIT STRING (SIZE (8)) OPTIONAL,
    allowedCombSizeValues              BIT STRING (SIZE (8)) OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { OnDemandPRS-Info-ExtIEs } } OPTIONAL,
    ...
}

OnDemandPRS-Info-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOACells ::= SEQUENCE (SIZE (1.. maxCellInRANode)) OF SEQUENCE {
    oTDOACellInfo          OTDOACell-Information,
    iE-Extensions          ProtocolExtensionContainer { {OTDOACells-ExtIEs} } OPTIONAL,
    ...
}

OTDOACells-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

OTDOACell-Information ::= SEQUENCE (SIZE (1..maxnoOTDOAtypes)) OF OTDOACell-Information-Item

OTDOACell-Information-Item ::= CHOICE {
    pCI-EUTRA          PCI-EUTRA,
    cGI-EUTRA          CGI-EUTRA,
    tAC                TAC,
    eARFCN             EARFCN,
    pRS-Bandwidth-EUTRA PRS-Bandwidth-EUTRA,
    pRS-ConfigurationIndex-EUTRA PRS-ConfigurationIndex-EUTRA,
    cPLength-EUTRA     CPLength-EUTRA,
    numberOfDlFrames-EUTRA NumberOfDlFrames-EUTRA,
    numberOfAntennaPorts-EUTRA NumberOfAntennaPorts-EUTRA,
    sFNInitialisationTime-EUTRA SFNInitialisationTime-EUTRA,
    nG-RANAccessPointPosition NG-RANAccessPointPosition,
    pRSMutingConfiguration-EUTRA PRSMutingConfiguration-EUTRA,
    prsid-EUTRA        PRS-ID-EUTRA,
    tpid-EUTRA         TP-ID-EUTRA,
    tpType-EUTRA       TP-Type-EUTRA,
    numberOfDlFrames-Extended-EUTRA NumberOfDlFrames-Extended-EUTRA,
    crsCPLength-EUTRA CPLength-EUTRA,
    dL-Bandwidth-EUTRA DL-Bandwidth-EUTRA,
    pRSOccasionGroup-EUTRA PRSOccasionGroup-EUTRA,
    pRSFrequencyHoppingConfiguration-EUTRA PRSFrequencyHoppingConfiguration-EUTRA,
    choice-Extension ProtocolIE-Single-Container { { OTDOACell-Information-Item-ExtensionIE } }
}

OTDOACell-Information-Item-ExtensionIE NRPPA-PROTOCOL-IES ::= {

```

```

    { ID id-TDD-Config-EUTRA-Item      CRITICALITY ignore TYPE TDD-Config-EUTRA-Item PRESENCE mandatory }|
    { ID id-CGI-NR                     CRITICALITY ignore TYPE CGI-NR PRESENCE mandatory }|
    { ID id-SFNInitialisationTime-NR   CRITICALITY ignore TYPE SFNInitialisationTime-EUTRA PRESENCE mandatory },
    ...
}

OTDOA-Information-Item ::= ENUMERATED {
    pci,
    cgi,
    tac,
    earfcn,
    prsBandwidth,
    prsConfigIndex,
    cpLength,
    noDlFrames,
    noAntennaPorts,
    sFNInitTime,
    nG-RANAccessPointPosition,
    prsmutingconfiguration,
    prsid,
    tpid,
    tpType,
    crsCPLength,
    dlBandwidth,
    multipleprsConfigurationsperCell,
    prsOccasionGroup,
    prsFrequencyHoppingConfiguration,
    ...,
    tddConfig
}

OtherRATMeasurementQuantities ::= SEQUENCE (SIZE (0.. maxNoMeas)) OF ProtocolIE-Single-Container { {OtherRATMeasurementQuantities-ItemIEs} }

OtherRATMeasurementQuantities-ItemIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-OtherRATMeasurementQuantities-Item CRITICALITY reject TYPE OtherRATMeasurementQuantities-Item PRESENCE mandatory}}

OtherRATMeasurementQuantities-Item ::= SEQUENCE {
    otherRATMeasurementQuantitiesValue OtherRATMeasurementQuantitiesValue,
    iE-Extensions ProtocolExtensionContainer { { OtherRATMeasurementQuantitiesValue-ExtIEs} } OPTIONAL,
    ...
}

OtherRATMeasurementQuantitiesValue-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

OtherRATMeasurementQuantitiesValue ::= ENUMERATED {
    geran,
    utran,
    ...,
    nR,
    eUTRA
}

```

```

OtherRATMeasurementResult ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF OtherRATMeasuredResultsValue

OtherRATMeasuredResultsValue ::= CHOICE {
    resultGERAN                ResultGERAN,
    resultUTRAN                ResultUTRAN,
    choice-Extension           ProtocolIE-Single-Container {{ OtherRATMeasuredResultsValue-ExtensionIE }}
}

OtherRATMeasuredResultsValue-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    { ID id-ResultNR          CRITICALITY ignore TYPE ResultNR          PRESENCE mandatory }|
    { ID id-ResultEUTRA      CRITICALITY ignore TYPE ResultEUTRA      PRESENCE mandatory },
    ...
}

Outcome ::= ENUMERATED {
    failed,
    ...
}

-- P

PathlossReferenceInformation ::= SEQUENCE {
    pathlossReferenceSignal      PathlossReferenceSignal,
    iE-Extensions               ProtocolExtensionContainer { { PathlossReferenceInformation-ExtIEs } } OPTIONAL,
    ...
}

PathlossReferenceInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PathlossReferenceSignal ::= CHOICE {
    sSB-Reference              SSB,
    dL-PRS-Reference           DL-PRS,
    choice-Extension           ProtocolIE-Single-Container {{ PathlossReferenceSignal-ExtensionIE }}
}

PathlossReferenceSignal-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    ...
}

PCI-EUTRA ::= INTEGER (0..503, ...)

PhysCellIDGERAN ::= INTEGER (0..63, ...)

PhysCellIDUTRA-FDD ::= INTEGER (0..511, ...)

PhysCellIDUTRA-TDD ::= INTEGER (0..127, ...)

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

```

PeriodicityList ::= SEQUENCE (SIZE (1.. maxnoSRS-ResourcePerSet)) OF PeriodicityItem

PeriodicityItem ::= ENUMERATED {ms0dot125, ms0dot25, ms0dot5, ms0dot625, ms1, ms1dot25, ms2, ms2dot5, ms4dot, ms5, ms8, ms10, ms16, ms20, ms32, ms40, ms64, ms80m, ms160, ms320, ms640m, ms1280, ms2560, ms5120, ms10240, ...}

PosSIBs ::= SEQUENCE (SIZE (1.. maxNrOfPosSIBs)) OF SEQUENCE {
 posSIB-Type PosSIB-Type,
 posSIB-Segments PosSIB-Segments,
 assistanceInformationMetaData AssistanceInformationMetaData OPTIONAL,
 broadcastPriority INTEGER (1..16,...) OPTIONAL,
 iE-Extensions ProtocolExtensionContainer { { PosSIBs-ExtIEs } } OPTIONAL,
 ...
 }

PosSIBs-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
 ...
 }

PosSIB-Segments ::= SEQUENCE (SIZE (1.. maxNrOfSegments)) OF SEQUENCE {
 assistanceDataSIBelement OCTET STRING,
 iE-Extensions ProtocolExtensionContainer { { PosSIB-Segments-ExtIEs } } OPTIONAL,
 ...
 }

PosSIB-Segments-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
 ...
 }

PosSIB-Type ::= ENUMERATED {
 posSibType1-1,
 posSibType1-2,
 posSibType1-3,
 posSibType1-4,
 posSibType1-5,
 posSibType1-6,
 posSibType1-7,
 posSibType1-8,
 posSibType2-1,
 posSibType2-2,
 posSibType2-3,
 posSibType2-4,
 posSibType2-5,
 posSibType2-6,
 posSibType2-7,
 posSibType2-8,
 posSibType2-9,
 posSibType2-10,
 posSibType2-11,
 posSibType2-12,
 posSibType2-13,
 posSibType2-14,
 posSibType2-15,
 }

```

    posSibType2-16,
    posSibType2-17,
    posSibType2-18,
    posSibType2-19,
    posSibType2-20,
    posSibType2-21,
    posSibType2-22,
    posSibType2-23,
    posSibType2-24,
    posSibType2-25,
    posSibType3-1,
    posSibType4-1,
    posSibType5-1,
    posSibType6-1,
    posSibType6-2,
    posSibType6-3,
    ...,
    posSibType1-9,
    posSibType1-10,
    posSibType6-4,
    posSibType6-5,
    posSibType6-6
}

PosSRSResource-List ::= SEQUENCE (SIZE (1..maxnoSRS-PosResources)) OF PosSRSResource-Item

PosSRSResource-Item ::= SEQUENCE {
    srs-PosResourceId          SRSPosResourceID,
    transmissionCombPos        TransmissionCombPos,
    startPosition              INTEGER (0..13),
    nrofSymbols                ENUMERATED {n1, n2, n4, n8, n12},
    freqDomainShift            INTEGER (0..268),
    c-SRS                      INTEGER (0..63),
    groupOrSequenceHopping    ENUMERATED {neither, groupHopping, sequenceHopping},
    resourceTypePos            ResourceTypePos,
    sequenceId                 INTEGER (0.. 65535),
    spatialRelationPos         SpatialRelationPos OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { PosSRSResource-Item-ExtIEs } } OPTIONAL,
    ...
}

PosSRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PosSRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoSRS-PosResourceSets)) OF PosSRSResourceSet-Item

PosSRSResourceID-List ::= SEQUENCE (SIZE (1..maxnoSRS-PosResourcePerSet)) OF SRSPosResourceID

PosSRSResourceSet-Item ::= SEQUENCE {
    possrsResourceSetID        INTEGER(0..15),
    possrsResourceID-List      PosSRSResourceID-List,

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```

    posresourceSetType          PosResourceSetType,
    iE-Extensions               ProtocolExtensionContainer { { PosSRSResourceSet-Item-ExtIEs } } OPTIONAL,
    ...
}

PosSRSResourceSet-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PosResourceSetType ::= CHOICE {
    periodic                   PosResourceSetTypePeriodic,
    semi-persistent           PosResourceSetTypeSemi-persistent,
    aperiodic                 PosResourceSetTypeAperiodic,
    choice-extension          ProtocolIE-Single-Container {{ PosResourceSetType-ExtIEs }}
}

PosResourceSetType-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

PosResourceSetTypePeriodic ::= SEQUENCE {
    posperiodicSet            ENUMERATED{true, ...},
    iE-Extensions            ProtocolExtensionContainer { { PosResourceSetTypePeriodic-ExtIEs } } OPTIONAL,
    ...
}

PosResourceSetTypePeriodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PosResourceSetTypeSemi-persistent ::= SEQUENCE {
    possemi-persistentSet    ENUMERATED{true, ...},
    iE-Extensions            ProtocolExtensionContainer { { PosResourceSetTypeSemi-persistent-ExtIEs } } OPTIONAL,
    ...
}

PosResourceSetTypeSemi-persistent-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PosResourceSetTypeAperiodic ::= SEQUENCE {
    sRSResourceTrigger        INTEGER(1..3),
    iE-Extensions            ProtocolExtensionContainer { { PosResourceSetTypeAperiodic-ExtIEs } } OPTIONAL,
    ...
}

PosResourceSetTypeAperiodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

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

PRS-Bandwidth-EUTRA ::= ENUMERATED {
    bw6,

```

```

    bw15,
    bw25,
    bw50,
    bw75,
    bw100,
    ...
}

PRSAngleItem ::= SEQUENCE {
    nRPRSAzimuth          INTEGER (0..359),
    nRPRSAzimuthFine     INTEGER (0..9) OPTIONAL,
    nRPRSElevation       INTEGER (0..180) OPTIONAL,
    nRPRSElevationFine   INTEGER (0..9) OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { PRSAngleItem-ExtIEs } } OPTIONAL,
    ...
}

PRSAngleItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-PRS-Resource-ID      CRITICALITY ignore EXTENSION PRS-Resource-ID      PRESENCE optional },
    ...
}

PRSIInformationPos ::= SEQUENCE {
    pRS-IDPos            INTEGER(0..255),
    pRS-Resource-Set-IDPos  INTEGER(0..7),
    pRS-Resource-IDPos    INTEGER(0..63) OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { PRSIInformationPos-ExtIEs } } OPTIONAL,
    ...
}

PRSIInformationPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSConfigRequestType ::= ENUMERATED {configure, off, ...}

PRSConfiguration ::= SEQUENCE {
    pRSResourceSet-List  PRSResourceSet-List,
    iE-Extensions        ProtocolExtensionContainer { { PRSConfiguration-ExtIEs } } OPTIONAL,
    ...
}

PRSConfiguration-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRS-ConfigurationIndex-EUTRA ::= INTEGER (0..4095, ...)

PRS-ID-EUTRA ::= INTEGER (0..4095, ...)

PRSMutingConfiguration-EUTRA ::= CHOICE {
    two                                BIT STRING (SIZE (2)),

```

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four BIT STRING (SIZE (4)),
eight BIT STRING (SIZE (8)),
sixteen BIT STRING (SIZE (16)),
thirty-two BIT STRING (SIZE (32)),
sixty-four BIT STRING (SIZE (64)),
one-hundred-and-twenty-eight BIT STRING (SIZE (128)),
two-hundred-and-fifty-six BIT STRING (SIZE (256)),
five-hundred-and-twelve BIT STRING (SIZE (512)),
one-thousand-and-twenty-four BIT STRING (SIZE (1024)),
choice-Extension ProtocolIE-Single-Container {{ PRSMutingConfiguration-EUTRA-ExtensionIE }}
}

PRSMutingConfiguration-EUTRA-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    ...
}

PRSOccasionGroup-EUTRA ::= ENUMERATED {
    og2,
    og4,
    og8,
    og16,
    og32,
    og64,
    og128,
    ...
}

PRSFrequencyHoppingConfiguration-EUTRA ::= SEQUENCE {
    noOfFreqHoppingBands NumberOfFrequencyHoppingBands,
    bandPositions SEQUENCE(SIZE (1..maxnoFreqHoppingBandsMinusOne)) OF NarrowBandIndex,
    iE-Extensions ProtocolExtensionContainer { { PRSFrequencyHoppingConfiguration-EUTRA-Item-IEs} } OPTIONAL,
    ...
}

PRSFrequencyHoppingConfiguration-EUTRA-Item-IEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRS-Measurements-Info-List ::= SEQUENCE (SIZE(1..maxFreqLayers)) OF PRS-Measurements-Info-List-Item

PRS-Measurements-Info-List-Item ::= SEQUENCE {
    pointA INTEGER (0..3279165),
    measPRSPeriodicity ENUMERATED {ms20, ms40, ms80, ms160, ...},
    measPRsoffset INTEGER (0..159, ...),
    measurementPRSLength ENUMERATED {ms1dot5, ms3, ms3dot5, ms4, ms5dot5, ms6, ms10, ms20},
    iE-Extensions ProtocolExtensionContainer { { PRS-Measurements-Info-List-Item-ExtIEs} } OPTIONAL,
    ...
}

PRS-Measurements-Info-List-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

PRSMuting ::= SEQUENCE {
    pRSMutingOption1          PRSMutingOption1          OPTIONAL,
    pRSMutingOption2          PRSMutingOption2          OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { PRSMuting-ExtIEs } } OPTIONAL,
    ...
}
PRSMuting-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSMutingOption1 ::= SEQUENCE {
    mutingPattern              DL-PRSMutingPattern,
    mutingBitRepetitionFactor  ENUMERATED{n1,n2,n4,n8,...},
    iE-Extensions              ProtocolExtensionContainer { { PRSMutingOption1-ExtIEs } } OPTIONAL,
    ...
}
PRSMutingOption1-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSMutingOption2 ::= SEQUENCE {
    mutingPattern              DL-PRSMutingPattern,
    iE-Extensions              ProtocolExtensionContainer { { PRSMutingOption2-ExtIEs } } OPTIONAL,
    ...
}
PRSMutingOption2-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSResource-List ::= SEQUENCE (SIZE (1..maxnoofPRSresource)) OF PRSResource-Item

PRSResource-Item ::= SEQUENCE {
    pRSResourceID              PRS-Resource-ID,
    sequenceID                  INTEGER(0..4095),
    rEOffset                    INTEGER(0..11,...),
    resourceSlotOffset          INTEGER(0..511),
    resourceSymbolOffset        INTEGER(0..12),
    qCLInfo                      PRSResource-QCLInfo          OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { PRSResource-Item-ExtIEs } } OPTIONAL,
    ...
}
PRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSResource-QCLInfo ::= CHOICE {
    qCLSourceSSB                PRSResource-QCLSourceSSB,
    qCLSourcePRS                PRSResource-QCLSourcePRS,
    choice-Extension            ProtocolIE-Single-Container {{ PRSResource-QCLInfo-ExtIEs }}
}

PRSResource-QCLInfo-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

```

```

}

PRSResource-QCLSourceSSB ::= SEQUENCE {
    pCI-NR          INTEGER(0..1007),
    sSB-Index      SSB-Index OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { { PRSResource-QCLSourceSSB-ExtIEs } } OPTIONAL,
    ...
}

PRSResource-QCLSourceSSB-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSResource-QCLSourcePRS ::= SEQUENCE {
    qCLSourcePRSResourceSetID  PRS-Resource-Set-ID,
    qCLSourcePRSResourceID     PRS-Resource-ID OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { PRSResource-QCLSourcePRS-ExtIEs } } OPTIONAL,
    ...
}

PRSResource-QCLSourcePRS-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoofPRSresourceSet)) OF PRSResourceSet-Item

PRSResourceSet-Item ::= SEQUENCE {
    pRSResourceSetID          PRS-Resource-Set-ID,
    subcarrierSpacing         ENUMERATED{kHz15, kHz30, kHz60, kHz120, ...},
    pRSbandwidth              INTEGER(1..63),
    startPRB                  INTEGER(0..2176),
    pointA                     INTEGER (0..3279165),
    combSize                   ENUMERATED{n2, n4, n6, n12, ...},
    cPType                     ENUMERATED{normal, extended, ...},
    resourceSetPeriodicity     ENUMERATED{n4,n5,n8,n10,n16,n20,n32,n40,n64,n80,n160,n320,n640,n1280,n2560,n5120,n10240,n20480,n40960,
n81920,...},
    resourceSetSlotOffset     INTEGER(0..81919,...),
    resourceRepetitionFactor   ENUMERATED{rf1,rf2,rf4,rf6,rf8,rf16,rf32,...},
    resourceTimeGap            ENUMERATED{tg1,tg2,tg4,tg8,tg16,tg32,...},
    resourceNumberOfSymbols    ENUMERATED{n2,n4,n6,n12,...},
    pRSMuting                  PRSMuting OPTIONAL,
    pRSResourceTransmitPower   INTEGER(-60..50),
    pRSResourceList            PRSResource-List,
    iE-Extensions              ProtocolExtensionContainer { { PRSResourceSet-Item-ExtIEs } } OPTIONAL,
    ...
}

PRSResourceSet-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRS-Resource-ID ::= INTEGER (0..63)

```

```

PRS-Resource-Set-ID ::= INTEGER(0..7)

PRS-ID ::= INTEGER(0..255)

PRSTransmissionOffIndication ::= CHOICE {
  pRSTransmissionOffPerTRP          NULL,
  pRSTransmissionOffPerResourceSet  PRSTransmissionOffPerResourceSet,
  pRSTransmissionOffPerResource     PRSTransmissionOffPerResource,
  choice-Extension                  ProtocolIE-Single-Container {{ PRSTransmissionOffIndication-ExtIEs }}
}

PRSTransmissionOffIndication-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

PRSTransmissionOffPerResource ::= SEQUENCE (SIZE (1..maxnoofPRSresourceSet)) OF PRSTransmissionOffPerResource-Item

PRSTransmissionOffPerResource-Item ::= SEQUENCE {
  pRSResourceSetID                PRS-Resource-Set-ID,
  pRSTransmissionOffIndicationPerResourceList  SEQUENCE (SIZE(1.. maxnoofPRSresource)) OF PRSTransmissionOffIndicationPerResource-Item,
  iE-Extensions                  ProtocolExtensionContainer { { PRSTransmissionOffPerResource-Item-ExtIEs } } OPTIONAL,
  ...
}

PRSTransmissionOffPerResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSTransmissionOffIndicationPerResource-Item ::= SEQUENCE {
  pRSResourceID                  PRS-Resource-ID,
  iE-Extensions                  ProtocolExtensionContainer { { PRSTransmissionOffIndicationPerResource-Item-ExtIEs } } OPTIONAL,
  ...
}

PRSTransmissionOffIndicationPerResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSTransmissionOffInformation ::= SEQUENCE {
  pRSTransmissionOffIndication    PRSTransmissionOffIndication,
  iE-Extensions                  ProtocolExtensionContainer { { PRSTransmissionOffInformation-ExtIEs } } OPTIONAL,
  ...
}

PRSTransmissionOffInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSTransmissionOffPerResourceSet ::= SEQUENCE (SIZE (1..maxnoofPRSresourceSet)) OF PRSTransmissionOffPerResourceSet-Item

PRSTransmissionOffPerResourceSet-Item ::= SEQUENCE {
  pRSResourceSetID                PRS-Resource-Set-ID,
  iE-Extensions                  ProtocolExtensionContainer { { PRSTransmissionOffPerResourceSet-Item-ExtIEs } } OPTIONAL,
  ...
}

```

```

}

PRSTransmissionOffPerResourceSet-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSTRPList ::= SEQUENCE (SIZE(1.. maxnoTRPs)) OF PRSTRPItem

PRSTRPItem ::= SEQUENCE {
  tRP-ID TRP-ID,
  requestedDLPRSTransmissionCharacteristics RequestedDLPRSTransmissionCharacteristics OPTIONAL,
-- The IE shall be present if the PRS Configuration Request Type IE is set to "configure" --
  pRSTransmissionOffInformation PRSTransmissionOffInformation OPTIONAL,
-- The IE shall be present if the PRS Configuration Request Type IE is set to "off" --
  iE-Extensions ProtocolExtensionContainer { { PRSTRPItem-ExtIEs } } OPTIONAL,
  ...
}

PRSTRPItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSTransmissionTRPList ::= SEQUENCE (SIZE(1.. maxnoTRPs)) OF PRSTransmissionTRPItem

PRSTransmissionTRPItem ::= SEQUENCE {
  tRP-ID TRP-ID,
  pRSConfiguration PRSConfiguration,
  iE-Extensions ProtocolExtensionContainer { { PRSTransmissionTRPItem-ExtIEs } } OPTIONAL,
  ...
}

PRSTransmissionTRPItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

-- Q
-- R

ReferenceSignal ::= CHOICE {
  nZP-CSI-RS NZP-CSI-RS-ResourceID,
  sSB SSB,
  sRS SRSResourceID,
  positioningSRS SRSPosResourceID,
  dL-PRS DL-PRS,
  choice-Extension ProtocolIE-Single-Container {{ReferenceSignal-ExtensionIE }}
}

ReferenceSignal-ExtensionIE NRPPA-PROTOCOL-IES ::= {
  ...
}

```

```

ReferencePoint ::= CHOICE {
    relativeCoordinateID      CoordinateID,
    referencePointCoordinate  NG-RANAccessPointPosition,
    referencePointCoordinateHA NGRANHighAccuracyAccessPointPosition,
    choice-Extension          ProtocolIE-Single-Container { { ReferencePoint-ExtIEs } }
}

ReferencePoint-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

CoordinateID ::= INTEGER (0..511, ...)
RelativeGeodeticLocation ::= SEQUENCE {
    milli-Arc-SecondUnits  ENUMERATED {zerodot03, zerodot3, three, ...},    heightUnits          ENUMERATED {mm, cm, m, ...},
    deltaLatitude           INTEGER (-1024.. 1023),
    deltaLongitude          INTEGER (-1024.. 1023),
    deltaHeight             INTEGER (-1024.. 1023),
    locationUncertainty     LocationUncertainty,
    iE-extensions           ProtocolExtensionContainer {{RelativeGeodeticLocation-ExtIEs }} OPTIONAL,
    ...
}

RelativeGeodeticLocation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RelativeCartesianLocation ::= SEQUENCE {
    xYZunit                 ENUMERATED {mm, cm, dm, ...},
    xvalue                  INTEGER (-65536..65535),
    yvalue                  INTEGER (-65536..65535),
    zvalue                  INTEGER (-32768..32767),
    locationUncertainty     LocationUncertainty,
    iE-Extensions          ProtocolExtensionContainer { { RelativeCartesianLocation-ExtIEs } } OPTIONAL,
    ...
}

RelativeCartesianLocation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RelativePathDelay ::= CHOICE {
    k0                      INTEGER(0..16351),
    k1                      INTEGER(0..8176),
    k2                      INTEGER(0..4088),
    k3                      INTEGER(0..2044),
    k4                      INTEGER(0..1022),
    k5                      INTEGER(0..511),
    choice-Extension        ProtocolIE-Single-Container { { RelativePathDelay-ExtIEs } }
}

RelativePathDelay-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

```

```

}

ReportCharacteristics ::= ENUMERATED {
    onDemand,
    periodic,
    ...
}

RequestedDLPRSTransmissionCharacteristics ::= SEQUENCE {
    requestedDLPRSResourceSet-List      RequestedDLPRSResourceSet-List,
    numberOfFrequencyLayers             INTEGER(1..4)                OPTIONAL,
    startTimeAndDuration                StartTimeAndDuration        OPTIONAL,
    iE-Extensions      ProtocolExtensionContainer { { RequestedDLPRSTransmissionCharacteristics-ExtIEs } } OPTIONAL,
    ...
}

RequestedDLPRSTransmissionCharacteristics-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RequestedDLPRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoofPRSresourceSet)) OF RequestedDLPRSResourceSet-Item

RequestedDLPRSResourceSet-Item ::= SEQUENCE {
    pRSbandwidth                INTEGER(1..63)    OPTIONAL,
    combSize                    ENUMERATED{n2, n4, n6, n12, ...}    OPTIONAL,
    resourceSetPeriodicity      ENUMERATED{n4,n5,n8,n10,n16,n20,n32,n40,n64,n80,n160,n320,n640,n1280,n2560,n5120,n10240,n20480,n40960,
n81920,...}    OPTIONAL,
    resourceRepetitionFactor    ENUMERATED{rf1,rf2,rf4,rf6,rf8,rf16,rf32,...}    OPTIONAL,
    resourceNumberOfSymbols     ENUMERATED{n2,n4,n6,n12,...}    OPTIONAL,
    requestedDLPRSResource-List RequestedDLPRSResource-List    OPTIONAL,
    resourceSetStartTimeAndDuration StartTimeAndDuration        OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { RequestedDLPRSResourceSet-Item-ExtIEs } } OPTIONAL,
    ...
}

RequestedDLPRSResourceSet-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RequestedDLPRSResource-List ::= SEQUENCE (SIZE (1..maxnoofPRSresource)) OF RequestedDLPRSResource-Item

RequestedDLPRSResource-Item ::= SEQUENCE {
    qCLInfo                    PRSResource-QCLInfo    OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { RequestedDLPRSResource-Item-ExtIEs } } OPTIONAL,
    ...
}

RequestedDLPRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RequestedSRSTransmissionCharacteristics ::= SEQUENCE {
    numberOfTransmissions      INTEGER (0..500,...)                OPTIONAL,

```

```

-- The IE shall be present if the Resource Type IE is set to "periodic" --
resourceType      ENUMERATED {periodic, semi-persistent, aperiodic, ...},
bandwidth        BandwidthSRS,
listOfSRSResourceSet SEQUENCE (SIZE (1.. maxnoSRS-ResourceSets)) OF SRSResourceSet-Item OPTIONAL,
sSBInformation    SSBInfo      OPTIONAL,
iE-Extensions    ProtocolExtensionContainer { { RequestedSRSTransmissionCharacteristics-ExtIEs } } OPTIONAL,
...
}

RequestedSRSTransmissionCharacteristics-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  { ID id-SrsFrequency          CRITICALITY ignore EXTENSION SrsFrequency          PRESENCE optional },
  ...
}

SRSResourceSet-Item ::= SEQUENCE {
  numberOfSRSResourcePerSet      INTEGER (1..16, ...)          OPTIONAL,
  periodicityList                PeriodicityList              OPTIONAL,
  spatialRelationInformation     SpatialRelationInfo          OPTIONAL,
  pathlossReferenceInformation   PathlossReferenceInformation  OPTIONAL,
  iE-Extensions                  ProtocolExtensionContainer { { SRSResourceSet-Item-ExtIEs } } OPTIONAL,
  ...
}

SRSResourceSet-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  { ID id-SRSSpatialRelationPerSRSResource CRITICALITY ignore EXTENSION SpatialRelationPerSRSResource PRESENCE optional},
  ...
}

RequestType ::= ENUMERATED {activate, deactivate, ...}

ResourceSetType ::= CHOICE {
  periodic      ResourceSetTypePeriodic,
  semi-persistent ResourceSetTypeSemi-persistent,
  aperiodic    ResourceSetTypeAperiodic,
  choice-extension ProtocolIE-Single-Container {{ ResourceSetType-ExtIEs }}
}

ResourceSetType-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

ResourceSetTypePeriodic ::= SEQUENCE {
  periodicSet      ENUMERATED{true, ...},
  iE-Extensions    ProtocolExtensionContainer { { ResourceSetTypePeriodic-ExtIEs } } OPTIONAL,
  ...
}

ResourceSetTypePeriodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

ResourceSetTypeSemi-persistent ::= SEQUENCE {
  semi-persistentSet ENUMERATED{true, ...},

```

```

    iE-Extensions      ProtocolExtensionContainer { { ResourceSetTypeSemi-persistent-ExtIEs } } OPTIONAL,
    ...
}

ResourceSetTypeSemi-persistent-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResourceSetTypeAperiodic ::= SEQUENCE {
    sRSResourceTrigger      INTEGER(1..3),
    slotoffset              INTEGER(0..32),
    iE-Extensions          ProtocolExtensionContainer { { ResourceSetTypeAperiodic-ExtIEs } } OPTIONAL,
    ...
}

ResourceSetTypeAperiodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResourceType ::= CHOICE {
    periodic                ResourceTypePeriodic,
    semi-persistent        ResourceTypeSemi-persistent,
    aperiodic              ResourceTypeAperiodic,
    choice-extension       ProtocolIE-Single-Container {{ ResourceType-ExtIEs }}
}

ResourceType-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

ResourceTypePeriodic ::= SEQUENCE {
    periodicity             ENUMERATED{slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160,
slot320, slot640, slot1280, slot2560, ...},
    offset                 INTEGER(0..2559, ...),
    iE-Extensions          ProtocolExtensionContainer { { ResourceTypePeriodic-ExtIEs } } OPTIONAL,
    ...
}

ResourceTypePeriodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResourceTypeSemi-persistent ::= SEQUENCE {
    periodicity             ENUMERATED{slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320,
slot640, slot1280, slot2560, ...},
    offset                 INTEGER(0..2559, ...),
    iE-Extensions          ProtocolExtensionContainer { { ResourceTypeSemi-persistent-ExtIEs } } OPTIONAL,
    ...
}

ResourceTypeSemi-persistent-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```



```

ResourceTypeAperiodic ::= SEQUENCE {
aperiodicResourceType      ENUMERATED{true, ...},
  iE-Extensions      ProtocolExtensionContainer { { ResourceTypeAperiodic-ExtIEs } } OPTIONAL,
  ...
}

ResourceTypeAperiodic-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

ResourceTypePos ::= CHOICE {
  periodic      ResourceTypePeriodicPos,
  semi-persistent      ResourceTypeSemi-persistentPos,
  aperiodic      ResourceTypeAperiodicPos,
  choice-extension      ProtocolIE-Single-Container {{ ResourceTypePos-ExtIEs }}
}

ResourceTypePos-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

ResourceTypePeriodicPos ::= SEQUENCE {
periodicity      ENUMERATED{slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640,
slot1280, slot2560, slot5120, slot10240, slot40960, slot81920, ...},
offset      INTEGER(0..81919, ...),
  iE-Extensions      ProtocolExtensionContainer { { ResourceTypePeriodicPos-ExtIEs } } OPTIONAL,
  ...
}

ResourceTypePeriodicPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

ResourceTypeSemi-persistentPos ::= SEQUENCE {
periodicity      ENUMERATED{slot1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640,
slot1280, slot2560, slot5120, slot10240, slot40960, slot81920, ...},
offset      INTEGER(0..81919, ...),
  iE-Extensions      ProtocolExtensionContainer { { ResourceTypeSemi-persistentPos-ExtIEs } } OPTIONAL,
  ...
}

ResourceTypeSemi-persistentPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

ResourceTypeAperiodicPos ::= SEQUENCE {
slotOffset      INTEGER (0..32),
  iE-Extensions      ProtocolExtensionContainer { { ResourceTypeAperiodicPos-ExtIEs } } OPTIONAL,
  ...
}

ResourceTypeAperiodicPos-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
ResponseTime ::= SEQUENCE {
    time          INTEGER (1..128,...),
    timeUnit     ENUMERATED {second, ten-seconds, ten-milliseconds,...},
    iE-Extensions ProtocolExtensionContainer { { ResponseTime-ExtIEs} } OPTIONAL,
    ...
}

ResponseTime-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultCSI-RSRP ::= SEQUENCE (SIZE (1.. maxCellReportNR)) OF ResultCSI-RSRP-Item

ResultCSI-RSRP-Item ::= SEQUENCE {
    nR-PCI          NR-PCI,
    nR-ARFCN       NR-ARFCN,
    CGI-NR         CGI-NR                                OPTIONAL,
    valueCSI-RSRP-Cell ValueRSRP-NR                    OPTIONAL,
    cSI-RSRP-PerCSI-RS ResultCSI-RSRP-PerCSI-RS        OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { ResultCSI-RSRP-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultCSI-RSRP-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultCSI-RSRP-PerCSI-RS ::= SEQUENCE (SIZE (1.. maxIndexesReport)) OF ResultCSI-RSRP-PerCSI-RS-Item

ResultCSI-RSRP-PerCSI-RS-Item ::= SEQUENCE {
    cSI-RS-Index   INTEGER (0..95),
    valueCSI-RSRP ValueRSRP-NR,
    iE-Extensions ProtocolExtensionContainer { { ResultCSI-RSRP-PerCSI-RS-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultCSI-RSRP-PerCSI-RS-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultCSI-RSRQ ::= SEQUENCE (SIZE (1.. maxCellReportNR)) OF ResultCSI-RSRQ-Item

ResultCSI-RSRQ-Item ::= SEQUENCE {
    nR-PCI          NR-PCI,
    nR-ARFCN       NR-ARFCN,
    CGI-NR         CGI-NR                                OPTIONAL,
    valueCSI-RSRQ-Cell ValueRSRQ-NR                    OPTIONAL,
    cSI-RSRQ-PerCSI-RS ResultCSI-RSRQ-PerCSI-RS        OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { ResultCSI-RSRQ-Item-ExtIEs} } OPTIONAL,
    ...
}

```

```

}
ResultCSI-RSRQ-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}
ResultCSI-RSRQ-PerCSI-RS ::= SEQUENCE (SIZE (1.. maxIndexesReport)) OF ResultCSI-RSRQ-PerCSI-RS-Item
ResultCSI-RSRQ-PerCSI-RS-Item ::= SEQUENCE {
  cSI-RS-Index          INTEGER (0..95),
  valueCSI-RSRQ        ValueRSRQ-NR,
  iE-Extensions        ProtocolExtensionContainer { { ResultCSI-RSRQ-PerCSI-RS-Item-ExtIEs } } OPTIONAL,
  ...
}
ResultCSI-RSRQ-PerCSI-RS-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}
ResultEUTRA ::= SEQUENCE (SIZE (1.. maxEUTRAMeas)) OF ResultEUTRA-Item
ResultEUTRA-Item ::= SEQUENCE {
  pCI-EUTRA            PCI-EUTRA,
  eARFCN               EARFCN,
  valueRSRP-EUTRA      ValueRSRP-EUTRA OPTIONAL,
  valueRSRQ-EUTRA      ValueRSRQ-EUTRA OPTIONAL,
  CGI-EUTRA            CGI-EUTRA OPTIONAL,
  iE-Extensions        ProtocolExtensionContainer { { ResultEUTRA-Item-ExtIEs } } OPTIONAL,
  ...
}
ResultEUTRA-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}
ResultRSRP-EUTRA ::= SEQUENCE (SIZE (1.. maxCellReport)) OF ResultRSRP-EUTRA-Item
ResultRSRP-EUTRA-Item ::= SEQUENCE {
  pCI-EUTRA            PCI-EUTRA,
  eARFCN               EARFCN,
  CGI-EUTRA            CGI-EUTRA OPTIONAL,
  valueRSRP-EUTRA      ValueRSRP-EUTRA,
  iE-Extensions        ProtocolExtensionContainer { { ResultRSRP-EUTRA-Item-ExtIEs } } OPTIONAL,
  ...
}
ResultRSRP-EUTRA-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}
ResultRSRQ-EUTRA ::= SEQUENCE (SIZE (1.. maxCellReport)) OF ResultRSRQ-EUTRA-Item
ResultRSRQ-EUTRA-Item ::= SEQUENCE {

```

```

    pCI-EUTRA          PCI-EUTRA,
    eARFCN             EARFCN,
    CGI-UTRA           CGI-EUTRA OPTIONAL,
    valueRSRQ-EUTRA   ValueRSRQ-EUTRA,
    iE-Extensions     ProtocolExtensionContainer { { ResultRSRQ-EUTRA-Item-ExtIEs } } OPTIONAL,
    ...
}

ResultRSRQ-EUTRA-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultSS-RSRP ::= SEQUENCE (SIZE (1.. maxCellReportNR)) OF ResultSS-RSRP-Item

ResultSS-RSRP-Item ::= SEQUENCE {
    nR-PCI             NR-PCI,
    nR-ARFCN          NR-ARFCN,
    CGI-NR            CGI-NR                               OPTIONAL,
    valueSS-RSRP-Cell ValueRSRP-NR                       OPTIONAL,
    sS-RSRP-PerSSB    ResultSS-RSRP-PerSSB               OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { { ResultSS-RSRP-Item-ExtIEs } } OPTIONAL,
    ...
}

ResultSS-RSRP-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultSS-RSRP-PerSSB ::= SEQUENCE (SIZE (1.. maxIndexesReport)) OF ResultSS-RSRP-PerSSB-Item

ResultSS-RSRP-PerSSB-Item ::= SEQUENCE {
    sSB-Index         SSB-Index,
    valueSS-RSRP      ValueRSRP-NR,
    iE-Extensions     ProtocolExtensionContainer { { ResultSS-RSRP-PerSSB-Item-ExtIEs } } OPTIONAL,
    ...
}

ResultSS-RSRP-PerSSB-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultSS-RSRQ ::= SEQUENCE (SIZE (1.. maxCellReportNR)) OF ResultSS-RSRQ-Item

ResultSS-RSRQ-Item ::= SEQUENCE {
    nR-PCI             NR-PCI,
    nR-ARFCN          NR-ARFCN,
    CGI-NR            CGI-NR                               OPTIONAL,
    valueSS-RSRQ-Cell ValueRSRQ-NR                       OPTIONAL,
    sS-RSRQ-PerSSB    ResultSS-RSRQ-PerSSB               OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { { ResultSS-RSRQ-Item-ExtIEs } } OPTIONAL,
    ...
}

```

```

ResultSS-RSRQ-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultSS-RSRQ-PerSSB ::= SEQUENCE (SIZE (1.. maxIndexesReport)) OF ResultSS-RSRQ-PerSSB-Item

ResultSS-RSRQ-PerSSB-Item ::= SEQUENCE {
    sSB-Index          SSB-Index,
    valueSS-RSRQ      ValueRSRQ-NR,
    iE-Extensions     ProtocolExtensionContainer { { ResultSS-RSRQ-PerSSB-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultSS-RSRQ-PerSSB-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultGERAN ::= SEQUENCE (SIZE (1.. maxGERANMeas)) OF ResultGERAN-Item

ResultGERAN-Item ::= SEQUENCE {
    bCCH              BCCH,
    physCellIDGERAN  PhysCellIDGERAN,
    rSSI              RSSI,
    iE-Extensions     ProtocolExtensionContainer { { ResultGERAN-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultGERAN-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultNR ::= SEQUENCE (SIZE (1.. maxNRMeas)) OF ResultNR-Item

ResultNR-Item ::= SEQUENCE {
    nR-PCI            NR-PCI,
    nR-ARFCN          NR-ARFCN,
    valueSS-RSRP-Cell ValueRSRP-NR                    OPTIONAL,
    valueSS-RSRQ-Cell ValueRSRQ-NR                    OPTIONAL,
    sS-RSRP-PerSSB    ResultSS-RSRP-PerSSB              OPTIONAL,
    sS-RSRQ-PerSSB    ResultSS-RSRQ-PerSSB              OPTIONAL,
    CGI-NR            CGI-NR                            OPTIONAL,
    iE-Extensions     ProtocolExtensionContainer { { ResultNR-Item-ExtIEs} } OPTIONAL,
    ...
}

ResultNR-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

ResultUTRAN ::= SEQUENCE (SIZE (1.. maxUTRANMeas)) OF ResultUTRAN-Item

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```

ResultUTRAN-Item ::= SEQUENCE {
    uARFCN                UARFCN,
    physCellIDUTRAN      CHOICE {
        physCellIDUTRA-FDD    PhysCellIDUTRA-FDD,
        physCellIDUTRA-TDD    PhysCellIDUTRA-TDD
    },
    uTRA-RSCP            UTRA-RSCP OPTIONAL,
    uTRA-EcN0           UTRA-EcN0 OPTIONAL,
    iE-Extensions       ProtocolExtensionContainer { { ResultUTRAN-Item-ExtIEs } } OPTIONAL,
    ...
}

ResultUTRAN-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RSSI ::= INTEGER (0..63, ...)

-- S

SCS-SpecificCarrier ::= SEQUENCE {
    offsetToCarrier        INTEGER (0..2199,...),
    subcarrierSpacing     ENUMERATED {kHz15, kHz30, kHz60, kHz120,...},
    carrierBandwidth      INTEGER (1..275,...),
    iE-Extensions         ProtocolExtensionContainer { { SCS-SpecificCarrier-ExtIEs } } OPTIONAL,
    ...
}

SCS-SpecificCarrier-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

Search-window-information ::= SEQUENCE {
    expectedPropagationDelay    INTEGER (-3841..3841,...),
    delayUncertainty           INTEGER (1..246,...),
    iE-Extensions              ProtocolExtensionContainer { { Search-window-information-ExtIEs } } OPTIONAL,
    ...
}

Search-window-information-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RelativeTime1900 ::= BIT STRING (SIZE (64))

SFNInitialisationTime-EUTRA ::= BIT STRING (SIZE (64))

SlotNumber ::= INTEGER (0..79)

SpatialDirectionInformation ::= SEQUENCE {
    nR-PRS-Beam-Information    NR-PRS-Beam-Information,

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```

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

SpatialDirectionInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SpatialRelationInfo ::= SEQUENCE {
    spatialRelationforResourceID          SpatialRelationforResourceID,
    iE-Extensions          ProtocolExtensionContainer { {SpatialRelationInfo-ExtIEs} } OPTIONAL,
    ...
}

SpatialRelationInfo-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SpatialRelationforResourceID ::= SEQUENCE (SIZE(1..maxnoSpatialRelations)) OF SpatialRelationforResourceIDItem

SpatialRelationforResourceIDItem ::= SEQUENCE {
    referenceSignal          ReferenceSignal,
    iE-Extensions          ProtocolExtensionContainer { {SpatialRelationforResourceIDItem-ExtIEs} } OPTIONAL,
    ...
}

SpatialRelationforResourceIDItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SpatialRelationPerSRSResource ::= SEQUENCE {
    spatialRelationPerSRSResource-List SpatialRelationPerSRSResource-List,
    iE-Extensions          ProtocolExtensionContainer { { SpatialRelationPerSRSResource-ExtIEs} } OPTIONAL,
    ...
}

SpatialRelationPerSRSResource-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SpatialRelationPerSRSResource-List ::= SEQUENCE (SIZE (1.. maxnoSRS-ResourcePerSet)) OF SpatialRelationPerSRSResourceItem

SpatialRelationPerSRSResourceItem ::= SEQUENCE {
    referenceSignal          ReferenceSignal,
    iE-Extensions          ProtocolExtensionContainer { {SpatialRelationPerSRSResourceItem-ExtIEs} } OPTIONAL,
    ...
}

SpatialRelationPerSRSResourceItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

SpatialRelationPos ::= CHOICE {
    sSBPos                SSB,
    pRSInformationPos     PRSInformationPos,
    choice-extension      ProtocolIE-Single-Container {{ SpatialInformationPos-ExtIEs }}
}

SpatialInformationPos-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

SRSSConfig ::= SEQUENCE {
    sRSResource-List      SRSResource-List OPTIONAL,
    posSRSResource-List  PosSRSResource-List OPTIONAL,
    sRSResourceSet-List  SRSResourceSet-List OPTIONAL,
    posSRSResourceSet-List PosSRSResourceSet-List OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { SRSSConfig-ExtIEs } } OPTIONAL,
    ...
}

SRSSConfig-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SRSCarrier-List ::= SEQUENCE (SIZE(1.. maxnoSRS-Carriers)) OF SRSCarrier-List-Item

SRSCarrier-List-Item ::= SEQUENCE {
    pointA                INTEGER (0..3279165),
    uplinkChannelBW-PerSCS-List UplinkChannelBW-PerSCS-List,
    activeULBWP           ActiveULBWP,
    pCI-NR                INTEGER (0..1007) OPTIONAL,
    iE-Extensions        ProtocolExtensionContainer { { SRSCarrier-List-Item-ExtIEs } } OPTIONAL,
    ...
}

SRSCarrier-List-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SRSSConfiguration ::= SEQUENCE {
    sRSCarrier-List      SRSCarrier-List,
    iE-Extensions        ProtocolExtensionContainer { { SRSSConfiguration-ExtIEs } } OPTIONAL,
    ...
}

SRSSConfiguration-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SrsFrequency ::= INTEGER (0..3279165)

```



```

SRSPosResourceID ::= INTEGER (0..63)

SRSResource ::= SEQUENCE {
    sRSResourceID                SRSResourceID,
    nrofSRS-Ports                ENUMERATED {port1, ports2, ports4},
    transmissionComb             TransmissionComb,
    startPosition                INTEGER (0..13),
    nrofSymbols                  ENUMERATED {n1, n2, n4},
    repetitionFactor             ENUMERATED {n1, n2, n4},
    freqDomainPosition           INTEGER (0..67),
    freqDomainShift              INTEGER (0..268),
    c-SRS                        INTEGER (0..63),
    b-SRS                        INTEGER (0..3),
    b-hop                        INTEGER (0..3),
    groupOrSequenceHopping       ENUMERATED { neither, groupHopping, sequenceHopping },
    resourceType                 ResourceType,
    sequenceID                   INTEGER (0..1023),
    iE-Extensions                ProtocolExtensionContainer { { SRSResource-ExtIEs } } OPTIONAL,
    ...
}

SRSResource-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SRSResourceID ::= INTEGER (0..63)

SRSResource-List ::= SEQUENCE (SIZE (1..maxnoSRS-Resources)) OF SRSResource

SRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoSRS-ResourceSets)) OF SRSResourceSet

SRSResourceID-List ::= SEQUENCE (SIZE (1..maxnoSRS-ResourcePerSet)) OF SRSResourceID

SRSResourceSet ::= SEQUENCE {
    sRSResourceSetID             INTEGER(0..15),
    sRSResourceID-List           SRSResourceID-List,
    resourceSetType              ResourceSetType,
    iE-Extensions                ProtocolExtensionContainer { { SRSResourceSet-ExtIEs } } OPTIONAL,
    ...
}

SRSResourceSet-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SRSResourceSetID ::= INTEGER (0..15, ...)

SRSResourceTrigger ::= SEQUENCE {
    aperiodicSRSResourceTriggerList AperiodicSRSResourceTriggerList,
    iE-Extensions                    ProtocolExtensionContainer { {SRSResourceTrigger-ExtIEs} } OPTIONAL,
    ...
}

SRSResourceTrigger-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {

```

```

}
...
}
SRSResourcetype ::= SEQUENCE {
    sRSResourceTypeChoice          SRSResourceTypeChoice,
    iE-Extensions          ProtocolExtensionContainer { { SRSResourcetype-ExtIEs} }    OPTIONAL,
    ...
}

SRSResourcetype-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SRSResourceTypeChoice ::= CHOICE {
    sRSResourceInfo          SRSInfo,
    posSRSResourceInfo          PosSRSInfo,
    ...
}

SRSInfo ::= SEQUENCE {
    sRSResource          SRSResourceID,
    ...
}

PosSRSInfo ::= SEQUENCE {
    posSRSResourceID          SRSPosResourceID,
    ...
}

SSBInfo ::= SEQUENCE {
    listOfSSBInfo          SEQUENCE (SIZE (1..maxNoSSBs)) OF SSBInfoItem,
    iE-Extensions          ProtocolExtensionContainer { {SSBInfo-ExtIEs} } OPTIONAL,
    ...
}

SSBInfo-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SSBInfoItem ::= SEQUENCE {
    sSB-Configuration          TF-Configuration,
    pCI-NR          INTEGER (0..1007),
    iE-Extensions          ProtocolExtensionContainer { { SSBInfoItem-ExtIEs} }    OPTIONAL,
    ...
}

SSBInfoItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

SSB ::= SEQUENCE {
    pCI-NR          INTEGER (0..1007),
    ssb-index      SSB-Index OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { {SSB-ExtIEs} } OPTIONAL,
    ...
}

SSB-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SSBBurstPosition ::= CHOICE {
    shortBitmap    BIT STRING (SIZE(4)),
    mediumBitmap   BIT STRING (SIZE(8)),
    longBitmap     BIT STRING (SIZE(64)),
    choice-extension ProtocolIE-Single-Container { { SSBBurstPosition-ExtIEs } }
}

SSBBurstPosition-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

SSB-Index ::= INTEGER(0..63)

SSID ::= OCTET STRING (SIZE(1..32))

StartTimeAndDuration ::= SEQUENCE {
    startTime      RelativeTime1900          OPTIONAL,
    duration       INTEGER (0..90060, ...)   OPTIONAL,
    iE-Extensions  ProtocolExtensionContainer { { StartTimeAndDuration-ExtIEs } } OPTIONAL,
    ...
}

StartTimeAndDuration-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

SystemFrameNumber ::= INTEGER (0..1023)

SystemInformation ::= SEQUENCE (SIZE (1.. maxNrOfPosSImessage)) OF SEQUENCE {
    broadcastPeriodicity BroadcastPeriodicity,
    posSIBs              PosSIBs,
    iE-Extensions       ProtocolExtensionContainer { { SystemInformation-ExtIEs } } OPTIONAL,
    ...
}

SystemInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

```

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-- T
TAC ::= OCTET STRING (SIZE(3))

TDD-Config-EUTRA-Item ::= SEQUENCE {
    subframeAssignment      ENUMERATED { sa0, sa1, sa2, sa3, sa4, sa5, sa6, ... },
    iE-Extensions           ProtocolExtensionContainer { { TDD-Config-EUTRA-Item-Item-ExtIEs } } OPTIONAL,
    ...
}

TDD-Config-EUTRA-Item-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPTEGIDInformation ::= CHOICE {
    rxTx-TEG                RxTxTEG,
    rx-TEG                  RxTEG,
    choice-extension        ProtocolIE-Single-Container { { TRPTEGIDInformation-ExtIEs } }
}

TRPTEGIDInformation-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

RxTxTEG ::= SEQUENCE {
    trp-RxTx-TEGID          INTEGER (0..255),
    trp-Tx-TEGID            INTEGER (0..7) OPTIONAL,
    iE-extensions           ProtocolExtensionContainer { { RxTxTEG-ExtIEs } } OPTIONAL,
    ...
}

RxTxTEG-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

RxTEG ::= SEQUENCE {
    trp-Rx-TEGID            INTEGER (0..31),
    trp-Tx-TEGID            INTEGER (0..7),
    iE-extensions           ProtocolExtensionContainer { { RxTEG-ExtIEs } } OPTIONAL,
    ...
}

RxTEG-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TF-Configuration ::= SEQUENCE {
    sSB-frequency           INTEGER (0..3279165),
    sSB-subcarrier-spacing  ENUMERATED {kHz15, kHz30, kHz120, kHz240, ..., kHz60},
    sSB-Transmit-power      INTEGER (-60..50),
    sSB-periodicity         ENUMERATED {ms5, ms10, ms20, ms40, ms80, ms160, ...},
    sSB-half-frame-offset  INTEGER(0..1),
    sSB-SFN-offset         INTEGER(0..15),
    sSB-BurstPosition       SSBBurstPosition OPTIONAL,
}

```

```

    sFN-initialisation-time      RelativeTime1900      OPTIONAL,
    iE-Extensions                ProtocolExtensionContainer { { TF-Configuration-ExtIEs } }  OPTIONAL,
    ...
}

TF-Configuration-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TimeStamp ::= SEQUENCE {
    systemFrameNumber            SystemFrameNumber,
    slotIndex                    TimeStampSlotIndex,
    measurementTime              RelativeTime1900      OPTIONAL,
    iE-Extension                 ProtocolExtensionContainer { { TimeStamp-ExtIEs } }  OPTIONAL,
    ...
}

TimeStamp-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TimeStampSlotIndex ::= CHOICE {
    sCS-15                       INTEGER(0..9),
    sCS-30                       INTEGER(0..19),
    sCS-60                       INTEGER(0..39),
    sCS-120                      INTEGER(0..79),
    choice-extension              ProtocolIE-Single-Container { { TimeStampSlotIndex-ExtIEs } }
}

TimeStampSlotIndex-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

TP-ID-EUTRA ::= INTEGER (0..4095, ...)

TP-Type-EUTRA ::= ENUMERATED { prs-only-tp, ... }

TransmissionComb ::= CHOICE {
    n2      SEQUENCE {
        combOffset-n2          INTEGER (0..1),
        cyclicShift-n2        INTEGER (0..7)
    },
    n4      SEQUENCE {
        combOffset-n4          INTEGER (0..3),
        cyclicShift-n4        INTEGER (0..11)
    },
    choice-extension           ProtocolIE-Single-Container { { TransmissionComb-ExtIEs } }
}

TransmissionComb-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

```

```

TransmissionCombPos ::= CHOICE {
  n2    SEQUENCE {
        combOffset-n2      INTEGER (0..1),
        cyclicShift-n2     INTEGER (0..7)
      },
  n4    SEQUENCE {
        combOffset-n4      INTEGER (0..3),
        cyclicShift-n4     INTEGER (0..11)
      },
  n8    SEQUENCE {
        combOffset-n8      INTEGER (0..7),
        cyclicShift-n8     INTEGER (0..5)
      },
  choice-extension          ProtocolIE-Single-Container { { TransmissionCombPos-ExtIEs } }
}
TransmissionCombPos-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

TRPBeamAntennaInformation ::= SEQUENCE {
  choice-TRP-Beam-Antenna-Info-Item      Choice-TRP-Beam-Antenna-Info-Item,
  IE-Extensions                          ProtocolExtensionContainer {{ TRPBeamAntennaInformation-ExtIEs}}
  ...
}
TRPBeamAntennaInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

Choice-TRP-Beam-Antenna-Info-Item ::= CHOICE {
  reference          TRP-ID,
  explicit           TRP-BeamAntennaExplicitInformation,
  noChange          NULL,
  choice-extension  ProtocolIE-Single-Container { { Choice-TRP-Beam-Info-Item-ExtIEs } }
}

Choice-TRP-Beam-Info-Item-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

TRP-BeamAntennaExplicitInformation ::= SEQUENCE {
  trp-BeamAntennaAngles          TRP-BeamAntennaAngles,
  lcs-to-gcs-translation          LCS-to-GCS-Translation
  IE-Extensions                  ProtocolExtensionContainer {{ TRP-BeamAntennaExplicitInformation-ExtIEs}}
  ...
}
TRP-BeamAntennaExplicitInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

TRP-BeamAntennaAngles ::= SEQUENCE (SIZE (1.. maxnoAzimuthAngles)) OF TRP-BeamAntennaAnglesList-Item

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```

TRP-BeamAntennaAnglesList-Item ::= SEQUENCE {
    trp-azimuth-angle          INTEGER (0..359),
    trp-azimuth-angle-fine     INTEGER (0..9) OPTIONAL,
    trp-elevation-angle-list   SEQUENCE (SIZE (1.. maxnoElevationAngles)) OF TRP-ElevationAngleList-Item,
    iE-Extensions              ProtocolExtensionContainer {{ TRP-BeamAntennaAnglesList-Item-ExtIEs}} OPTIONAL,
    ...
}

TRP-BeamAntennaAnglesList-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRP-ElevationAngleList-Item ::= SEQUENCE {
    trp-elevation-angle        INTEGER (0..180),
    trp-elevation-angle-fine   INTEGER (0..9) OPTIONAL,
    trp-beam-power-list        SEQUENCE (SIZE (2..maxNumResourcesPerAngle)) OF TRP-Beam-Power-Item,
    iE-Extensions              ProtocolExtensionContainer {{ TRP-ElevationAngleList-Item-ExtIEs}} OPTIONAL,
    ...
}

TRP-ElevationAngleList-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRP-Beam-Power-Item ::= SEQUENCE {
    pRSResourceSetID           PRS-Resource-Set-ID          OPTIONAL,
    pRSResourceID              PRS-Resource-ID,
    relativePower               INTEGER (0..30), --negative value
    relativePowerFine           INTEGER (0..9)              OPTIONAL, --negative value
    iE-Extensions              ProtocolExtensionContainer {{ TRP-Beam-Power-Item-ExtIEs}} OPTIONAL,
    ...
}

TRP-Beam-Power-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPMeasurementQuantities ::= SEQUENCE (SIZE (1..maxnoPosMeas)) OF TRPMeasurementQuantitiesList-Item

TRPMeasurementQuantitiesList-Item ::= SEQUENCE {
    trPMeasurementQuantities-Item TRPMeasurementQuantities-Item,
    timingReportingGranularityFactor INTEGER (0..5) OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer {{ TRPMeasurementQuantitiesList-Item-ExtIEs}} OPTIONAL,
    ...
}

TRPMeasurementQuantitiesList-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPMeasurementQuantities-Item ::= ENUMERATED {
    gNB-RxTxTimeDiff,
    uL-SRS-RSRP,

```

```

    uL-AoA,
    uL-RTOA,
    ...,
    multiple-UL-AoA,
    uL-SRS-RSRPP
}

TrpMeasurementResult ::= SEQUENCE (SIZE (1.. maxnoPosMeas)) OF TrpMeasurementResultItem
TrpMeasurementResultItem ::= SEQUENCE {
    measuredResultsValue      TrpMeasuredResultsValue,
    timeStamp                  TimeStamp,
    measurementQuality         TrpMeasurementQuality          OPTIONAL,
    measurementBeamInfo       MeasurementBeamInfo            OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer {{TrpMeasurementResultItem-ExtIEs}}  OPTIONAL,
    ...
}

TrpMeasurementResultItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    { ID id-SRSResourceType CRITICALITY ignore EXTENSION SRSResourceType PRESENCE optional}|
    { ID id-ARP-ID          CRITICALITY ignore EXTENSION ARP-ID          PRESENCE optional}|
    { ID id-LoS-NLoSInformation CRITICALITY ignore EXTENSION LoS-NLoSInformation PRESENCE optional },
    ...
}

TrpMeasuredResultsValue ::= CHOICE {
    uL-AngleOfArrival      UL-AoA,
    uL-SRS-RSRP            UL-SRS-RSRP,
    uL-RTOA                UL-RTOAMeasurement,
    gNB-RxTxTimeDiff      GNB-RxTxTimeDiff,
    choice-extension       ProtocolIE-Single-Container { { TrpMeasuredResultsValue-ExtIEs } }
}

TrpMeasuredResultsValue-ExtIEs NRPPA-PROTOCOL-IES ::= {
    { ID id-ZoA          CRITICALITY reject TYPE ZoA PRESENCE mandatory}|
    { ID id-MultipleULAoA CRITICALITY reject TYPE MultipleULAoA PRESENCE mandatory}|
    { ID id-UL-SRS-RSRPP CRITICALITY reject TYPE UL-SRS-RSRPP PRESENCE mandatory},
    ...
}

TrpMeasurementQuality ::= CHOICE {
    timingMeasQuality      TrpMeasurementTimingQuality,
    angleMeasQuality       TrpMeasurementAngleQuality,
    choice-Extension       ProtocolIE-Single-Container {{ TrpMeasurementQuality-ExtIEs}}
}

TrpMeasurementQuality-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

TrpMeasurementTimingQuality ::= SEQUENCE {
    measurementQuality      INTEGER (0..31),
    resolution              ENUMERATED {m0dot1, m1, m10, m30, ...},
    iE-extensions           ProtocolExtensionContainer { { TrpMeasurementTimingQuality-ExtIEs } } OPTIONAL,
}

```



```

}
...
}
TrpMeasurementTimingQuality-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}
TrpMeasurementAngleQuality ::= SEQUENCE {
azimuthQuality      INTEGER (0..255),
zenithQuality       INTEGER (0..255)   OPTIONAL,
resolution          ENUMERATED {deg0dot1, ...},
iE-extensions       ProtocolExtensionContainer { { TrpMeasurementAngleQuality-ExtIEs } } OPTIONAL,
...
}
TrpMeasurementAngleQuality-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}
TRP-MeasurementRequestList ::= SEQUENCE (SIZE (1..maxNoOfMeasTRPs)) OF TRP-MeasurementRequestItem
TRP-MeasurementRequestItem ::= SEQUENCE {
trp-ID              TRP-ID,
search-window-information Search-window-information   OPTIONAL,
iE-extensions       ProtocolExtensionContainer { { TRP-MeasurementRequestItem-ExtIEs } } OPTIONAL,
...
}
TRP-MeasurementRequestItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
{ ID id-Cell-ID      CRITICALITY ignore EXTENSION CGI-NR      PRESENCE optional }|
{ ID id-AoA-SearchWindow CRITICALITY ignore EXTENSION AoA-AssistanceInfo PRESENCE optional }|
{ ID id-NumberOfTRPRxTEG CRITICALITY ignore EXTENSION NumberOfTRPRxTEG PRESENCE optional }|
{ ID id-NumberOfTRPRxTxTEG CRITICALITY ignore EXTENSION NumberOfTRPRxTxTEG PRESENCE optional },
...
}
TRP-MeasurementResponseList ::= SEQUENCE (SIZE (1..maxNoOfMeasTRPs)) OF TRP-MeasurementResponseItem
TRP-MeasurementResponseItem ::= SEQUENCE {
trp-ID              TRP-ID,
measurementResult   TrpMeasurementResult,
iE-extensions       ProtocolExtensionContainer { { TRP-MeasurementResponseItem-ExtIEs } } OPTIONAL,
...
}
TRP-MeasurementResponseItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
{ ID id-Cell-ID      CRITICALITY ignore EXTENSION CGI-NR      PRESENCE optional },
...
}
TRP-MeasurementUpdateList ::= SEQUENCE (SIZE (1..maxNoOfMeasTRPs)) OF TRP-MeasurementUpdateItem
TRP-MeasurementUpdateItem ::= SEQUENCE {

```

```

    TRP-ID
    aoA-window-information      TRP-ID,
    iE-extensions                AoA-AssistanceInfo OPTIONAL,
    ...                          ProtocolExtensionContainer { { TRP-MeasurementUpdateItem-ExtIEs } } OPTIONAL,
}

TRP-MeasurementUpdateItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  { ID id-NumberOfTRPRxTEG      CRITICALITY ignore EXTENSION NumberOfTRPRxTEG      PRESENCE optional }|
  { ID id-NumberOfTRPRxTxTEG    CRITICALITY ignore EXTENSION NumberOfTRPRxTxTEG    PRESENCE optional },
  ...
}

TRPInformationListTRPResp ::= SEQUENCE (SIZE (1.. maxnoTRPs)) OF SEQUENCE {
  TRPInformation                TRPInformation,
  iE-Extensions                ProtocolExtensionContainer { {TRPInformationTRPResp-ExtIEs} } OPTIONAL,
  ...
}

TRPInformationTRPResp-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

TRPInformation ::= SEQUENCE {
  TRP-ID                        TRP-ID,
  TRPInformationTypeResponseList TRPInformationTypeResponseList,
  iE-Extensions                ProtocolExtensionContainer { { TRPInformation-ExtIEs } } OPTIONAL,
  ...
}

TRPInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

TRPInformationTypeResponseList ::= SEQUENCE (SIZE (1..maxnoTRPInfoTypes)) OF TRPInformationTypeResponseItem

TRPInformationTypeResponseItem ::= CHOICE {
  pCI-NR                        INTEGER (0..1007),
  cGI-NR                        CGI-NR,
  aRFCN                         INTEGER (0..3279165),
  pRSConfiguration             PRSConfiguration,
  sSBinformation               SSBInfo,
  sFNInitialisationTime        RelativeTime1900,
  spatialDirectionInformation   SpatialDirectionInformation,
  geographicalCoordinates       GeographicalCoordinates,
  choice-extension              ProtocolIE-Single-Container { { TRPInformationTypeResponseItem-ExtIEs } }
}

TRPInformationTypeResponseItem-ExtIEs NRPPA-PROTOCOL-IES ::= {
  { ID id-TRPType                CRITICALITY reject TYPE TRPType                PRESENCE mandatory }|
  { ID id-OnDemandPRS            CRITICALITY reject TYPE OnDemandPRS-Info        PRESENCE mandatory }|
  { ID id-TRPTxTEGAssociation     CRITICALITY reject TYPE TRPTxTEGAssociation    PRESENCE mandatory }|
  { ID id-TRPBeamAntennaInformation CRITICALITY reject TYPE TRPBeamAntennaInformation PRESENCE mandatory },
  ...
}

```

```

}

TRPInformationTypeListTRPReq ::= SEQUENCE (SIZE(1.. maxnoTRPInfoTypes)) OF ProtocolIE-Single-Container { {TRPInformationTypeItemTRPReq} }

TRPInformationTypeItemTRPReq NRPPA-PROTOCOL-IES ::= {
  { ID id-TRPInformationTypeItem    CRITICALITY reject    TYPE TRPInformationTypeItem    PRESENCE mandatory },
  ...
}

TRPInformationTypeItem ::= ENUMERATED {
  nrPCI,
  nG-RAN-CGI,
  arfcn,
  pRSConfig,
  sSBInfo,
  sFNInitTime,
  spatialDirectInfo,
  geoCoord,

  ...,
  trp-type,
  ondemandPRSInfo,
  trpTxTeg,
  beam-antenna-info
}

TRPList ::= SEQUENCE (SIZE(1.. maxnoTRPs)) OF TRPItem

TRPItem ::= SEQUENCE {
  trp-ID      TRP-ID,
  iE-Extensions  ProtocolExtensionContainer { {TRPItem-ExtIEs} } OPTIONAL,
  ...
}

TRPItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

TRP-ID ::= INTEGER (1.. maxnoTRPs, ...)

TRPPositionDefinitionType ::= CHOICE {
  direct      TRPPositionDirect,
  referenced  TRPPositionReferenced,
  choice-extension
  ProtocolIE-Single-Container { { TRPPositionDefinitionType-ExtIEs } }
}

TRPPositionDefinitionType-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

```

```

TRPPositionDirect ::= SEQUENCE {
    accuracy      TRPPositionDirectAccuracy,
    iE-extensions  ProtocolExtensionContainer { { TRPPositionDirect-ExtIEs } } OPTIONAL,
    ...
}

TRPPositionDirect-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPPositionDirectAccuracy ::= CHOICE {
    tRPPosition      NG-RANAccessPointPosition ,
    tRPHAPosition    NGRANHighAccuracyAccessPointPosition ,
    choice-extension  ProtocolIE-Single-Container { { TRPPositionDirectAccuracy-ExtIEs } }
}

TRPPositionDirectAccuracy-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}

TRPPositionReferenced ::= SEQUENCE {
    referencePoint      ReferencePoint,
    referencePointType  TRPReferencePointType,
    iE-extensions       ProtocolExtensionContainer { { TRPPositionReferenced-ExtIEs } } OPTIONAL,
    ...
}

TRPPositionReferenced-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRP-PRS-Information-List ::= SEQUENCE (SIZE(1.. maxnoPRSTRPs)) OF TRP-PRS-Information-List-Item

TRP-PRS-Information-List-Item ::= SEQUENCE {
    tRP-ID              TRP-ID,
    nR-PCI              NR-PCI,
    CGI-NR              CGI-NR              OPTIONAL,
    pRSConfiguration    PRSConfiguration,
    iE-Extensions       ProtocolExtensionContainer { { TRP-PRS-Information-List-Item-ExtIEs } } OPTIONAL,
    ...
}

TRP-PRS-Information-List-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPReferencePointType ::= CHOICE {
    tRPPositionRelativeGeodetic      RelativeGeodeticLocation,
    tRPPositionRelativeCartesian     RelativeCartesianLocation,
    choice-extension                  ProtocolIE-Single-Container { { TRPReferencePointType-ExtIEs } }
}

TRPReferencePointType-ExtIEs NRPPA-PROTOCOL-IES ::= {

```

```

}
...
}
TRPTxTEGAssociation ::= SEQUENCE (SIZE(1.. maxnoTRPTEGs)) OF TRPTEGItem

TRPTEGItem ::= SEQUENCE {
    tRP-Tx-TEG-ID          INTEGER (0..7),
    dl-PRSResourceSetID    PRS-Resource-Set-ID,
    dl-PRSResourceID-List  SEQUENCE (SIZE(1.. maxPRS-ResourcesPerSet)) OF DLPRSResourceID-Item OPTIONAL,
    iE-Extensions          ProtocolExtensionContainer { { TRPTEGItem-ExtIEs } } OPTIONAL,
    ...
}

TRPTEGItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

DLPRSResourceID-Item ::= SEQUENCE {
    dl-PRSResourceID      PRS-Resource-ID,
    iE-Extensions          ProtocolExtensionContainer { { DLPRSResource-Item-ExtIEs } } OPTIONAL,
    ...
}

DLPRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRPType ::= ENUMERATED {
    prsOnlyTP,
    srsOnlyRP,
    tp,
    rp,
    trp,
    ...
}

TypeOfError ::= ENUMERATED {
    not-understood,
    missing,
    ...
}

-- U

UARFCN ::= INTEGER (0..16383, ...)

UE-Measurement-ID ::= INTEGER (1..15, ..., 16..256)

UEReportingInformation ::= SEQUENCE {
    reportingAmount        ENUMERATED {ma0, ma1, ma2, ma4, ma8, ma16, ma32, ma64},
    reportingInterval      ENUMERATED {none, one, two, four, eight, ten, sixteen, twenty, thirty-two, sixty-four, ...},
    iE-extensions          ProtocolExtensionContainer { { UEReportingInformation-ExtIEs } } OPTIONAL,
}

```

```

}
...
}
UEReportingInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}
UETxTEGAssociation ::= SEQUENCE (SIZE(1.. maxnoUETEGs)) OF UETEGItem
UETEGItem ::= SEQUENCE {
    uE-Tx-TEG-ID                INTEGER (0..7),
    posSRSResourceID-List      PosSRSResourceID-List,
    iE-Extensions                ProtocolExtensionContainer { { UETEGItem-ExtIEs } } OPTIONAL,
    ...
}
UETEGItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}
SRSResourceID-Item ::= SEQUENCE {
    sRSResourceID                SRSResourceID,
    iE-Extensions                ProtocolExtensionContainer { { SRSResourceID-Item-ExtIEs } } OPTIONAL,
    ...
}
SRSResourceID-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}
UE-TEG-Info-Request ::= ENUMERATED {true, ...}
UTRA-EcN0 ::= INTEGER (0..49, ...)
UTRA-RSCP ::= INTEGER (-5..91, ...)

UL-AoA ::= SEQUENCE {
    azimuthAoA                INTEGER (0..3599),
    zenithAoA                  INTEGER (0..1799)                OPTIONAL,
    lCS-to-GCS-Translation      LCS-to-GCS-Translation          OPTIONAL,
    iE-extensions                ProtocolExtensionContainer { { UL-AoA-ExtIEs } }    OPTIONAL,
    ...
}
UL-AoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
...
}

UL-RTOAMeasurement ::= SEQUENCE {
    uLRTOameas                ULRTOAmeas,
    additionalPathList          AdditionalPathList              OPTIONAL,
    iE-extensions                ProtocolExtensionContainer { { UL-RTOAMeasurement-ExtIEs } }    OPTIONAL, ...
}

```

```

}
UL-RTOAMeasurement-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  { ID id-ExtendedAdditionalPathList  CRITICALITY ignore EXTENSION ExtendedAdditionalPathList  PRESENCE optional}|
  { ID id-TRPRXTEGID                  CRITICALITY ignore EXTENSION      INTEGER (0..31) PRESENCE optional},
  ...
}

ULRTOAMeas ::= CHOICE {
  k0      INTEGER (0.. 1970049),
  k1      INTEGER (0.. 985025),
  k2      INTEGER (0.. 492513),
  k3      INTEGER (0.. 246257),
  k4      INTEGER (0.. 123129),
  k5      INTEGER (0.. 61565),
  choice-extension      ProtocolIE-Single-Container { { ULRTOAMeas-ExtIEs } }
}
ULRTOAMeas-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

UL-SRS-RSRP ::= INTEGER (0..126)

UL-SRS-RSRPP ::= SEQUENCE {
  firstPathRSRPP      INTEGER (0..126),
  iE-extensions      ProtocolExtensionContainer { { UL-SRS-RSRPP-ExtIEs } }  OPTIONAL,
  ...
}

UL-SRS-RSRPP-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

UplinkChannelBW-PerSCS-List ::= SEQUENCE (SIZE (1..maxnoSCSs)) OF SCS-SpecificCarrier

Uncertainty-range-AoA ::= INTEGER (0..3599)

Uncertainty-range-ZoA ::= INTEGER (0..1799)

-- V

ValueRSRP-EUTRA ::= INTEGER (0..97, ...)

ValueRSRQ-EUTRA ::= INTEGER (0..34, ...)

ValueRSRP-NR ::= INTEGER (0..127)

ValueRSRQ-NR ::= INTEGER (0..127)

-- W

```

```

WLANMeasurementQuantities ::= SEQUENCE (SIZE (0.. maxNoMeas)) OF ProtocolIE-Single-Container { {WLANMeasurementQuantities-ItemIEs} }

WLANMeasurementQuantities-ItemIEs NRPPA-PROTOCOL-IES ::= {
  { ID id-WLANMeasurementQuantities-Item CRITICALITY reject TYPE WLANMeasurementQuantities-Item PRESENCE mandatory}}

WLANMeasurementQuantities-Item ::= SEQUENCE {
  wlanMeasurementQuantitiesValue WLANMeasurementQuantitiesValue,
  iE-Extensions ProtocolExtensionContainer { { WLANMeasurementQuantitiesValue-ExtIEs} } OPTIONAL,
  ...
}

WLANMeasurementQuantitiesValue-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

WLANMeasurementQuantitiesValue ::= ENUMERATED {
  wlan,
  ...
}

WLANMeasurementResult ::= SEQUENCE (SIZE (1..maxNoMeas)) OF WLANMeasurementResult-Item

WLANMeasurementResult-Item ::= SEQUENCE {
  wlan-RSSI WLAN-RSSI,
  sSID SSID OPTIONAL,
  bSSID BSSID OPTIONAL,
  hESSID HESSID OPTIONAL,
  operatingClass WLANOperatingClass OPTIONAL,
  countryCode WLANCountryCode OPTIONAL,
  wlanChannelList WLANChannelList OPTIONAL,
  wlanBand WLANBand OPTIONAL,
  iE-Extensions ProtocolExtensionContainer { { WLANMeasurementResult-Item-ExtIEs } } OPTIONAL,
  ...
}

WLANMeasurementResult-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

WLAN-RSSI ::= INTEGER (0..141, ...)

WLANBand ::= ENUMERATED {band2dot4, band5, ...}

WLANChannelList ::= SEQUENCE (SIZE (1..maxWLANchannels)) OF WLANChannel

WLANChannel ::= INTEGER (0..255)

WLANCountryCode ::= ENUMERATED {
  unitedStates,
  europe,
  japan,
  global,
  ...
}

```



```

WLANOperatingClass ::= INTEGER (0..255)

-- X

-- Y

-- Z

ZoA ::= SEQUENCE {
    zenithAoA                INTEGER (0..1799),
    lCS-to-GCS-Translation   LCS-to-GCS-Translation   OPTIONAL,
    iE-extensions            ProtocolExtensionContainer { { ZoA-ExtIEs } } OPTIONAL,
    ...
}

ZoA-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

END
-- ASN1STOP

```

9.3.6 Common definitions

```

-- ASN1START
-- *****
--
-- Common definitions
--
-- *****

NRPPA-CommonDataTypes {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-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 }
NRPPATransactionID ::= INTEGER (0..32767)

Presence        ::= ENUMERATED { optional, conditional, mandatory }

PrivateIE-ID    ::= CHOICE {
    local        INTEGER (0.. maxPrivateIEs),
    global       OBJECT IDENTIFIER
}

ProcedureCode   ::= INTEGER (0..255)

ProtocolIE-ID   ::= INTEGER (0..maxProtocolIEs)

TriggeringMessage ::= ENUMERATED { initiating-message, successful-outcome, unsuccessful-outcome}

END
-- ASN1STOP

```

9.3.7 Constant definitions

```

-- ASN1START
-- *****
--
-- Constant definitions
--
-- *****

NRPPA-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS

    ProcedureCode,
    ProtocolIE-ID
FROM NRPPA-CommonDataTypes;

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

```

id-errorIndication	ProcedureCode ::= 0
id-privateMessage	ProcedureCode ::= 1
id-e-CIDMeasurementInitiation	ProcedureCode ::= 2
id-e-CIDMeasurementFailureIndication	ProcedureCode ::= 3
id-e-CIDMeasurementReport	ProcedureCode ::= 4
id-e-CIDMeasurementTermination	ProcedureCode ::= 5
id-oTDOAInformationExchange	ProcedureCode ::= 6
id-assistanceInformationControl	ProcedureCode ::= 7
id-assistanceInformationFeedback	ProcedureCode ::= 8
id-positioningInformationExchange	ProcedureCode ::= 9
id-positioningInformationUpdate	ProcedureCode ::= 10
id-Measurement	ProcedureCode ::= 11
id-MeasurementReport	ProcedureCode ::= 12
id-MeasurementUpdate	ProcedureCode ::= 13
id-MeasurementAbort	ProcedureCode ::= 14
id-MeasurementFailureIndication	ProcedureCode ::= 15
id-tRPInformationExchange	ProcedureCode ::= 16
id-positioningActivation	ProcedureCode ::= 17
id-positioningDeactivation	ProcedureCode ::= 18
id-pRSConfigurationExchange	ProcedureCode ::= 19
id-measurementPreconfiguration	ProcedureCode ::= 20
id-measurementActivation	ProcedureCode ::= 21

```
-- *****
--
-- Lists
--
-- *****
```

maxNrOfErrors	INTEGER ::= 256
maxCellInRANode	INTEGER ::= 3840
maxIndexesReport	INTEGER ::= 64
maxNoMeas	INTEGER ::= 64
maxCellReport	INTEGER ::= 9
maxCellReportNR	INTEGER ::= 9
maxnoOTDOAtypes	INTEGER ::= 63
maxServCell	INTEGER ::= 5
maxEUTRAMEas	INTEGER ::= 8
maxGERANMeas	INTEGER ::= 8
maxNRMeas	INTEGER ::= 8
maxUTRANMeas	INTEGER ::= 8
maxWLANchannels	INTEGER ::= 16
maxnoFreqHoppingBandsMinusOne	INTEGER ::= 7
maxNoPath	INTEGER ::= 2
maxNrOfPosSImessage	INTEGER ::= 32
maxnoAssistInfoFailureListItems	INTEGER ::= 32
maxNrOfSegments	INTEGER ::= 64
maxNrOfPosSIBs	INTEGER ::= 32
maxNoOfMeasTRPs	INTEGER ::= 64
maxnoTRPs	INTEGER ::= 65535
maxnoTRPInfoTypes	INTEGER ::= 64
maxnoofAngleInfo	INTEGER ::= 65535
maxnolcs-gcs-translation	INTEGER ::= 3

maxnoBcastCell	INTEGER ::= 16384
maxnoSRSTriggerStates	INTEGER ::= 3
maxnoSpatialRelations	INTEGER ::= 64
maxnoPosMeas	INTEGER ::= 16384
maxnoSRS-Carriers	INTEGER ::= 32
maxnoSCSs	INTEGER ::= 5
maxnoSRS-Resources	INTEGER ::= 64
maxnoSRS-PosResources	INTEGER ::= 64
maxnoSRS-ResourceSets	INTEGER ::= 16
maxnoSRS-ResourcePerSet	INTEGER ::= 16
maxnoSRS-PosResourceSets	INTEGER ::= 16
maxnoSRS-PosResourcePerSet	INTEGER ::= 16
maxPRS-ResourceSets	INTEGER ::= 2
maxPRS-ResourcesPerSet	INTEGER ::= 64
maxNoSSBs	INTEGER ::= 255
maxnoofPRSresourceSet	INTEGER ::= 8
maxnoofPRSresource	INTEGER ::= 64
maxnoofULAoAs	INTEGER ::= 8
maxNoPathExtended	INTEGER ::= 8
maxnoARPs	INTEGER ::= 16
maxnoUETEGs	INTEGER ::= 8
maxnoTRPTEGs	INTEGER ::= 8
maxFreqLayers	INTEGER ::= 4
maxNumResourcesPerAngle	INTEGER ::= 24
maxnoAzimuthAngles	INTEGER ::= 3600
maxnoElevationAngles	INTEGER ::= 1801
maxnoPRSTRPs	INTEGER ::= 256

```
-- *****
--
-- IEs
--
-- *****
```

id-Cause	ProtocolIE-ID ::= 0
id-CriticalityDiagnostics	ProtocolIE-ID ::= 1
id-LMF-UE-Measurement-ID	ProtocolIE-ID ::= 2
id-ReportCharacteristics	ProtocolIE-ID ::= 3
id-MeasurementPeriodicity	ProtocolIE-ID ::= 4
id-MeasurementQuantities	ProtocolIE-ID ::= 5
id-RAN-UE-Measurement-ID	ProtocolIE-ID ::= 6
id-E-CID-MeasurementResult	ProtocolIE-ID ::= 7
id-OTDOACells	ProtocolIE-ID ::= 8
id-OTDOA-Information-Type-Group	ProtocolIE-ID ::= 9
id-OTDOA-Information-Type-Item	ProtocolIE-ID ::= 10
id-MeasurementQuantities-Item	ProtocolIE-ID ::= 11
id-RequestedSRSTransmissionCharacteristics	ProtocolIE-ID ::= 12
id-Cell-Portion-ID	ProtocolIE-ID ::= 14
id-OtherRATMeasurementQuantities	ProtocolIE-ID ::= 15
id-OtherRATMeasurementQuantities-Item	ProtocolIE-ID ::= 16
id-OtherRATMeasurementResult	ProtocolIE-ID ::= 17
id-WLANMeasurementQuantities	ProtocolIE-ID ::= 19

id-WLANMeasurementQuantities-Item	ProtocolIE-ID ::= 20
id-WLANMeasurementResult	ProtocolIE-ID ::= 21
id-TDD-Config-EUTRA-Item	ProtocolIE-ID ::= 22
id-Assistance-Information	ProtocolIE-ID ::= 23
id-Broadcast	ProtocolIE-ID ::= 24
id-AssistanceInformationFailureList	ProtocolIE-ID ::= 25
id-SRSConfiguration	ProtocolIE-ID ::= 26
id-MeasurementResult	ProtocolIE-ID ::= 27
id-TRP-ID	ProtocolIE-ID ::= 28
id-TRPInformationTypeListTRPReq	ProtocolIE-ID ::= 29
id-TRPInformationListTRPResp	ProtocolIE-ID ::= 30
id-MeasurementBeamInfoRequest	ProtocolIE-ID ::= 31
id-ResultSS-RSRP	ProtocolIE-ID ::= 32
id-ResultSS-RSRQ	ProtocolIE-ID ::= 33
id-ResultCSI-RSRP	ProtocolIE-ID ::= 34
id-ResultCSI-RSRQ	ProtocolIE-ID ::= 35
id-AngleOfArrivalNR	ProtocolIE-ID ::= 36
id-GeographicalCoordinates	ProtocolIE-ID ::= 37
id-PositioningBroadcastCells	ProtocolIE-ID ::= 38
id-LMF-Measurement-ID	ProtocolIE-ID ::= 39
id-RAN-Measurement-ID	ProtocolIE-ID ::= 40
id-TRP-MeasurementRequestList	ProtocolIE-ID ::= 41
id-TRP-MeasurementResponseList	ProtocolIE-ID ::= 42
id-TRP-MeasurementReportList	ProtocolIE-ID ::= 43
id-SRSType	ProtocolIE-ID ::= 44
id-ActivationTime	ProtocolIE-ID ::= 45
id-SRSResourceSetID	ProtocolIE-ID ::= 46
id-TRPList	ProtocolIE-ID ::= 47
id-SRSSpatialRelation	ProtocolIE-ID ::= 48
id-SystemFrameNumber	ProtocolIE-ID ::= 49
id-SlotNumber	ProtocolIE-ID ::= 50
id-SRSResourceTrigger	ProtocolIE-ID ::= 51
id-TRPMeasurementQuantities	ProtocolIE-ID ::= 52
id-AbortTransmission	ProtocolIE-ID ::= 53
id-SFNInitialisationTime	ProtocolIE-ID ::= 54
id-ResultNR	ProtocolIE-ID ::= 55
id-ResultEUTRA	ProtocolIE-ID ::= 56
id-TRPInformationTypeItem	ProtocolIE-ID ::= 57
id-CGI-NR	ProtocolIE-ID ::= 58
id-SFNInitialisationTime-NR	ProtocolIE-ID ::= 59
id-Cell-ID	ProtocolIE-ID ::= 60
id-SrsFrequency	ProtocolIE-ID ::= 61
id-TRPType	ProtocolIE-ID ::= 62
id-SRSSpatialRelationPerSRSResource	ProtocolIE-ID ::= 63
id-MeasurementPeriodicityExtended	ProtocolIE-ID ::= 64
id-PRS-Resource-ID	ProtocolIE-ID ::= 65
id-PRSTRList	ProtocolIE-ID ::= 66
id-PRSTransmissionTRPList	ProtocolIE-ID ::= 67
id-OnDemandPRS	ProtocolIE-ID ::= 68
id-AoA-SearchWindow	ProtocolIE-ID ::= 69
id-TRP-MeasurementUpdateList	ProtocolIE-ID ::= 70
id-ZoA	ProtocolIE-ID ::= 71
id-ResponseTime	ProtocolIE-ID ::= 72
id-UEReportingInformation	ProtocolIE-ID ::= 73

id-MultipleULAoA	ProtocolIE-ID ::= 74
id-UL-SRS-RSRPP	ProtocolIE-ID ::= 75
id-SRSResourceType	ProtocolIE-ID ::= 76
id-ExtendedAdditionalPathList	ProtocolIE-ID ::= 77
id-ARPLocationInfo	ProtocolIE-ID ::= 78
id-ARP-ID	ProtocolIE-ID ::= 79
id-LoS-NLoSInformation	ProtocolIE-ID ::= 80
id-UE-Tx-TEG-Association	ProtocolIE-ID ::= 81
id-NumberOfTRPRxTEG	ProtocolIE-ID ::= 82
id-NumberOfTRPRxTxTEG	ProtocolIE-ID ::= 83
id-TRPTxTEGAssociation	ProtocolIE-ID ::= 84
id-TRPTEGIDInformation	ProtocolIE-ID ::= 85
id-TRPRXTEGID	ProtocolIE-ID ::= 86
id-TRP-PRS-Information-List	ProtocolIE-ID ::= 87
id-PRS-Measurements-Info-List	ProtocolIE-ID ::= 88
id-PRSConfigRequestType	ProtocolIE-ID ::= 89
id-UE-TEG-Info-Request	ProtocolIE-ID ::= 90
id-MeasurementTimeOccasion	ProtocolIE-ID ::= 91
id-MeasurementCharacteristicsRequestIndicator	ProtocolIE-ID ::= 92
id-TRPBeamAntennaInformation	ProtocolIE-ID ::= 93
id-NR-TADV	ProtocolIE-ID ::= 94
id-MeasurementAmount	ProtocolIE-ID ::= 95
id-pathPower	ProtocolIE-ID ::= 96
id-PreconfigurationResult	ProtocolIE-ID ::= 97
id-RequestType	ProtocolIE-ID ::= 98

END
-- ASN1STOP

9.3.8 Container definitions

```
-- ASN1START
-- *****
--
-- Container definitions
--
-- *****

NRPPA-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-Containers (5)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

```

IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,
    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID
FROM NRPPA-CommonDataTypes;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

NRPPA-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
--
-- *****

NRPPA-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
--
-- *****

```

```

NRPPA-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 { NRPPA-PROTOCOL-IES : IESSetParam } ::=
    SEQUENCE (SIZE (0..maxProtocolIES)) OF
    ProtocolIE-Field {{IESSetParam}}

ProtocolIE-Single-Container { NRPPA-PROTOCOL-IES : IESSetParam } ::=
    ProtocolIE-Field {{IESSetParam}}

ProtocolIE-Field { NRPPA-PROTOCOL-IES : IESSetParam } ::= SEQUENCE {
    id                NRPPA-PROTOCOL-IES.&id                ({IESSetParam}),
    criticality       NRPPA-PROTOCOL-IES.&criticality        ({IESSetParam}{@id}),
    value            NRPPA-PROTOCOL-IES.&Value              ({IESSetParam}{@id})
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

ProtocolIE-ContainerList { INTEGER : lowerBound, INTEGER : upperBound, NRPPA-PROTOCOL-IES : IESSetParam } ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
    ProtocolIE-Container {{IESSetParam}}

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer { NRPPA-PROTOCOL-EXTENSION : ExtensionSetParam } ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
    ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField { NRPPA-PROTOCOL-EXTENSION : ExtensionSetParam } ::= SEQUENCE {

```



```
    id                NRPPA-PROTOCOL-EXTENSION.&id          ({ExtensionSetParam}),
    criticality       NRPPA-PROTOCOL-EXTENSION.&criticality  ({ExtensionSetParam}@id),
    extensionValue    NRPPA-PROTOCOL-EXTENSION.&Extension  ({ExtensionSetParam}@id)
}

-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container { NRPPA-PRIVATE-IES : IEsSetParam} ::=
    SEQUENCE (SIZE (1..maxPrivateIEs)) OF
        PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field { NRPPA-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
    id                NRPPA-PRIVATE-IES.&id          ({IEsSetParam}),
    criticality       NRPPA-PRIVATE-IES.&criticality  ({IEsSetParam}@id),
    value            NRPPA-PRIVATE-IES.&Value        ({IEsSetParam}@id)
}

END
-- ASN1STOP
```

9.4 Message transfer syntax

NRPPa shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ref. ITU-T Rec. X.691 [6].

9.5 Timers

Void.

10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 38.413 [2] is applicable for the purposes of the present document, with the following additions:

- In case of Abstract Syntax Error, when reporting the *Criticality Diagnostics* IE for not comprehended IE/IE groups or missing IE/IE groups, the *NRPPa Transaction ID* IE shall also be included;
- In case of Logical Error, when reporting the *Criticality Diagnostics* IE, the *NRPPa Transaction ID* IE shall also be included.

Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-08-23	RAN3#97	R3-173238				TS skeleton agreed	v0.0.0
2017-08-25	RAN3#97	R3-173374				TS 38.455 V0.1.0	v0.1.0
2017-10-18	RAN3#97bis	R3-173979				Implemented agreed pCR from R3#97bis	V0.2.0
2017-12-04	RAN3#98	R3-175064				Implemented agreed pCR from R3#98	V0.3.0
2018-01-31	RAN3 Adhoc 1801	R3-180658				Implemented agreed pCR from R3 Adhoc_1801	V0.5.0
2018-03-15	RAN3#99	R3-181595				Implemented agreed pCR's from R3#99	V0.6.0
2018-05-29	RAN3#100	R3-183598				Implemented agreed pCR's from R3#100	V0.7.0
2018-06	RAN#80	RP-181147				Submitted to RAN plenary for Approval	V1.0.0
2018-06	RAN#80	-	-	-	-	Specification approved at TSG-RAN and placed under change control	15.0.0
2018-09	RAN#81	RP-181921	0002	1	F	Rapporteur CR for TS 38.455	15.1.0
2018-12	RAN#82	RP-182446	0003	1	F	Addition of TDD UL/DL configuration to OTDOA assistance data	15.2.0
2019-01	RAN#82					Editorial Corrections: - 1 editorial correction to ASN.1 - adding "ASN1START" and "ASN1STOP" TAGs to the ASN.1	15.2.1
2020-07	SA#88-e	-	-	-	-	Update to Rel-16 version (MCC)	16.0.0
2020-09	SA#89-e	RP-201849	0008	19	B	Introduction of NR Positioning in NRPPa	16.1.0
2020-12	RAN#90-e	RP-202315	0014	2	A	Support OTDOA assistance data for case of NR serving cell	16.2.0
2020-12	RAN#90-e	RP-202311	0015	2	F	Corrections to tabular and asn.1 for NR positioning (NRPPa)	16.2.0
2020-12	RAN#90-e	RP-202311	0016	-	F	Correction of NRPPa positioning procedures	16.2.0
2020-12	RAN#90-e	RP-202311	0021	1	F	RRC alignment and various correction including ASN.1	16.2.0
2020-12	RAN#90-e	RP-202311	0022	2	F	Coupling TRP ID and Cell ID in Measurement procedures	16.2.0
2021-03	RAN#91-e	RP-210230	0024	1	F	Including SRS frequency information in Positioning Information Request	16.3.0
2021-03	RAN#91-e	RP-210230	0025	1	F	Corrections on NRPPa	16.3.0
2021-03	RAN#91-e	RP-210236	0026	-	F	Correction of NRPPa section 10	16.3.0
2021-06	RAN#92-e	RP-211333	0028	-	A	Clarification of E-CID Measurement Result	16.4.0
2021-06	RAN#92-e	RP-211327	0029	-	F	Correction of Spatial Relation Information	16.4.0
2021-06	RAN#92-e	RP-211327	0033	1	F	Correction on SFN Initialisation Time	16.4.0
2021-06	RAN#92-e	RP-211327	0034	-	F	Correction on relative cartesian coordinate	16.4.0
2021-09	RAN#93-e	RP-211883	0039	1	F	Correction of the RAN and LMF UE measurement IDs extension	16.5.0
2021-09	RAN#93-e	RP-211883	0041	1	F	Adding procedural text for System Frame Number and Slot Number	16.5.0
2021-12	RAN#94-e	RP-213173	0047	3	F	Correction on PRS-only TP	16.6.0
2021-12	RAN#94-e	RP-212867	0049	1	F	Support of providing spatial relation per SRS resource from LMF to gNB	16.6.0
2022-03	RAN#95-e	RP-220281	0052	1	F	Correction on Measurement Periodicity	16.7.0
2022-03	RAN#95-e	RP-220281	0053	1	F	Correction on PRS Beam Information	16.7.0
2022-03	RAN#95-e	RP-220228	0037	8	B	Introduction of NR Positioning enhancements to NRPPa	17.0.0
2022-03	RAN#95-e	RP-220236	0042	2	B	Addition of NR Timing Advance reporting for NR UL E-CID [NRTADV]	17.0.0
2022-03	RAN#95-e	RP-220236	0054	-	D	NRPPa Rapporteur Corrections	17.0.0
2022-06	RAN#96	RP-221131	0057	1	F	NRPPa ASN.1 review for NR Positioning Enhancements	17.1.0
2022-06	RAN#96	RP-221145	0058	4	F	CR to 38.455 on Measurement Amount	17.1.0
2022-06	RAN#96	RP-221145	0062	2	D	Rapporteur Corrections to Rel-17 NRPPa	17.1.0
2022-06	RAN#96	RP-221131	0063	4	F	Positioning corrections for NRPPa	17.1.0
2022-06	RAN#96	RP-221131	0066	1	F	Corrections to Measurement Pre-configuration Information Transfer	17.1.0
2022-06	RAN#96	RP-221131	0067	1	F	Support for Multiple Measurement Instances	17.1.0
2022-06	RAN#96	RP-221152	0069	2	A	Correction for PRS Muting	17.1.0
2022-06	RAN#96	RP-221152	0074		A	Correction to SSB subcarrier spacing	17.1.0
2022-06						editorial corrections to rename the following asn.1 names as choice extension names - sRSType-extension -> choice-Extension - cause-Extension -> choice-Extension - measuredResultsValue-Extension -> choice-Extension - nG-RANCell-Extension -> choice-Extension - oTDOACell-Information-Item-Extension -> choice-Extension - otherRATMeasuredResultsValue-Extension -> choice-Extension - PRSMutingConfiguration-EUTRA-Extension -> choice-Extension	17.1.1

History

Document history		
V17.0.0	May 2022	Publication
V17.1.1	August 2022	Publication