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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
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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 *Information Element Name* is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. *Cause* 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 configure and activate measurement gap, and/or to pre-configure 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

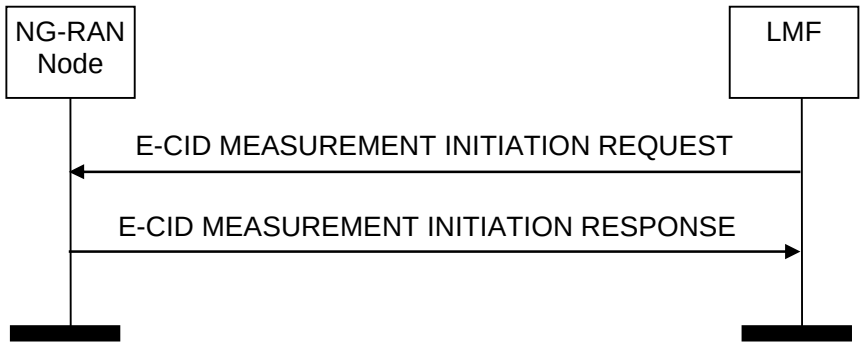

Figure 8.2.1.2-1: E-CID Measurement Initiation procedure, successful operation

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

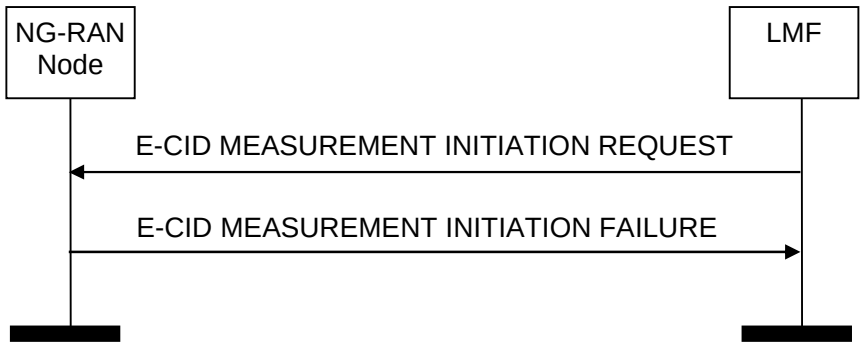

Figure 8.2.1.3-1: E-CID Measurement Initiation procedure, unsuccessful operation

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.

8.2.2 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.

8.2.3 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.

8.2.4 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.

8.2.5 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

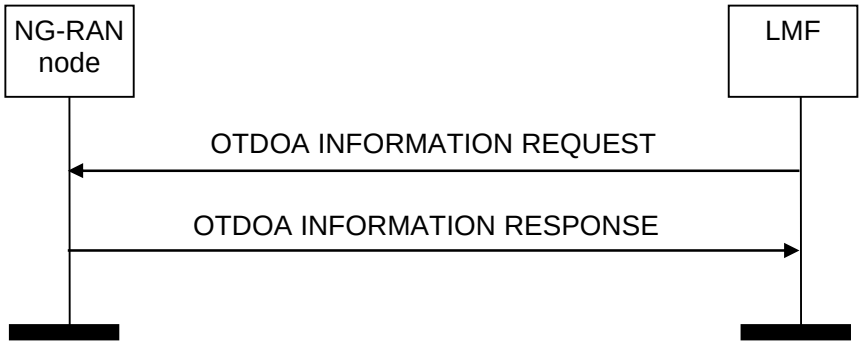

Figure 8.2.5.2-1: OTDOA Information Exchange procedure, successful operation

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

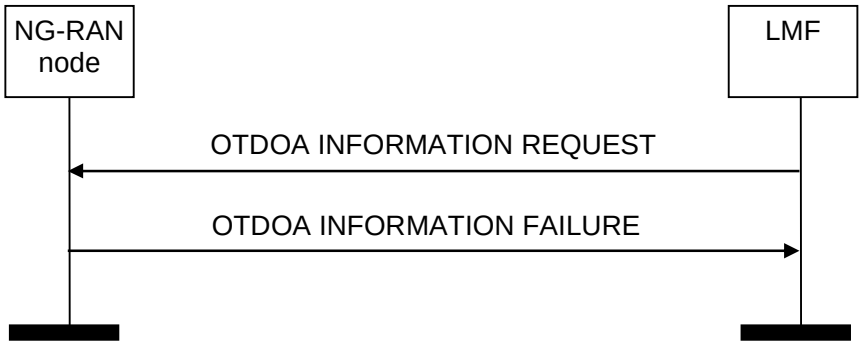

Figure 8.2.5.3-1: OTDOA Information Exchange procedure, unsuccessful operation

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.

8.2.6 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

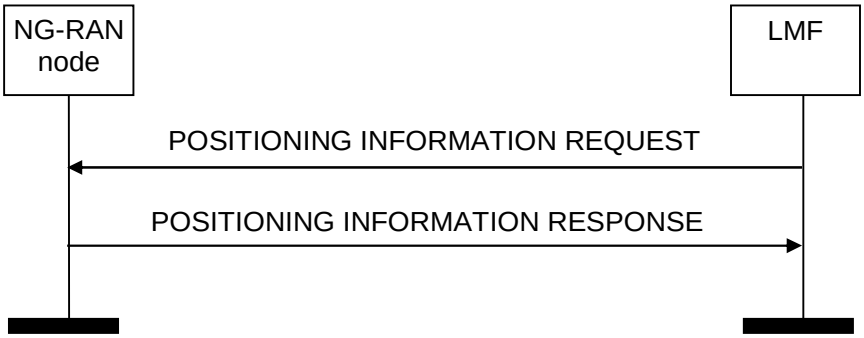

Figure 8.2.6.2-1: Positioning Information Exchange procedure, successful operation

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 ID 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

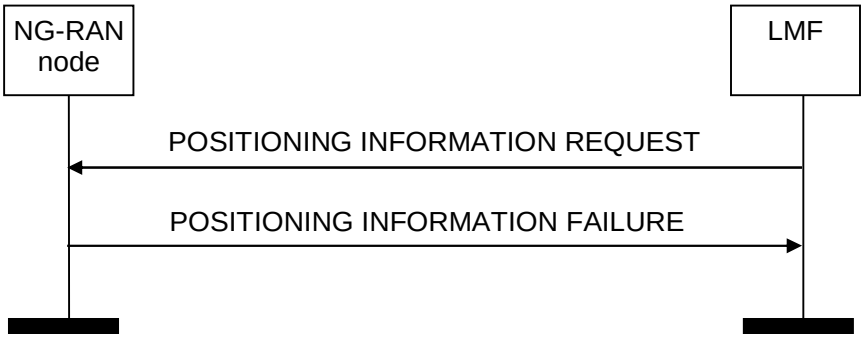

Figure 8.2.6.3-1: Positioning Information Exchange procedure, unsuccessful operation

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.

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

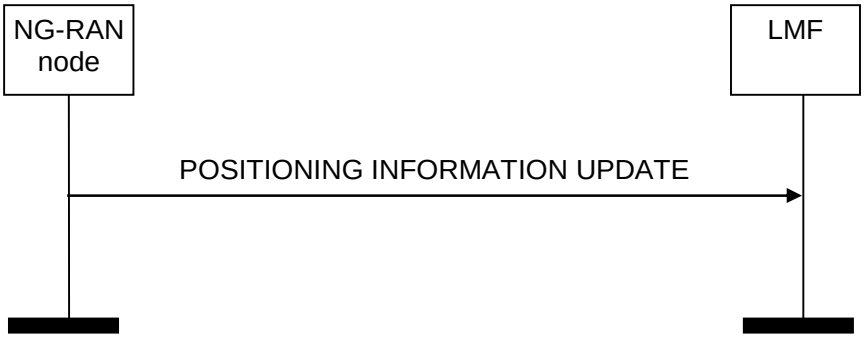

Figure 8.2.7.2-1: Positioning Information Update procedure, successful operation

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, if supported, consider it as the UE 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

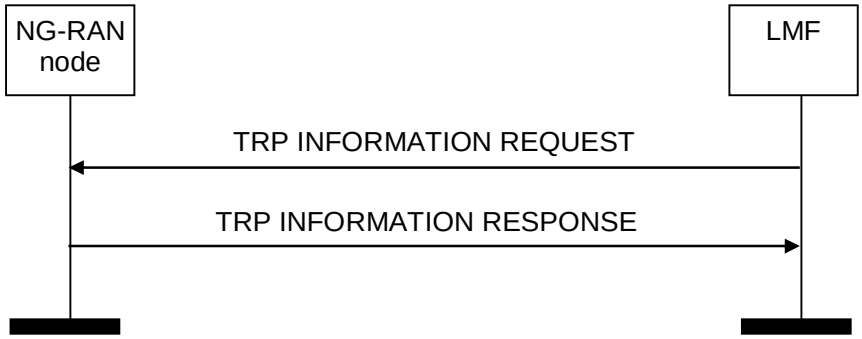

Figure 8.2.8.2-1: TRP Information Exchange procedure, successful operation

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

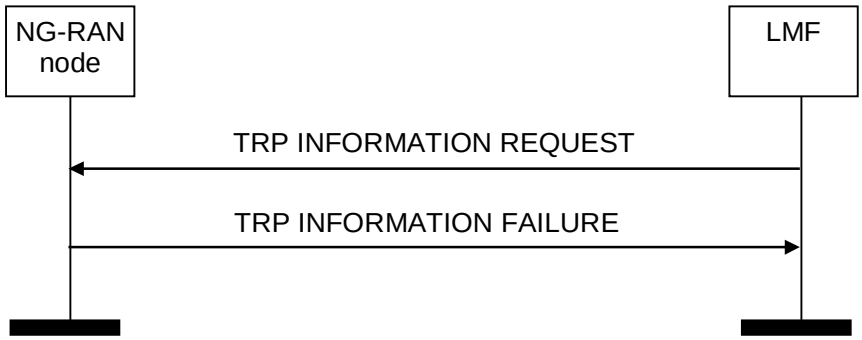

Figure 8.2.8.3-1: TRP Information Exchange procedure, unsuccessful operation

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.

8.2.9 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

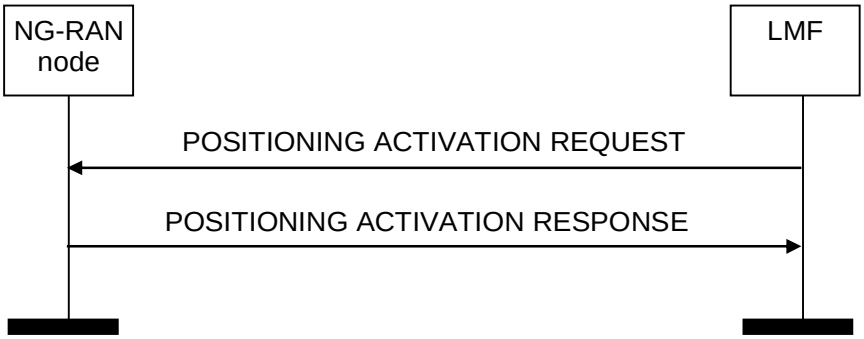

Figure 8.2.9.2-1: Positioning Activation procedure, successful operation

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

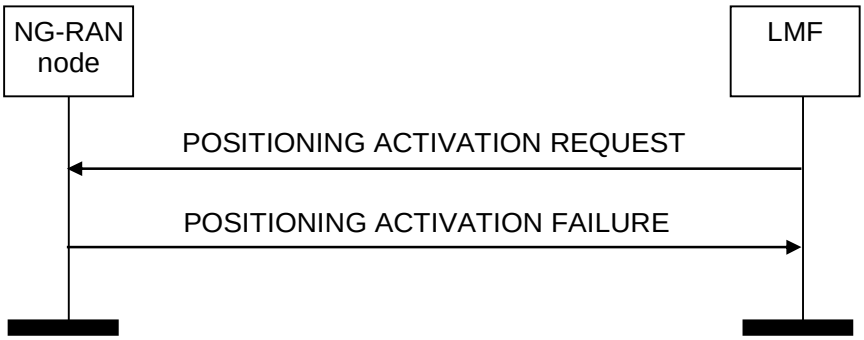

Figure 8.2.9.3-1: Positioning Activation procedure, unsuccessful operation

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

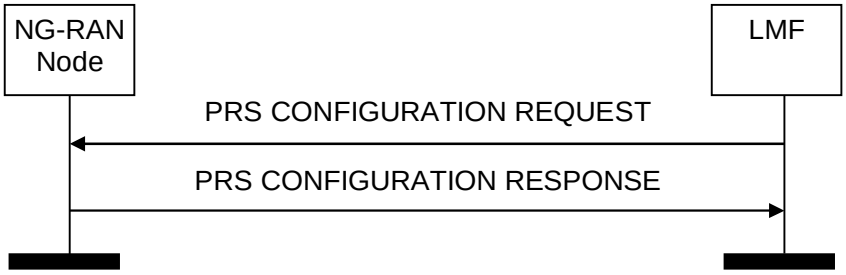

Figure 8.2.11.2-1: PRS Configuration Exchange procedure, successful operation

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

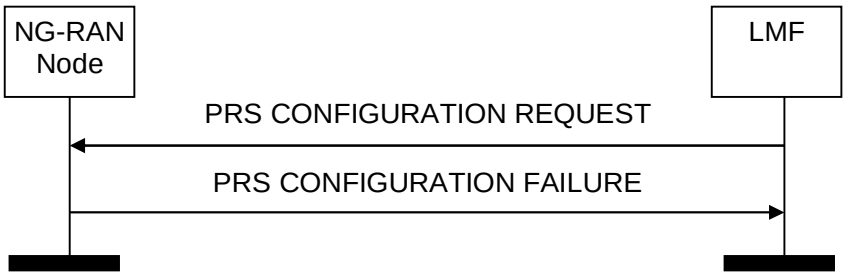

Figure 8.2.11.3-1: PRS Configuration Exchange procedure, unsuccessful operation

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 configure measurement gap 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

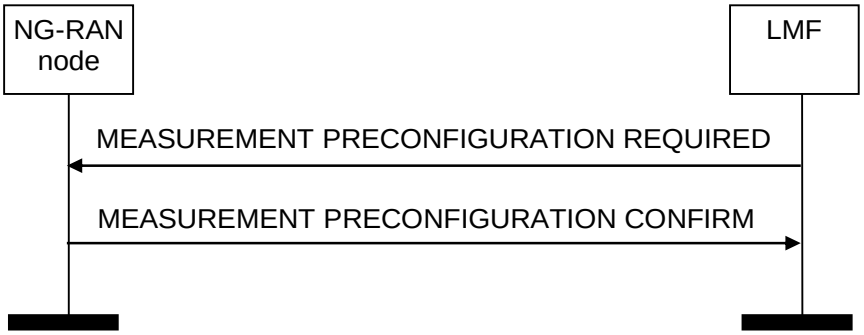

Figure 8.2.12.2-1: Measurement Preconfiguration procedure, successful operation

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

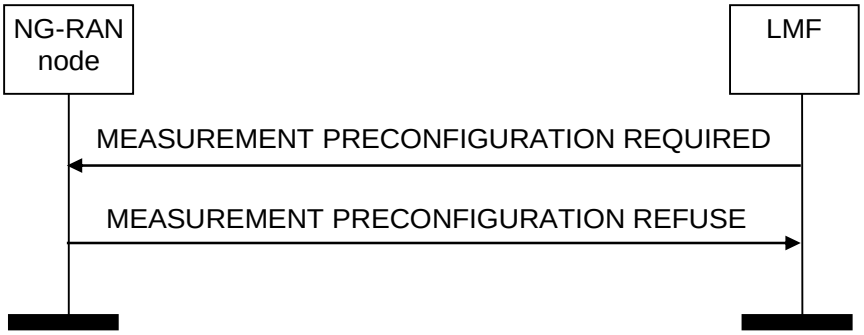

Figure 8.2.12.3-1: Measurement Preconfiguration procedure, unsuccessful operation

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.

8.2.13 Measurement Activation

8.2.13.1 General

The Measurement Activation procedure is initiated by the LMF to indicate the NG-RAN node to activate the preconfigured measurement gap 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.

8.2.13.3 Unsuccessful Operation

Not Applicable.

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

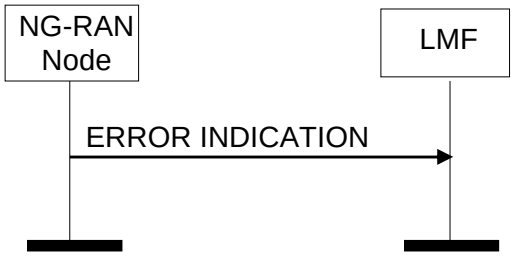

Figure 8.3.1.2-2: Error Indication procedure, NG-RAN node originated, successful operation

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

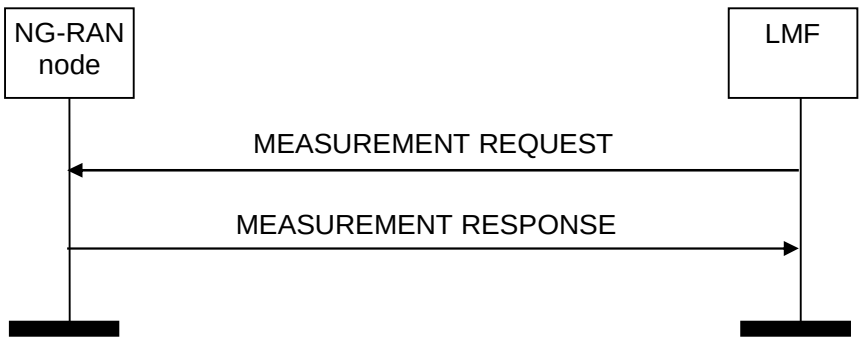

Figure 8.5.1.2.1: Measurement procedure. Successful operation.

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, include the requested information 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.

8.5.1.3 Unsuccessful Operation

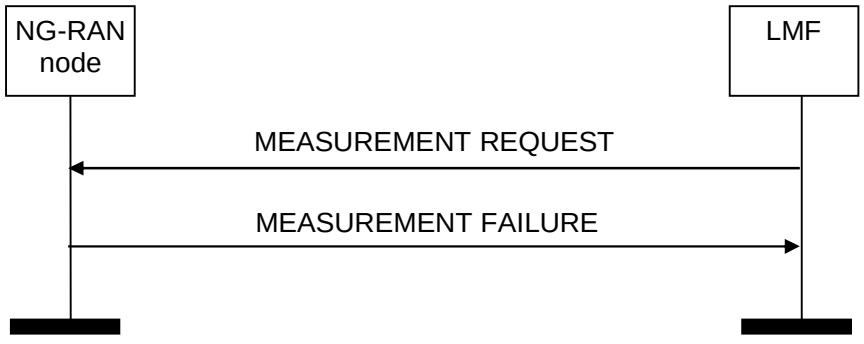

Figure 8.5.1.3.1: Measurement procedure. Unsuccessful operation.

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.

8.5.3 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.

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.

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 *Report Characteristics* 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, noDlFrames, 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 .. <maxCelliRANnode>*		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 ID 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 trp prs info, 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.

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 *Spatial Relation Information per SRS Resource* 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 *Abort Transmission*	M				YES	Ignore
>Deactivate SRS Resource Set						
>>SRS Resource Set ID	M		9.2.33		-	
>Release ALL			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 *PRS Configuration Request Type* IE is set to the value "configure".
ifOff	This IE shall be present if the *PRS Configuration Request Type* 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		*1*			YES	ignore
>PRS Transmission TRP Item		*1 .. <maxnoTRPs>*			EACH	ignore
>>TRP ID	M		9.2.24		-	
>>PRS Configuration	M		9.2.44		-	

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		-	
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 indicate the NG-RAN node to activate the preconfigured measurement gap 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		-	
PRS Measurement Info List		*1*			YES	Ignore
>PRS Measurement Info Item		*1 .. < maxFreqLayers>*			-	
>>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..<maxnoofMeasTRPs>*			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 .. <maxnoPosMeas>*			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 *Measurement Characteristics Request Indicator* 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		YES	ignore
Measurement Characteristics Request Indicator	O		9.2.81		YES	ignore
Measurement Time Occasion	O		ENUMERATED (o1, o4, …)		YES	ignore

Condition	Explanation
ifReportCharacteristicsPeriodic	This IE shall be present if the *Report Characteristics* IE is set to the value "Periodic".
ifMeasPerExt	This IE shall be present if the *Measurement Periodicity* 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	Maxmum 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..<maxnoofMeasTRPs>*			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		9.2.11		YES	ignore

Range bound	Explanation
maxnoofMeasTRPs	Maxmum 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		9.2.11		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..<maxnoofMeasTRPs>*			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	Maxmum 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..*<maxnoofMeasTRPs>*			EACH	reject
>>TRP ID	M		9.2.24		-	
>>AoA Search Window Information	O		UL-AoA Assistance Information 9.2.66		YES	ignore

Range bound	Explanation
maxnoofMeasTRPs	Maxmum 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 maxNroOfErrors 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 *Geographical Coordinates* IE is used, the *NG-RAN Access Point Position* IE shall be ignored.	-	
Measured Results		*0*		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 NDL/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 NDL for FDD and NDL/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*			-	
>>>>>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*			-	
>>>>>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*			-	
>>>>>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*			-	
>>>>>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 *NG-RAN Cell*	M			
>NR Cell				
NR Cell Identifier	M		BIT STRING (36)	
>E-UTRAN Cell				
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))	Digits 0 to 9 encoded 0000 to 1001, 1111 used as filler digit. Two digits per octet: - bits 4 to 1 of octet n encoding digit 2n-1 - bits 8 to 5 of octet n encoding digit 2n PLMN Identity consists of 3 digits from MCC followed by either: - a filler digit plus 2 digits from MNC (in case of 2 digit MNC) or - 3 digits from MNC (in case of 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*			-	
>>>>>Result SS-RSRP Per SSB Item		*1..<maxIndexesReport)>*			-	
>>>>>>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*			-	

>>>>>Result SS-RSRQ Per SSB Item		*1..<maxIndexesReport>*			-	
>>>>>>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..<maxEUTRAMeas>*			-	
>>>>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			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			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 <maxnoOTDOAtypes>*				
>>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 *PCI* and/or *PRS-ID* 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

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 *PRS Muting Configuration*	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..<maxNrOfSegments>*		
>Assistance Data SIB Element	M		OCTET STRING	TS 37.355 [14]

Range bound	Explanation
maxNrOfSegments	Maximum number of positioning SIB segments (in case of *Assistance Information Element* 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, ...)	

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		*1..<maxnoAssistInfoFailureListItems>*		
>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 *TRP Information Item*	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 $T_0 + t_{\mathrm{SRS}}$, where - T_0 is the SFN Initialisation Time - $t_{\mathrm{SRS}} = (10n_{\mathrm{f}} + n_{\mathrm{sf}}) \times 10^{-3}$, where n_{f} and n_{sf} are the system frame number and the subframe number of the SRS, respectively. Granularity 4Ts, where Ts=1/(15·10^3 ·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 Ts=1/(15·10^3·2048) 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-ifResourceTypePeriodic		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 *Bandwidth*	M					
>FR1			ENUMERATED (5mHz, 10mHz, 20mHz, 40mHz, 50mHz, 80mHz, 100mHz, ...)			
>FR2			ENUMERATED (50mHz, 100mHz, 200mHz, 400mHz,…)			
SRS Resource Set List		*0.. 1*				
>SRS Resource Set Item		*1..< maxnoSRS-ResourceSets>*				
>>Number of SRS Resources Per Set	O		INTEGER (1..16,...)	The number of SRS Resources per resource set for SRS transmission.		
>>Periodicity List		*0.. 1*				
>>>Periodicity List Item		*1..<maxnoSRS-ResourcePerSet>*				
>>>>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 *Spatial Relation Information per SRS Resource* 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

Condition	Explanation
ifResourceTypePeriodic	This IE shall be present if the *Resource Type* 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..<maxnoSRS-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..<maxnoSRS-Resources>*		
>>>>>SRS Resource	M		9.2.29	*SRS-Resource* as defined in TS 38.331 [13]
>>>>Positioning SRS Resource List		*0..<maxnoSRS-PosResources>*		
>>>>>Positioning SRS Resource	M		9.2.30	*SRS-PosResource-r16* as defined in TS 38.331 [13]
>>>>SRS Resource Set List		*0..<maxnoSRS-ResourceSets>*		
>>>>>SRS Resource Set	M		9.2.31	*SRS-ResourceSet* as defined in TS 38.331 [13]
>>>>Positioning SRS Resource Set List		*0..<maxnoSRS-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.

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 *Transmission Comb*	M			
>*Comb Two*				
>>Comb Offset	M		INTEGER(0..1)	
>>Cyclic Shift	M		INTEGER(0..7)	
>*Comb Four*				
>>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 *Resource Type*	M			
>*Periodic*				
>>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, …)	
>*Semi-persistent*				
>>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, …)	
>*Aperiodic*				
>>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 *Transmission Comb*	M			
>*Comb Two*				
>>Comb Offset	M		INTEGER(0..1)	
>>Cyclic Shift	M		INTEGER(0..7)	
>*Comb Four*				
>>Comb Offset	M		INTEGER(0..3)	
>>Cyclic Shift	M		INTEGER(0..11)	
>*Comb Eight*				
>>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,n 4, 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 *Resource Type Positioning*	M			
>*periodic*				
>>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,…)	
>*semi-persistent*				
>>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,…)	
>*aperiodic*				
>>slot offset	M		INTEGER(0..32)	
Sequence ID	M		INTEGER(0..65535)	
CHOICE *Spatial Relation Positioning*	O			
>*SSB*				
>> NR PCI	M		INTEGER (0..1007)	
>>SSB index	O		INTEGER(0..63)	
>*PRS*				
>>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		*1..<maxnoSRS-ResourcePerSet>*		
>SRS Resource ID	M		INTEGER(0..63)	
CHOICE *Resource Set Type*	M			
>*periodic*				
>>periodicSet	M		ENUMERATED(true,…)	
>*semi-persistent*				
>>semi-persistentSet	M		ENUMERATED(true,…)	
>*aperiodic*				
>>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		1..*<maxnoSRS-PosResourcePerSet>*		
>Positioning SRS Resource ID	M		INTEGER(0..63)	
CHOICE *Resource Type*	M			
>periodic				
>>PosperiodicSet	M		ENUMERATED(true,…)	
>semi-persistent				
>>Possemi-persistentSet	M		ENUMERATED(true,…)	
>aperiodic				
>>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		*1..<maxnoSpatialRelations>*		According to TS 38.321 [15] and TS 38.331 [13]
CHOICE *Reference Signal*	M			
>*NZP CSI-RS*				
>>NZP 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		*1..<maxnoSRS-TriggerStates>*		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 Initalisation 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 .. <maxnoPosMeas>*				
>CHOICE *Measured Results Value*	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 *UL RTOA Measurement*	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 *Extended Additional Path List* 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 g*NB Rx-Tx Time Difference Measurement*	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 *Extended Additional Path List* 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		*1..<maxno path>*			-	
>CHOICE *Relative Path Delay*	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

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 *Slot Index*	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 *Measurement Quality*	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		*1..<maxnoofPRSresourceSet>*		
>>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		*NR-DL-PRS-Resource-r16* as defined in TS 37.355 [14]
>>>PRS Resource Item		*1..<maxnoofPRSresources>*		
>>>>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

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..<maxPRS-Resource Sets>*		
>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>CHOICE *DL-PRS Resource Set ARP Location*	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..<maxPRS-Resources PerSet>*		
>>DL-PRS Resource ID	M		INTEGER (0..63)	
>>CHOICE *DL-PRS Resource ARP Location*	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 *XYZ Unit* IE.
Y value	M		INTEGER (-2^{16}.. 2^{16}-1)	Positive value represents northing from reference point in units of *XYZ Unit* IE.
Z value	M		INTEGER (-2^{15}.. 2^{15}-1)	Height with respect to reference point in units of *XYZ Unit* 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 *ReferencePoint*	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…<maxNoSSBs>*		
>>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.. < maxPRS-ResourceSets >*				
>>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.. ..< maxPRS-ResourcesPerSet >*				
>>>>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..<maxnolcs-gcs-translation >*				
>>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 .. <maxnoBcastCell>*		
>NG-RAN-CGI	M		9.2.6	

Range bound	Explanation
maxnoBcastCells	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			
>NZP CSI-RS				
>>NZP 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..<maxnoofPRSresourceSet>*		
>>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 *Start Time and Duration* 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.
maxnoofPRSresource	Maximum no of PRS resources per PRS resource set. Value is 64.

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*		*NR-DL-PRS-Resource-r16* as defined in TS 37.355 [14]
>Requested DL-PRS Resource Item		*1..<maxnoofPRSresource>*		
>>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 *level*	M			
>TRP level			NULL	
>PRS resource set level				
>>PRS Resource Set List		*1*		
>>>PRS Resource Set Item		*1..<maxnoofPRSresourceSet>*		
>>>>PRS Resource Set ID	M		INTEGER(0..7)	
>PRS resource level				
>>PRS Resource Set List		*1*		
>>>PRS Resource Set Item		*1..<maxnoofPRSresourceSet>*		
>>>>PRS Resource Set ID	M		INTEGER(0..7)	
>>>>PRS Resource List		*1*		
>>>>>PRS Resource Item		*1..<maxnoofPRSresource>*		
>>>>>>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))	This IE applies only if the fourth bit of the On-demand PRS Request Allowed IE is set to '1'. 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.
Allowed Comb Size Values	O		BIT STRING (SIZE(8))	This IE applies only if the fifth bit of the On-demand PRS Request Allowed IE is set to '1'. 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.

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 *AngleMeasurement*	M			
>Expected UL Angle of Arrival				
>>Expected Azimuth AoA		*1*		Defined as (φ_{AOA} - $\Delta\varphi_{AOA}$/2, φ_{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 (θ_{ZOA} – $\Delta\theta_{ZOA}$/2, θ_{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 (θ_{ZOA} – $\Delta\theta_{ZOA}$/2, θ_{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.

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		INTEGER (0..64)	Value 0 represents an infinite number of periodic reporting
Reporting Interval	M		ENUMERATED (none, 0.25, 0.5, 1, 2, 4, 8, 16, 32, 64)	

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 *AngleMeasurement*	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 *Reference Signal*	M			
>SRS				
>>SRS Resource ID	M		INTEGER(0..63)	
>>SRS Resource Set ID	M		9.2.33	
>Positioning SRS				
>>Positioning SRS Resource ID	M		INTEGER(0..63)	
>>Positioning SRS Resource Set ID	M		INTEGER(0..15)	

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		*1..<maxno ExtPath>*		
>CHOICE *Relative Path Delay*	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
maxnoExtPath	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		*1*		
>ARP Location Information Item		*1..<maxno ARPs>*		
>>ARP ID	M		9.2.75	
>>CHOICE *ARP Location Type*	M			
>>>geodetic				
>>>>ARP Position Relative Geodetic	M		Relative Geodetic Location 9.2.48	
>>>cartesian				
>>>>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 *LoS/NLoS Indicator*	M			
>*Soft Indicator*				
>>LoS/NLoS Indicator Soft	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.
>*Hard Indicator*				
>>LoS/NLoS Indicator Hard	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	1 .. <maxnoUETEGs>			
>UE Tx TEG ID	M		INTEGER (0..7)	
>SRS Resource Set ID	M		INTEGER (0..15)	
>SRS Resource ID List		0..<maxnoSRS-ResourcePerSet>		
>>SRS Resource ID	M		INTEGER(0..63)	

Range bound	Explanation
maxnoUETEGs	Maximum no of reported UE Tx TEG association. Value is 8.
maxnoSRS-ResourcePerSet	Maximum no of SRS Resources per 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	*1 .. <maxnoTRPTEGs>*			
>TRP Tx TEG ID	M		INTEGER (0..7)	
>DL-PRS Resource Set ID	M		INTEGER (0..7)	
>DL-PRS Resource ID List		*0..<maxPRS-ResourcesPerSet>*		
>>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 *TRP TEG ID*	M			
>RxTx TEG				
>>TRP RxTx TEG ID	M		INTEGER (0..255)	
>>TRP Tx TEG ID	O		INTEGER (0..7)	
>Rx TEG				
>>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))	Each position in the bitmap represents a requested measurement characteristic: first bit: Measurement Beam Information Second bit: Extended Additional Path List Third bit: Additional Path Power Fourth Bit: Multiple UL AoA of Additional Path Fifth bit: LoS/NLoS Information Sixth bit: TRP Rx TEG association for UL-TDOA Seventh bit: TRP RxTxTEG-ID information for DL+UL positioning. Eighth bit: SRS Resource Type Other bits reserved for future use. Value ‘1’ indicates ‘requested measurement characteristic’, Value ‘0’ indicates ‘not requested’.

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 *TRP Beam Antenna Info Item*	M			
>*Reference*				
>>Associated TRP ID	M		TRP ID 9.2.24	This IE specifies the *TRP ID* of the associated TRP from which the beam information parameters are adopted.
>*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	M	*1..< maxnoAzimuthAngles>*		
>TRP Azimuth Angle	M		INTEGER (0..3599)	Scale factor 0.1 deg. 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 Elevation Angle List		*1*		
>>TRP Elevation Angle		*1..<maxnoElevationAngles>*		
>>>TRP Elevation Angle	M		INTEGER (0..1800)	Scale factor 0.1 deg. 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 Beam Power List				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.
>>>>>Relative Power	M		INTEGER (0..500)	Scale factor -0.1 dB

Range bound	Explanation
maxNumResourcesPerAngle	Maximum number of DL-PRS Resources per angle per TRP. Value is 512.
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
```

```
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-MeasurementPperiodicityExtended,
    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



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 Characteritics 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 Characteritics 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}|
    { ID id-MeasurementTimeOccasion         CRITICALITY ignore  TYPE MeasurementTimeOccasion    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},
    ...
}

-- **************************************************************
--
-- 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,
    sRSType-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-PRSTRPList              CRITICALITY ignore  TYPE PRSTRPList                        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 mandatory},
    ...
}

-- **************************************************************
--
-- 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-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-PRS-Measurements-Info-List  CRITICALITY ignore  TYPE PRS-Measurements-Info-List PRESENCE mandatory},
    ...
}


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-OnDemandTRPPRS,
    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



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},
    ...
}

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-TranslationAoA   LCS-to-GCS-TranslationAoA       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,
    cause-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, ...)

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

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 reject EXTENSION ARPLocationInformation     PRESENCE optional},
    ...
}


GNB-RxTxTimeDiff ::= SEQUENCE {

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

LCS-to-GCS-TranslationAoA-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-NLoSInfoRequest ::= ENUMERATED {true, ...}

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, ...)

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,
    measuredResultsValue-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 { { AngleMeasurementType-ExtIEs } }
}

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


-- N

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

NG-RANAccessPointPosition ::= SEQUENCE {
    latitudeSign                INTEGER {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,
    nG-RANCell-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)

-- O

OnDemandTRPPRS-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 { { OnDemandTRPPRS-Info-ExtIEs} } OPTIONAL,
    ...
}

OnDemandTRPPRS-Info-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
```

```
    ...
}

OTDOACells ::= SEQUENCE (SIZE (1.. maxCellinRANnode)) 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,
    oTDOACell-Information-Item-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,
    otherRATMeasuredResultsValue-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,
    ...
}

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,
    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 ::= {
    ...
}

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 },
    ...
```

```
}

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

PRSInformationPos-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)),
    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)),
    pRSMutingConfiguration-EUTRA-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,
    pRSMutingOption2            PRSMutingOption2,
    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),
    pRSResource-List                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},
    ...
}

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,...), -- FFS
    timeUnit      ENUMERATED {second, ten-seconds, ten-milliseconds,...}, -- FFS
    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

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,
    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 ::= {
    ...
}



SRSConfig  ::= SEQUENCE {
    sRSResource-List            SRSResource-List OPTIONAL,
    posSRSResource-List         PosSRSResource-List OPTIONAL,
    sRSResourceSet-List         SRSResourceSet-List OPTIONAL,
    posSRSResourceSet-List      PosSRSResourceSet-List OPTIONAL,
    iE-Extensions                   ProtocolExtensionContainer { { SRSConfig-ExtIEs } } OPTIONAL,
    ...
}

SRSConfig-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 ::= {
    ...
}


SRSConfiguration ::= SEQUENCE {
    sRSCarrier-List     SRSCarrier-List,
    iE-Extensions           ProtocolExtensionContainer { { SRSConfiguration-ExtIEs } } OPTIONAL,
    ...
}

SRSConfiguration-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,
    sRSResourceSetID    SRSResourceSetID,
    ...
```

```
}

PosSRSInfo ::= SEQUENCE {
    posSRSResourceID        SRSPosResourceID,
    posSRSResourceSetID     INTEGER(0..15),
    ...
}


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 ::= {
    ...
}


-- 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, ...},
    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}}           OPTIONAL,
    ...
}

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-TranslationAoA                                   OPTIONAL,
    iE-Extensions           ProtocolExtensionContainer {{ TRP-BeamAntennaExplicitInformation-ExtIEs}}           OPTIONAL,
    ...
}

TRP-BeamAntennaExplicitInformation-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

TRP-BeamAntennaAngles ::= SEQUENCE (SIZE (1.. maxnoAzimuthAngles)) OF TRP-BeamAntennaAnglesList-Item

TRP-BeamAntennaAnglesList-Item ::= SEQUENCE {
    trp-azimuth-angle                   INTEGER (0..3599),
    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..1800),
    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..500),
    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,
    ...
}

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                      TRP-ID,
    aoA-window-information      AoA-AssistanceInfo  OPTIONAL,
    iE-extensions                   ProtocolExtensionContainer { { TRP-MeasurementUpdateItem-ExtIEs } } OPTIONAL,
    ...
}

TRP-MeasurementUpdateItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}


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-OnDemandTRPPRS              CRITICALITY reject TYPE OnDemandTRPPRS-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,
        ondemandTRPPRSInfo,
        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,
    ...
}

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UARFCN ::= INTEGER (0..16383, ...)

UE-Measurement-ID ::= INTEGER (1..15, ..., 16..256)

UEReportingInformation::= SEQUENCE {
    reportingAmount             INTEGER (0..64),
    reportingInterval           ENUMERATED {none, quarter, half, one, two, four, eight, sixteen, 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),
        sRSResourceSetID        SRSResourceSetID,
        sRSResourceSetID-List   SEQUENCE (SIZE(1.. maxnoSRS-ResourcePerSet)) OF SRSResourceID-Item   OPTIONAL,
    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-TranslationAoA   LCS-to-GCS-TranslationAoA      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-TranslationAoA   LCS-to-GCS-TranslationAoA       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
maxCellinRANnode                        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 ::= 512
```

```
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-PRSTRPList                                       ProtocolIE-ID ::= 66
id-PRSTransmissionTRPList                           ProtocolIE-ID ::= 67
id-OnDemandTRPPRS                                   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-UETxTEGAssociation                               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


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 alignement 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

History

Document history		
V17.0.0	May 2022	Publication