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TECHNICAL SPECIFICATION

**5G;  
NG-RAN;  
NR Positioning Protocol A (NRPPa)  
(3GPP TS 38.455 version 16.16.0 Release 16)**



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# Foreword

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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".

## 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
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
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

WAAS            Wide Area Augmentation System  
Z-AoA           Zenith Angles of Arrival

## 4 General

### 4.1 Procedure specification principles

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

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

- The procedure text discriminates between:
  - 1) Functionality which "shall" be executed
 

The procedure text indicates that the receiving node "shall" perform a certain function Y under a certain condition. If the receiving node supports procedure X but cannot perform functionality Y requested in the initiating message of a Class 1 EP, the receiving node shall respond with the message used to report unsuccessful outcome for this procedure, containing an appropriate cause value.
  - 2) Functionality which "shall, if supported" be executed
 

The procedure text indicates that the receiving node "shall, if supported," perform a certain function Y under a certain condition. If the receiving node supports procedure X, but does not support functionality Y, the receiving node shall proceed with the execution of the EP, possibly informing the requesting node about the not supported functionality.
- Any required inclusion of an optional IE in a response message is explicitly indicated in the procedure text. If the procedure text does not explicitly indicate that an optional IE shall be included in a response message, the optional IE shall not be included. For requirements on including *Criticality Diagnostics* IE, see section 10.

### 4.2 Forwards and backwards compatibility

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

### 4.3 Specification notations

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

Procedure	When referring to an elementary procedure in the specification the Procedure Name is written with the first letters in each word in upper case characters followed by the word "procedure", e.g. Handover Preparation procedure.
Message	When referring to a message in the specification the MESSAGE NAME is written with all letters in upper case characters followed by the word "message", e.g. ERROR INDICATION message.
IE	When referring to an information element (IE) in the specification the <i>Information Element Name</i> is written with the first letters in each word in upper case characters and all letters in Italic font followed by the abbreviation "IE", e.g. <i>Cause</i> IE.
Value of an IE	When referring to the value of an information element (IE) in the specification the "Value" is written as it is specified in sub clause 9.2 enclosed by quotation marks, e.g. "Value".

---

## 5 NRPPa services

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

### 5.1 NRPPa procedure modules

The procedures are divided into two modules as follows:

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

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

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

### 5.2 Parallel transactions

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

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## 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.

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**

<b>Function</b>	<b>Elementary Procedure(s)</b>
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

## 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**

<b>Elementary Procedure</b>	<b>Initiating Message</b>	<b>Successful Outcome</b>	<b>Unsuccessful Outcome</b>
		<b>Response message</b>	<b>Response message</b>
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

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

## 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

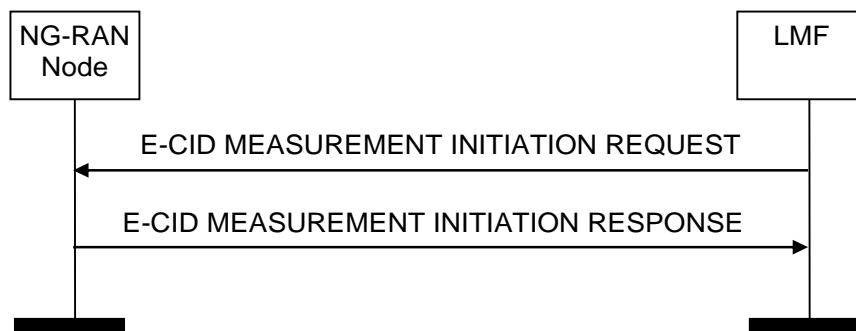


Figure 8.2.1.2-1: E-CID Measurement Initiation procedure, successful operation

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.

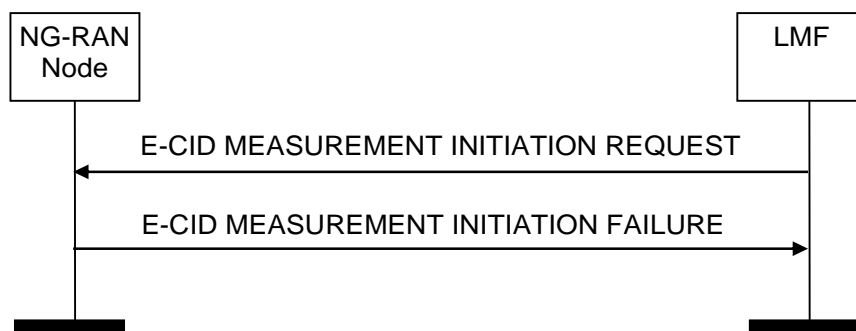
The *Measured Results* IE shall be included in the *E-CID Measurement Result* IE of the E-CID MEASUREMENT INITIATION RESPONSE message when measurement results other than the "Cell-ID" have been requested.

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 or the *Geographical Coordinates* 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**

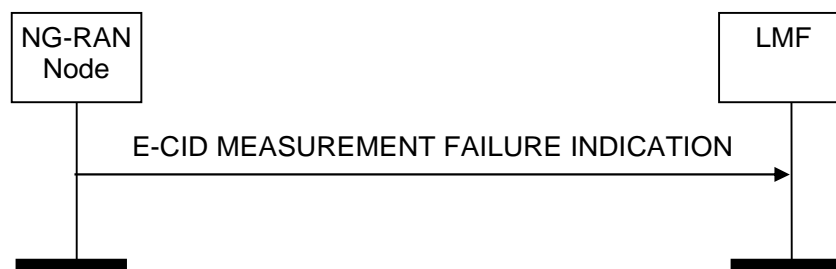
If the NG-RAN node is not able to initiate at least one of the requested E-CID measurements, the NG-RAN node shall respond with an E-CID MEASUREMENT INITIATION FAILURE message.

## 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

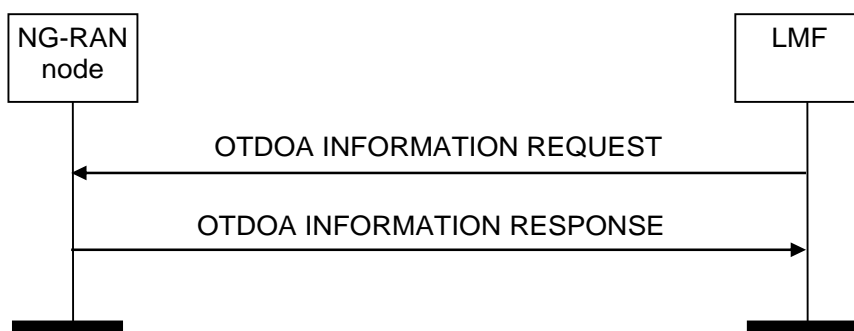
Not applicable.

## 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.

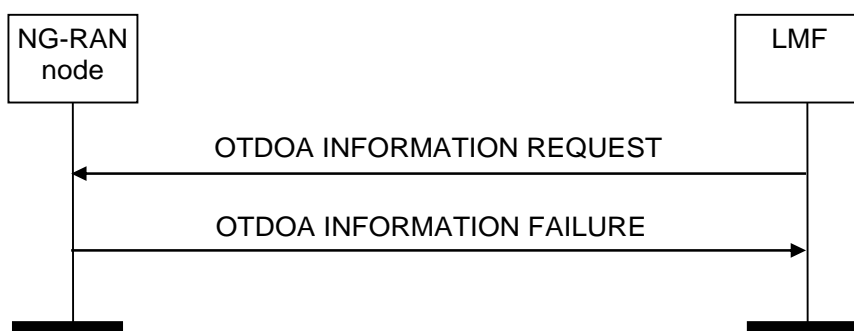
### 8.2.5.2 Successful Operation



**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**

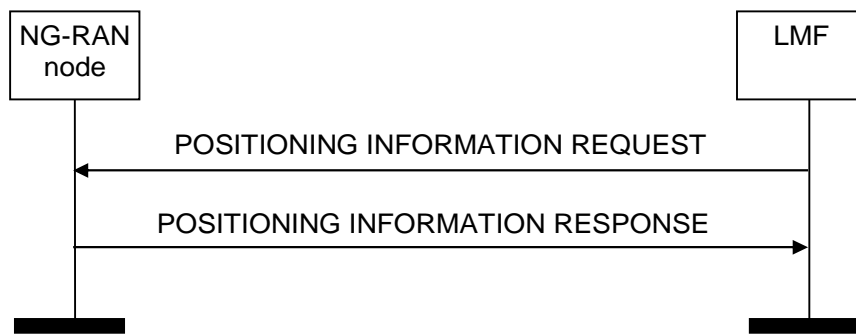
If the NG-RAN node does not have any OTDOA information to report, the NG-RAN node shall respond with an OTDOA INFORMATION FAILURE message.

## 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



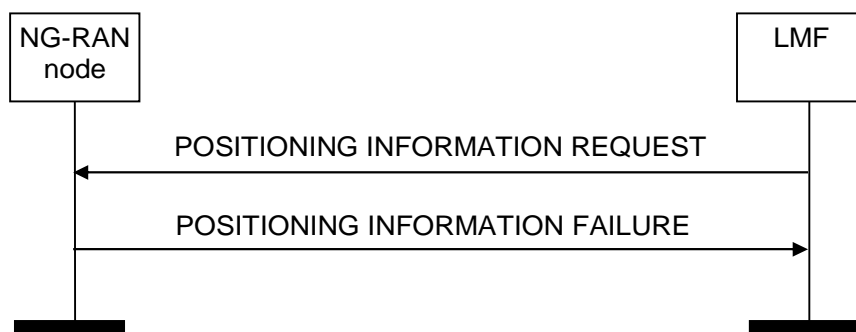
**Figure 8.2.6.2-1: Positioning Information Exchange procedure, successful operation**

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.

### 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

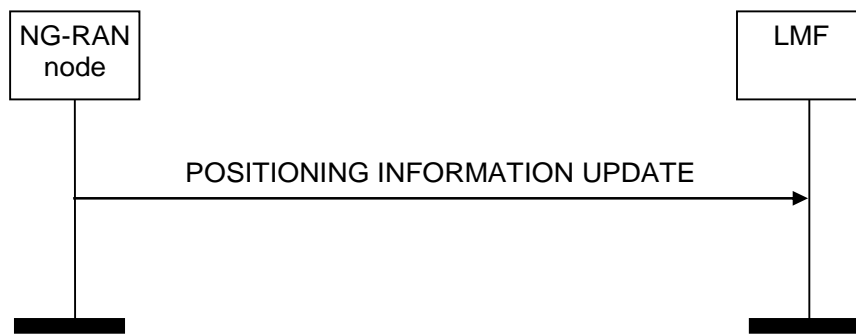
Void.

## 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. 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 *SRS Transmission Status* IE is included in the POSITIONING INFORMATION UPDATE message and set to "stopped", the LMF shall consider that the SRS transmission has stopped.

### 8.2.7.3 Unsuccessful Operation

Not Applicable.

### 8.2.7.4 Abnormal Conditions

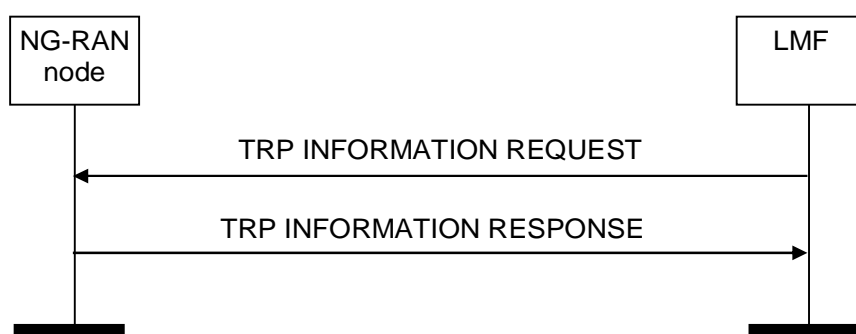
Void.

## 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.

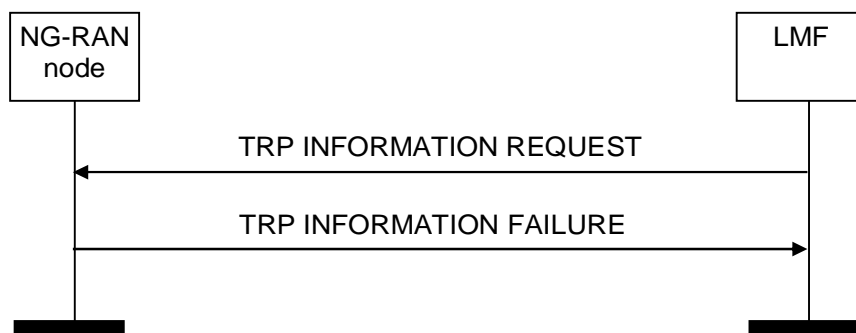
If the *TRP List* IE is not included in the TRP INFORMATION REQUEST message, the NG-RAN node should include the requested information for all TRPs hosted by the NG-RAN node in the TRP INFORMATION RESPONSE message

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**

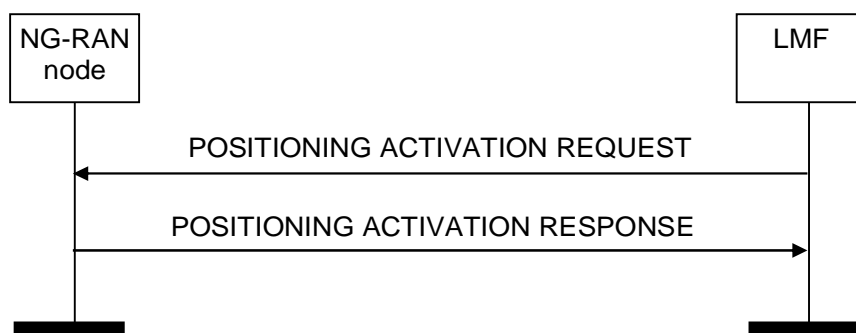
If the NG-RAN node cannot provide any of the requested information for any TRP, the NG-RAN node shall respond with a TRP INFORMATION FAILURE message.

## 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**

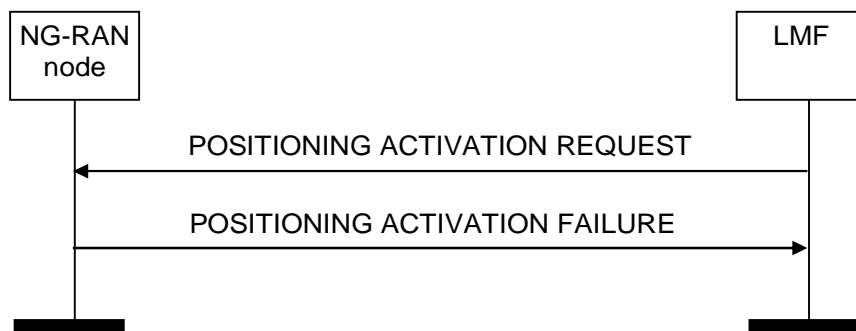
The LMF initiates the procedure by sending a POSITIONING ACTIVATION REQUEST message to the NG-RAN node.

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.

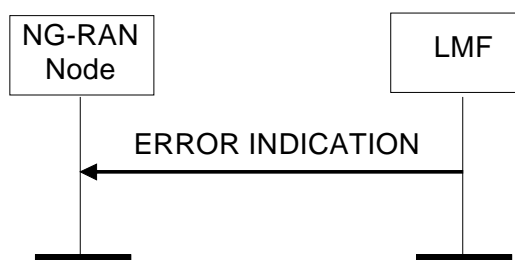
## 8.3 Management Procedures

### 8.3.1 Error Indication

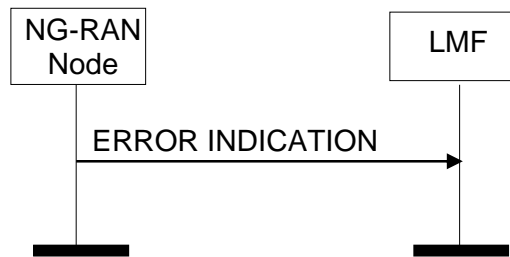
#### 8.3.1.1 General

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 replace any previously received assistance information with the newly received information, and use the newly 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 Node shall, if supported, consider that the procedure is applicable only to the indicated cells in this IE.

### 8.4.1.3 Abnormal Conditions

If the *Broadcast* IE is set to "start", and the *Assistance Information* IE is not included, the NG-RAN Node shall consider the procedure as failed.

If the *Broadcast* IE is not 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.

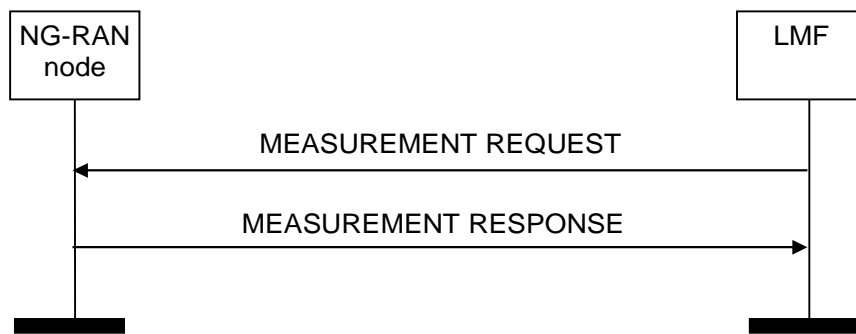
## 8.5 Measurement Information Transfer

### 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.

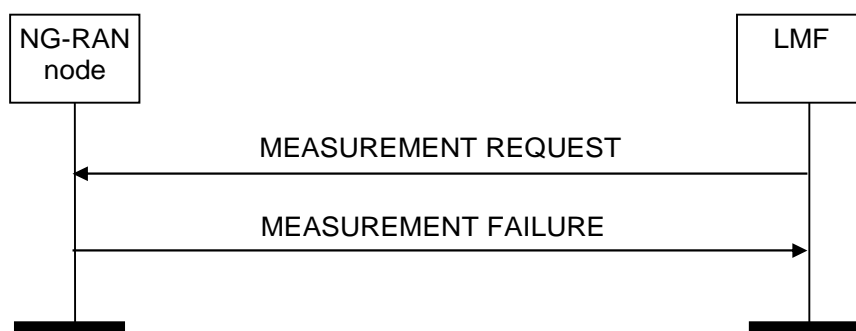
If the *Measurement Beam Information Request* IE is included in the MEASUREMENT REQUEST message, the NG-RAN node shall, if supported, include the *Measurement Beam Information* IE in the *Measurement Result* IE of the MEASUREMENT RESPONSE message.

If the *Measurement Quality* IE is included in the *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.

### 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

Not applicable.

### 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 8.5.2.2.1: Measurement Report procedure. Successful operation.**

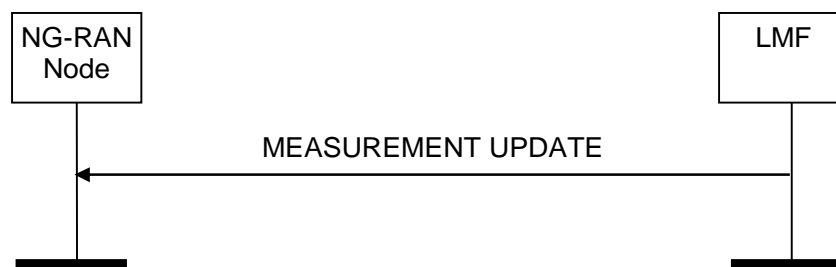
The NG-RAN node initiates the procedure by sending a MEASUREMENT REPORT message to the LMF. The MEASUREMENT REPORT message contains the measurement results according to the associated measurement configuration.

### 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. Upon receiving the message, the NG-RAN node shall overwrite the previously received measurement configuration.

### 8.5.3.3 Unsuccessful Operation

Not applicable.

### 8.5.3.4 Abnormal Conditions

If the NG-RAN node cannot identify 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- ifReportCh aracteristi csPeriodic		ENUMERATED (120ms, 240ms, 480ms, 640ms, 1024ms, 2048ms, 5120ms, 10240ms, 1min, 6min, 12min, 30min, 60min,..., 20480ms,	The codepoint 60min applies only for ng-eNB.  The codepoint "extended" is not applicable.  This IE is not applicable to NR Angle of Arrival.	YES	reject

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
			40960ms, extended)			
<b>Measurement Quantities</b>		1 .. <maxnoMeas>			EACH	reject
>Measurement Quantities Item	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)		-	-
Other-RAT Measurement Quantities		0 .. <maxnoMeas>			EACH	ignore
>Other-RAT Measurement Quantities Item	M		ENUMERATED (GERAN, UTRAN,..., NR, EUTRA)			
WLAN Measurement Quantities		0 .. <maxnoMeas>			EACH	ignore
>WLAN Measurement Quantities Item	M		ENUMERATED (WLAN, ...)		-	
Measurement Periodicity NR-AoA	C-ifReportCharacteristicsPeriodicAndMeasurementQuantityItemAoA		ENUMERATED (160ms, 320ms, 640ms, 1280ms, 2560ms, 5120ms, 10240ms, 20480ms, 40960ms, 61440ms, 81920ms, 368640ms, 737280ms, 1843200ms, ...)		YES	reject

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

Condition	Explanation
ifReportCharacteristicsPeriodic	This IE shall be present if the <i>Report Characteristics</i> IE is set to the value "Periodic".
ifReportCharacteristicsPeriodicAndMeasurementQuantityItemAoA	This IE shall be present if the <i>Report Characteristics</i> IE is set to the value "Periodic" and the <i>Measurement Quantities Item</i> IE is set to the value "NR Angle of Arrival".

### 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		-	
<b>OTDOA Information Type</b>		1 .. <maxnoOTDOAtype s>			EACH	reject
>OTDOA Information Item	M		ENUMERATED (pci, cellid, tac, earfcn, prsBandwidth, prsConfigIndex, cpLength, noDIFrames, noAntennaPorts, sFNInitTime, nG-RANAccessPointPosition, prsmutingconfiguration, prsid, tpid, tpType, crsCPLength, dlBandwidth, multipleprsConfigurationsperCel		-	-

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
			l, prsOccasionGroup, prsFrequencyHoppingConfiguration, ..., tddConfig)			

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

### 9.1.1.8 OTDOA INFORMATION RESPONSE

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

Direction: NG-RAN node → LMF.

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

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

### 9.1.1.9 OTDOA INFORMATION FAILURE

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

Direction: NG-RAN node → LMF.

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

### 9.1.1.10 POSITIONING INFORMATION REQUEST

This message is sent by 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

### 9.1.1.11 POSITIONING INFORMATION RESPONSE

This message is sent by 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

### 9.1.1.12 POSITIONING INFORMATION FAILURE

This message is sent by 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 NG-RAN node to indicate that a change in the SRS configuration 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
SRS Transmission Status	O		ENUMERATED (stopped, ...)		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		-	
<b>TRP List</b>		0..1			YES	ignore
>TRP Item		1.. <maxnoTRPs>			EACH	ignore
>>TRP ID	M		9.2.24		-	
<b>TRP Information Type List</b>		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)			

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		-	
<b>TRP Information List</b>		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

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

### 9.1.1.17 POSITIONING ACTIVATION REQUEST

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

Direction: LMF → NG-RAN node.

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

### 9.1.1.18 POSITIONING ACTIVATION RESPONSE

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

Direction: NG-RAN node → LMF.

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

### 9.1.1.19 POSITIONING ACTIVATION FAILURE

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

Direction: NG-RAN node → LMF.

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

### 9.1.1.20 POSITIONING DEACTIVATION

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

Direction: LMF → NG-RAN node.

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

## 9.1.2 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

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Broadcast	O		ENUMERATED (start, stop, ...)		YES	reject
Positioning Broadcast Cells	O		9.2.59		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 <i>Assistance Information Failure List</i> 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
<b>TRP Measurement Request List</b>		1			YES	reject
<b>&gt;TRP Measurement Request Item</b>		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>>Search Window Information	O		9.2.26		-	
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the <i>TRP ID</i> IE.	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,	The codepoint 120ms, 240ms, 480ms, 1024ms, 2048ms, 1min, 6min, 12min, 30min, and 60min are not applicable	YES	reject

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
			30min, 60min,..., 20480ms, 40960ms, extended)			
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,...)		-	
>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,...)		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

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

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

### 9.1.4.2 MEASUREMENT RESPONSE

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

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
<b>TRP Measurement Response List</b>		0..1			YES	reject
<b>&gt;TRP Measurement Response Item</b>		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>> TRP Measurement Result	M		9.2.37		-	
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the TRP ID IE.	YES	ignore
Criticality Diagnostics	O		9.2.11		YES	ignore

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

### 9.1.4.3 MEASUREMENT FAILURE

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

Direction: NG-RAN node → LMF.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	reject
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
Cause	M		9.2.1		YES	ignore
Criticality Diagnostics	O		9.2.11		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
<b>TRP Measurement Response List</b>		1			YES	reject
<b>&gt;TRP Measurement Response Item</b>		1..<maxno ofMeasTRPs>			EACH	reject
>>TRP ID	M		9.2.24		-	
>> TRP Measurement Result	M		9.2.37		-	

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
>>Cell ID	O		NR CGI 9.2.9	The Cell ID of the TRP identified by the <i>TRP ID</i> IE.	YES	ignore

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

#### 9.1.4.5 MEASUREMENT UPDATE

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

Direction: LMF → NG-RAN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.3		YES	ignore
NRPPa Transaction ID	M		9.2.4		-	
LMF Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
RAN Measurement ID	M		INTEGER (1..65536, ...)		YES	reject
SRS Configuration	O		9.2.28		YES	ignore

#### 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, ... )	
>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

Radio Network Layer cause	Meaning
	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.

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)
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)
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)
Message not Compatible with Receiver State	The received message was not compatible with the receiver state (see sub clause 10.4)
Semantic Error	The received message included a semantic error (see sub clause 10.4)
Transfer Syntax Error	The received message included a transfer syntax error (see sub clause 10.2)
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	
<b>Information Element Criticality Diagnostics</b>		$0 .. <maxNrOfErrors>$		
>IE Criticality	M		ENUMERATED (reject, ignore, notify)	The IE Criticality is used for reporting the criticality of the triggering IE. The value "ignore" shall not be used.
>IE ID	M		INTEGER (0..65535)	The IE ID of the not understood or missing IE.
>Type Of Error	M		ENUMERATED (not understood, missing, ...)	

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

### 9.2.3 Message Type

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

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

### 9.2.4 NRPPa Transaction ID

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

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

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

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

### 9.2.5 E-CID Measurement Result

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Serving Cell ID	M		NG-RAN CGI 9.2.6	NG-RAN Cell Identifier of the serving cell	-	
Serving Cell TAC	M		TAC 9.2.11	Tracking Area Code of the serving cell	-	
NG-RAN Access Point Position	O		9.2.10	The configured estimated geographical position of the antenna of the cell. If the <i>Geographical Coordinates</i> IE is used, the <i>NG-RAN Access Point Position</i> IE shall be ignored.	-	
Measured Results		0 .. <maxnoM eas>		Measurement results of the serving RAT.	-	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
>CHOICE <i>Measured Results Value</i>	M				-	
>>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)	According to mapping in TS 36.214 [17]	-	
>>>Value Timing Advance Type 2 EUTRA	M		INTEGER (0..7690)	According to mapping in TS 36.214 [17]	-	
>>>Result RSRP EUTRA		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 NDLC for FDD and NDLC/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 .. <maxCell Report>			-	
>>>>> PCI EUTRA	M		INTEGER (0..503)	Physical Cell Identifier of the reported E-UTRA cell	-	
>>>>>EARFCN	M		INTEGER (0..262143, ...)	Corresponds to NDLC for FDD and NDLC/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 .. <maxCell ReportNR >			YES	ignore
>>>>>>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 .. <maxIndexesReport >			-	
>>>>>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>>>>>>Value SS-	M		INTEGER	SS-RSRP	-	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
RSRP			(0..127)	measurement per SSB resource		
<b>&gt;&gt;Result SS-RSRQ</b>		1 .. <maxCell ReportNR >			YES	ignore
>>>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	-	
<b>&gt;&gt;&gt;SS-RSRQ per SSB Resource</b>		0 .. <maxIndicesReport >			-	
>>>>SSB Index	M		INTEGER (0..63)		-	
>>>>Value SS-RSRQ	M		INTEGER (0..127)	SS-RSRQ measurement per SSB resource	-	
<b>&gt;&gt;Result CSI-RSRP</b>		1 .. <maxCell ReportNR >			YES	ignore
>>>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	-	
<b>&gt;&gt;&gt;CSI-RSRP per CSI-RS Resource</b>		0 .. <maxIndicesReport >			-	
>>>>CSI-RS Index	M		INTEGER (0..95)		-	
>>>>Value CSI-RSRP	M		INTEGER (0..127)	CSI-RSRP measurement per CSI-RS resource	-	
<b>&gt;&gt;Result CSI-RSRQ</b>		1 .. <maxCell ReportNR >			YES	ignore
>>>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	-	
<b>&gt;&gt;&gt;CSI-RSRQ per CSI-RS Resource</b>		0 .. <maxIndicesReport >			-	
>>>>CSI-RS Index	M		INTEGER (0..95)		-	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
>>>>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
Geographical Coordinates	O		9.2.46		YES	ignore

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

## 9.2.6 NG-RAN CGI

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

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

## 9.2.7 CGI EUTRA

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

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

## 9.2.8 PLMN Identity

This IE indicates the PLMN Identity.

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

IE/Group Name	Presence	Range	IE type and reference	Semantics description
				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 <sup>23</sup> -1)	The IE value (N) is derived by this formula: $N \leq 2^{23} \times X / 90 < N+1$ X being the latitude in degrees (0°.. 90°).
Degrees Of Longitude	M		INTEGER (-2 <sup>23</sup> ..2 <sup>23</sup> -1)	The IE value (N) is derived by this formula: $N \leq 2^{24} \times X / 360 < N+1$ X being the longitude in degrees (-180°..+180°).
Direction of Altitude	M		ENUMERATED (Height, Depth)	
Altitude	M		INTEGER (0..2 <sup>15</sup> -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 $r = 10 \times (1.1^{k-1})$ .
Uncertainty semi-minor	M		INTEGER (0..127)	The uncertainty "r" is derived from the "uncertainty code" k by $r = 10 \times (1.1^{k-1})$ .
Orientation of major axis	M		INTEGER (0..179)	
Uncertainty Altitude	M		INTEGER (0..127)	The uncertainty altitude "h" expressed in metres is derived from the "uncertainty code" k, by: $h = 45 \times (1.025^{k-1})$ .
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
<b>Other-RAT Measured Results</b>		1.. <maxnoMeas>				
>CHOICE <i>Other-RAT Measured Results Value</i>	M					
>>Result GERAN	M	1..<maxGERANMeasurements>				
>>>ARFCN of BCCH	M		INTEGER (0..1023, ...)			
>>>Physical CellId GERAN	M		INTEGER (0..63, ...)			
>>>RSSI	M		INTEGER (0..63, ...)			
>>Result UTRAN		1..<maxUTRANMeasurements>				
>>>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..<maxNRMeasurements>			YES	ignore
>>>NR PCI	M		INTEGER (0..1007)		-	
>>>NR ARFCN	M		INTEGER (0..3279165)		-	

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

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

## 9.2.15 OTDOA Cell Information

This IE contains OTDOA information of a cell/TP.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned criticality
<b>OTDOA Cell Information</b>		1.. <maxnoOTDOAtype s>				
>CHOICE OTDOA Cell Information Item	M					
>>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 <sub>DL</sub> for FDD and N <sub>DL/UL</sub> for TDD in ref. TS 36.104 [7].		
>>PRS Bandwidth EUTRA	M		ENUMERATED (bw6, bw15, ...)	Transmission bandwidth of PRS		

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned criticality
			bw25, bw50, bw75, bw100, ...)			
>>PRS Configuration Index EUTRA	M		INTEGER (0..4095, ...)	PRS Configuration Index, ref TS 36.211 [10]		
>>CP Length EUTRA	M		ENUMERATED (Normal, Extended, ...)	Cyclic prefix length of the PRS		
>>Number of DL Frames EUTRA	M		ENUMERATED (sf1, sf2, sf4, sf6, ...)	Number of consecutive downlink subframes $N_{PRS}$ with PRS, ref TS 36.211 [10]		
>>Number of Antenna Ports EUTRA	M		ENUMERATED (n1-or-n2, n4, ...)	Number of used antenna ports, where n1-or-n2 corresponds to 1 or 2 ports, n4 corresponds to 4 ports		
>>SFN Initialisation Time EUTRA	M		BIT STRING (64)	Time in seconds relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time reference) where binary encoding of the integer part is in the first 32 bits and binary encoding of the fraction part in the last 32 bits. The fraction part is expressed with a granularity of $1/2^{**32}$ second.		
>>NG-RAN Access Point Position	M		9.2.10	The configured estimated geographical position of the antenna of the cell/TP.		
>>PRS Muting Configuration EUTRA	M		9.2.16	The configuration of positioning reference signals muting pattern.		
>>PRS-ID EUTRA	M		INTEGER (0..4095, ...)	PRS ID, ref TS 36.211 [10].		
>>TP-ID EUTRA	M		INTEGER (0..4095, ...)	Identity of the transmission point. This IE together with the <i>PCI</i> and/or <i>PRS-ID</i> may be used to identify the transmission point in case the same physical cell ID is		

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

## 9.2.17 PRS Frequency Hopping Configuration EUTRA

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Number of Frequency Hopping Bands	M		ENUMERATED (twobands, fourbands, ...)	Number of bands for frequency hopping.
<b>Band Positions</b>		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
<b>Assistance Information</b>	M			
> <b>System Information</b>		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]
>> <b>Pos SIBs</b>		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
<b>PosSIB Segments</b>		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 <i>Assistance Information Element</i> contains segmented data according to TS 37.355 [14]). Value is 64.

## 9.2.21 Assistance Information Meta Data

This parameter contains meta data for an assistance information element.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Encrypted	O		ENUMERATED (true, ...)	
GNSS ID	O		ENUMERATED (gps, sbas, qzss, galileo, glonass, bds, navic ...)	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
SBAS ID	O		ENUMERATED (waas, egnos, msas, gagan, ...)	

### 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	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
>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		-	
<b>TRP Information Type</b>		1 .. <maxnoTRPInfoTypes>			-	
>CHOICE <i>TRP Information Item</i>	M				-	
>>NR PCI	M		INTEGER (0..1007)	NR Physical Cell ID	-	
>>NR CGI	M		9.2.9		-	
>>NR ARFCN	M		INTEGER (0..3279165)		-	
>>PRS Configuration	M		9.2.44		-	
>>SSB Information	M		9.2.54		-	
>>SFN Initialisation Time	M		Relative Time 1900 9.2.36		-	
>>Spatial Direction Information	M		9.2.45		-	
>>Geographical Coordinates	M		9.2.46		-	
>>TRP type	M		ENUMERATED (prs-only-tp, srs-only-rp, tp, rp, trp...)	TS 38.305 [18]	YES	reject

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

### 9.2.26 Search Window Information

This information element contains search window information for the TRP.

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

## 9.2.27 Requested SRS Transmission Characteristics

This IE contains the requested SRS configuration for the UE.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
Number Of Periodic Transmissions	C- ifResource TypePeriodic		INTEGER (0..500,...)	The number of periodic SRS transmissions requested. The value of '0' represents an infinite number of periodic SRS transmissions.		
Resource Type	M		ENUMERATED (periodic, semi-persistent, aperiodic, ...)			
CHOICE <i>Bandwidth</i>	M					
>FR1			ENUMERATED (5mHz, 10mHz, 20mHz, 40mHz, 50mHz, 80mHz, 100mHz, ... , rel-18-dummy1, rel-18-dummy2, 15mHz, 25mHz, 30mHz, 60mHz)	The codepoints 'rel-18-dummy1' and 'rel-18-dummy2' are ignored.		
>FR2			ENUMERATED (50mHz, 100mHz, 200mHz, 400mHz,...)			
SRS Resource Set List		0.. 1				
>SRS Resource Set Item		1..< <i>maxnoSRS-Resource Sets</i> >				

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description	Criticality	Assigned Criticality
>>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..<maxno SRS-Resource PerSet>				
>>>>PeriodicitySRS	M		ENUMERATED (0.125, 0.25, 0.5, 0.625, 1, 1.25, 2, 2.5, 4, 5, 8, 10, 16, 20, 32, 40, 64, 80, 160, 320, 640, 1280, 2560, 5120, 10240, ...)	Milli-seconds		
>>Spatial Relation Information	O		9.2.34	This IE is ignored if the <i>Spatial Relation Information per SRS Resource</i> IE is present.		
>>Pathloss Reference Information	O		9.2.53			
>>Spatial Relation Information per SRS Resource	O		9.2.60			
SSB Information	O		9.2.54			
SRS Frequency	O		INTEGER(0..3279165)	NR ARFCN The carrier frequency of SRS transmission bandwidth.	YES	ignore

Condition	Explanation
ifResourceTypePeriodic	This IE shall be present if the <i>Resource Type</i> IE is set to the value "Periodic".

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

## 9.2.28 SRS Configuration

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<b>SRS Carrier List</b>		1..<maxnoSRS-Carriers>		
>Point A	M		INTEGER (0..3279165)	NR ARFCN
>Uplink Channel BW-PerSCS-List		1..<maxnoSCSs>		SCS-SpecificCarrier TS 38.331 [13]
>>Offset To Carrier	M		INTEGER(0..2199,	First usable RB to Point A in the

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
			...)	number of PRBs
>>Subcarrier Spacing	M		ENUMERATED(kHz 15, 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(kHz 15, kHz30, kHz60, kHz120,...)	
>>Cyclic Prefix	M		ENUMERATED(Normal, Extended)	
>>Tx Direct Current Location	M		INTEGER(0..3301, ...)	
>>Shift7dot5kHz	O		ENUMERATED(true, ...)	
>>SRS Config	M			<i>SRS-Config</i> as defined in TS 38.331 [13]
>>>SRS Resource List		0..<maxnoSRS-Resources>		
>>>>SRS Resource	M		9.2.29	<i>SRS-Resource</i> as defined in TS 38.331 [13]
>>>Positioning SRS Resource List		0..<maxnoSRS-Resources>		
>>>>Positioning SRS Resource	M		9.2.30	<i>SRS-PosResource-r16</i> as defined in TS 38.331 [13]
>>>SRS Resource Set List		0..<maxnoSRS-Resources>		
>>>>SRS Resource Set	M		9.2.31	<i>SRS-ResourceSet</i> as defined in TS 38.331 [13]
>>>Positioning SRS Resource Set List		0..<maxnoSRS-Resources>		
>>>>Positioning SRS Resource Set	M		9.2.32	<i>SRS-PosResourceSet-r16</i> 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(port 1, ports2, ports4)	
CHOICE <i>Transmission Comb</i>	M			
> <i>Comb Two</i>				

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>>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 <i>Resource Type</i>	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 <i>Transmission Comb</i>	M			
>Comb Two				
>>Comb Offset	M		INTEGER(0..1)	
>>Cyclic Shift	M		INTEGER(0..7)	
>Comb Four				
>>Comb Offset	M		INTEGER(0..3)	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>>Cyclic Shift	M		INTEGER(0..11)	
> <i>Comb Eight</i>				
>>Comb Offset	M		INTEGER(0..7)	
>>Cyclic Shift	M		INTEGER(0..5)	
Start Position	M		INTEGER(0..13)	
Number of Symbols	M		ENUMERATED(n1, n2, n4, n8, n12)	
Frequency Domain Shift	M		INTEGER(0..268)	
C-SRS	M		INTEGER(0..63)	
Group or Sequence Hopping	M		ENUMERATED(Neither, groupHopping, sequenceHopping)	
CHOICE <i>Resource Type Positioning</i>	M			
> <i>periodic</i>				
>>Periodicity	M		ENUMERATED(slot 1, slot2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920, ..., slot128, slot256, slot512, slot20480)	
>>Offset	M		INTEGER(0..81919, ...)	
> <i>semi-persistent</i>				
>>Periodicity	M		ENUMERATED(slot 1, slot 2, slot4, slot5, slot8, slot10, slot16, slot20, slot32, slot40, slot64, slot80, slot160, slot320, slot640, slot1280, slot2560, slot5120, slot10240, slot40960, slot81920, ..., slot128, slot256, slot512, slot20480)	
>>Offset	M		INTEGER(0..81919, ...)	
> <i>aperiodic</i>				
>>slot offset	M		INTEGER(0..32)	
Sequence ID	M		INTEGER(0..65535)	
CHOICE <i>Spatial Relation Positioning</i>	O			
> <i>SSB</i>				
>> NR PCI	M		INTEGER (0..1007)	
>>SSB index	O		INTEGER(0..63)	
> <i>PRS</i>				
>>PRS ID	M		INTEGER(0..255)	
>>PRS Resource Set ID	M		INTEGER(0..7)	
>>PRS Resource ID	O		INTEGER(0..63)	

### 9.2.31 SRS Resource Set

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

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

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

### 9.2.32 Positioning SRS Resource Set

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

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

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

### 9.2.33 SRS Resource Set ID

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

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

## 9.2.34 Spatial Relation Information

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

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

Range bound	Explanation
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
<b>Aperiodic SRS Resource Trigger List</b>		<i>1..&lt;maxnoSRS - TriggerStates&gt;</i>		According to TS 38.331 [13]
>Aperiodic SRS Resource Trigger			INTEGER (1..3)	

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

## 9.2.36 Relative Time 1900

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
Relative Time 1900	M		BIT STRING (SIZE(64))	Time in seconds relative to 00:00:00 on 1 January 1900 (calculated as continuous time without leap seconds and traceable to a common time)

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
				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
<b>Measured Result Item</b>		1 .. <maxnoPosMeas>		
>CHOICE <i>Measured Results Value</i>	M			
>>UL Angle of Arrival	M		9.2.38	
>>UL SRS-RSRP	M		INTEGER (0..126)	
>>UL RTOA	M		9.2.39	
>>gNB Rx-Tx Time Difference	M		9.2.40	
>Time Stamp	M		9.2.42	
>Measurement Quality	O		9.2.43	
>Measurement Beam Information	O		9.2.57	

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]
<b>LCS to GCS Translation</b>		0..1		If absent, the azimuth and zenith are provided in GCS.
>Alpha	M		INTEGER (0..3599)	
>Beta	M		INTEGER (0..3599)	
>Gamma	M		INTEGER (0..3599)	

### 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
CHOICE <i>UL RTOA Measurement</i>	M			
>k0	M		INTEGER (0..1970049)	TS 38.133 [16]

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>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	

## 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
CHOICE <i>gNB Rx-Tx Time Difference Measurement</i>	M			
>k0	M		INTEGER (0..1970049)	TS 38.133 [16]
>k1	M		INTEGER (0..985025)	TS 38.133 [16]
>k2	M		INTEGER (0..492513)	TS 38.133 [16]
>k3	M		INTEGER (0..246257)	TS 38.133 [16]
>k4	M		INTEGER (0..123129)	TS 38.133 [16]
>k5	M		INTEGER (0..61565)	TS 38.133 [16]
Additional Path List	O		9.2.41	

## 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
<b>Additional Path Item</b>		<i>1..&lt;maxnopath</i> >		
>CHOICE <i>Relative Path Delay</i>	M			
>>k0	M		INTEGER(0..16351)	
>>k1	M		INTEGER(0..8176)	
>>k2	M		INTEGER(0..4088)	
>>k3	M		INTEGER(0..2044)	
>>k4	M		INTEGER(0..1022)	
>>k5	M		INTEGER(0..511)	
>Path Quality	O		Measurement Quality 9.2.43	

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

## 9.2.42 Time Stamp

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

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

### 9.2.43 Measurement Quality

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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>Measurement Quality</i>	M			
>Timing Measurement Quality				
>>Measurement Quality	M		INTEGER(0..31)	TS 37.355 [14]
>>Resolution	M		ENUMERATED(0.1 m, 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
<b>PRS Resource Set List</b>		1..<maxnoofP RSresourceSet >		
>PRS Resource Set ID	M		INTEGER(0..7)	
>Subcarrier Spacing	M		ENUMERATED(kHz 15, 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(nor mal, extended, ...)	
>Resource Set Periodicity	M		ENUMERATED(4,5, 8,10,16,20,32,40,64, 80,160,320,640,128 0,2560,5120,10240, 20480,40960,81920, ...,128, 256, 512)	Slots
>Resource Set Slot Offset	M		INTEGER(0..81919, ...)	
>Resource Repetition Factor	M		ENUMERATED(rf1,r f2,rf4,rf6,rf8,rf16,rf32)	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
			,...)	
>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	M	1..<maxnoofPRSresources>		NR-DL-PRS-Resource-r16 as defined in TS 37.355 [14]
>>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.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE TRP Position	M			

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<i>Definition Type</i>				
> <i>Direct</i>				
>>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.
> <i>Referenced</i>				
>>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

## 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
<b>DL-PRS Resource Set ARP List</b>	M	1..<maxPRS-ResourceSets >		
>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	
<b>&gt;DL-PRS Resource ARP List</b>	M	1..<maxPRS-ResourcesPer Set>		
>>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	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
>>>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 <sup>-3</sup> metre, 10 <sup>-2</sup> 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 <sup>16</sup> .. 2 <sup>16</sup> -1)	Positive value represents easting from reference point, in units of <i>XYZ Unit</i> IE.
Y value	M		INTEGER (-2 <sup>16</sup> .. 2 <sup>16</sup> -1)	Positive value represents northing from reference point in units of <i>XYZ Unit</i> IE.
Z value	M		INTEGER (-2 <sup>15</sup> .. 2 <sup>15</sup> -1)	Height with respect to reference point in units of <i>XYZ Unit</i> IE, where the XY-plane is horizontal and the Z-axis points up.
Location uncertainty	M		9.2.52	

## 9.2.51 Reference Point

This information element provides a reference point information.

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
CHOICE <i>ReferencePoint</i>	M			Reference point to which relative location information is related to
>Coordinate ID				
>>Coordinate ID	M		INTEGER(0.. 2 <sup>9</sup> -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

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
				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
<b>SSB Info List</b>		<i>1...&lt;maxNoSSBs&gt;</i>		
>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,...)	The value 60kHz is not supported in this version of the specification.
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	

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
			(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
<b>NR-PRS Beam Information</b>		<i>1 .. &lt; maxPRS-Resource Sets &gt;</i>				
>PRS Resource Set ID	M		INTEGER (0..7)	The resource set in which the resources are associated with the angle.		
<b>&gt;PRS Angle Item</b>		<i>1..&lt; maxPRS-Resources PerSet &gt;</i>				
>>NR PRS Azimuth	M		INTEGER (0..359)			

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
>>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
<b>LCS to GCS Translation</b>		<i>0 .. &lt;maxnolcs-gcs-translation &gt;</i>		If absent, the azimuth and elevation are provided in GCS.		
>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
<b>Positioning Broadcast Cells</b>		<i>1 .. &lt;maxnoBcast Cell&gt;</i>		
>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
<b>Spatial Relation per SRS Resource List</b>		<i>1</i>		
> Spatial Relation per SRS Resource Item		<i>1..&lt;maxnoSRS - ResourcePerSet&gt;</i>		
>CHOICE Reference	M			

IE/Group Name	Presence	Range	IE Type and Reference	Semantics Description
<i>Signal</i>				
>NZIP CSI-RS				
>>NZIP 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.

## 9.3 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
```

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

```

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,
    ...
}

NRPPA-ELEMENTARY-PROCEDURES-CLASS-2 NRPPA-ELEMENTARY-PROCEDURE ::= {
    e-CIDMeasurementFailureIndication |

```

```

    e-CIDMeasurementReport
    e-CIDMeasurementTermination
    errorIndication
    privateMessage
    assistanceInformationControl
    assistanceInformationFeedback
    positioningInformationUpdate
    measurementReport
    measurementUpdate
    measurementAbort
    measurementFailureIndication
    positioningDeactivation,
    ...
}

-- *****
--
-- 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
}

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,
    MeasurementBeamInfoRequest,
    PositioningBroadcastCells,
    SRSResourceSetID,
    SpatialRelationInfo,
    SRSResourceTrigger,
    TRPList,
    AbortTransmission,
```

SystemFrameNumber,  
SlotNumber,  
RelativeTime1900,  
SpatialRelationPerSRSResource,  
MeasurementPeriodicityExtended,  
MeasurementPeriodicityNR-AoA,  
SRSTransmissionStatus

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-MeasurementBeamInfoRequest,
id-PositioningBroadcastCells,
id-SRSType,
id-ActivationTime,
id-SRSResourceSetID,
id-TRPLList,
id-SRSSpatialRelation,
id-AbortTransmission,
id-SystemFrameNumber,
id-SlotNumber,
id-SRSResourceTrigger,
id-SFNInitialisationTime,
id-SRSSpatialRelationPerSRSResource,
id-MeasurementPeriodicityExtended,
id-MeasurementPeriodicityNR-AoA,
id-SRSTransmissionStatus

FROM NRPPA-Constants;

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

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

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

-- *****
--
-- 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-TypeIEs } }

```

```

OTDOA-Information-TypeIEs 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-Type-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},
    ...
}
-- *****
--
-- 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},
    ...
}
-- *****
--
-- 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-SRSTransmissionStatus     CRITICALITY ignore  TYPE SRSTransmissionStatus    PRESENCE optional},
  ...
}

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

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

MeasurementRequest-IEs NRPPA-PROTOCOL-IES ::= {
  { ID id-LMF-Measurement-ID        CRITICALITY reject  TYPE Measurement-ID          PRESENCE mandatory}|
  { ID id-TRP-MeasurementRequestList  CRITICALITY reject  TYPE TRP-MeasurementRequestList  PRESENCE mandatory}|
  { ID id-ReportCharacteristics      CRITICALITY reject  TYPE ReportCharacteristics      PRESENCE mandatory}|
  { ID id-MeasurementPeriodicity     CRITICALITY reject  TYPE MeasurementPeriodicity     PRESENCE conditional}|
-- The IE shall be present if the Report Characteristics IE is set to "periodic" -
  { ID id-TRPMeasurementQuantities   CRITICALITY reject  TYPE TRPMeasurementQuantities   PRESENCE mandatory}|
  { ID id-SFNInitialisationTime     CRITICALITY ignore  TYPE RelativeTime1900         PRESENCE optional}|
  { ID id-SRSConfiguration          CRITICALITY ignore  TYPE SRSConfiguration          PRESENCE optional}|
  { ID id-MeasurementBeamInfoRequest CRITICALITY ignore  TYPE MeasurementBeamInfoRequest PRESENCE optional}|
  { ID id-SystemFrameNumber         CRITICALITY ignore  TYPE SystemFrameNumber         PRESENCE optional}|
  { ID id-SlotNumber                CRITICALITY ignore  TYPE SlotNumber                PRESENCE optional}|
  { ID id-MeasurementPeriodicityExtended  CRITICALITY reject  TYPE MeasurementPeriodicityExtended  PRESENCE conditional}
-- The IE shall be present the MeasurementPeriodicity IE is set to the value "extended"
,

```

```

}
...
}
-- *****
--
-- 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},
    ...
}

-- *****
--
-- MEASUREMENT ABORT
--
-- *****

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

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

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

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

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

```

```

    { ID id-RAN-Measurement-ID      CRITICALITY reject  TYPE Measurement-ID      PRESENCE mandatory}|
    { ID id-Cause                   CRITICALITY ignore TYPE Cause                PRESENCE mandatory},
    ...
}

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

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

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

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

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

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

-- *****
--
-- TRP INFORMATION FAILURE
--
-- *****

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

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

```

```

}

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

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

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

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

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

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

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

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

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

```

```

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

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

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

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

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

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

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

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

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

```

```
}

```

```
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,  
id-Cell-ID,  
id-TRPInformationTypeItem,  
id-SrsFrequency,  
id-TRPType,  
id-SRSSpatialRelationPerSRSResource,  
id-PRS-Resource-ID
```

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 ::= {
  ...
}

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

AperiodicSRSResourceTrigger ::= INTEGER (1..3)

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, ..., rel-18-dummy1, rel-18-dummy2, mHz15, mHz25, mHz30, mHz60},
    fr2      ENUMERATED {mHz50, mHz100, mHz200, mHz400, ...},
    choice-extension      ProtocolIE-Single-Container { { BandwidthSRS-ExtIEs } }
}
BandwidthSRS-ExtIEs NRPPA-PROTOCOL-IES ::= {
    ...
}
BCCH ::= INTEGER (0..1023, ...)
Broadcast ::= ENUMERATED {
    start,
    stop,
    ...
}
BroadcastPeriodicity ::= ENUMERATED {
    ms80,
    ms160,
    ms320,
    ms640,
    ms1280,

```

```

    ms2560,
    ms5120,
    ...
}

PositioningBroadcastCells ::= SEQUENCE (SIZE (1..maxnoBcastCell)) OF NG-RAN-CGI

BSSID ::= OCTET STRING (SIZE(6))

-- C

Cause ::= CHOICE {
    radioNetwork      CauseRadioNetwork,
    protocol          CauseProtocol,
    misc              CauseMisc,
    choice-Extension  ProtocolIE-Single-Container {{ Cause-ExtensionIE }}
}

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

CauseMisc ::= ENUMERATED {
    unspecified,
    ...
}

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

CauseRadioNetwork ::= ENUMERATED {
    unspecified,
    requested-item-not-supported,
    requested-item-temporarily-not-available,
    ...
}

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, ...)

-- F

-- G

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

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

GNB-RxTxTimeDiff ::= SEQUENCE {
    rxTxTimeDiff GNB-RxTxTimeDiffMeas,
    additionalPathList AdditionalPathList OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { GNB-RxTxTimeDiff-ExtIEs } } OPTIONAL,
    ...
}

GNB-RxTxTimeDiff-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

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 ::= {
    ...
}

-- 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,
...
}

MeasurementPeriodicityNR-AoA ::= ENUMERATED {
ms160,
ms320,
ms640,
ms1280,
ms2560,
ms5120,
```

```

ms10240,
ms20480,
ms40960,
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
}

MeasuredResults ::= SEQUENCE (SIZE (1.. maxNoMeas)) OF MeasuredResultsValue

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

```

```

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

-- N

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

NG-RANAccessPointPosition ::= SEQUENCE {
  latitudeSign      ENUMERATED {north, south},
  latitude          INTEGER (0..8388607),
  longitude         INTEGER (-8388608..8388607),
  directionOfAltitude  ENUMERATED {height, depth},
  altitude          INTEGER (0..32767),
  uncertaintySemi-major  INTEGER (0..127),
  uncertaintySemi-minor  INTEGER (0..127),
  orientationOfMajorAxis  INTEGER (0..179),
  uncertaintyAltitude    INTEGER (0..127),
  confidence         INTEGER (0..100),
  iE-Extensions      ProtocolExtensionContainer { { NG-RANAccessPointPosition-ExtIEs } } OPTIONAL,
  ...
}

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

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

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

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

```

```

}
...
}
NG-RAN-CGI-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}
NG-RANCell ::= CHOICE {
    eUTRA-CellID      EUTRACellIdentifier,
    nR-CellID        NRCellIdentifier,
    choice-Extension ProtocolIE-Single-Container {{ NG-RANCell-ExtensionIE }}
}
NG-RANCell-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    ...
}
NR-ARFCN ::= INTEGER (0..3279165)
NRCellIdentifier ::= BIT STRING (SIZE (36))
NR-PCI ::= INTEGER (0..1007)
NR-PRS-Beam-Information ::= SEQUENCE {
    nR-PRS-Beam-InformationList SEQUENCE (SIZE(1.. maxPRS-ResourceSets)) OF NR-PRS-Beam-InformationItem,
    LCS-to-GCS-TranslationList SEQUENCE (SIZE(1..maxnolcs-gcs-translation)) OF LCS-to-GCS-TranslationItem OPTIONAL,
    iE-Extensions ProtocolExtensionContainer { { NR-PRS-Beam-Information-IEs} } OPTIONAL,
    ...
}
NR-PRS-Beam-Information-IEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}
NR-PRS-Beam-InformationItem ::= SEQUENCE {
    pRSresourceSetID PRS-Resource-Set-ID,
    pRSAngleItem SEQUENCE (SIZE(1..maxPRS-ResourcesPerSet)) OF PRSAngleItem,
    iE-Extensions ProtocolExtensionContainer { { NR-PRS-Beam-InformationItem-ExtIEs} } OPTIONAL,
    ...
}
NR-PRS-Beam-InformationItem-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}
NumberOfAntennaPorts-EUTRA ::= ENUMERATED {
    n1-or-n2,
    n4,
    ...
}
NumberOfDlFrames-EUTRA ::= ENUMERATED {
    sf1,
    sf2,

```

```

        sf4,
        sf6,
        ...
    }

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

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

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

-- 0

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

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

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

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

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

```

```

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

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

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

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

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

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

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

```

```

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

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

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

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

-- P

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

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

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

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

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

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

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

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

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

```

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

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

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

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

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

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

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

```

    posSibType2-16,
    posSibType2-17,
    posSibType2-18,
    posSibType2-19,
    posSibType2-20,
    posSibType2-21,
    posSibType2-22,
    posSibType2-23,
    posSibType2-24,
    posSibType2-25,
    posSibType3-1,
    posSibType4-1,
    posSibType5-1,
    posSibType6-1,
    posSibType6-2,
    posSibType6-3,
    ...
}

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 {
    nPRSAzimuth          INTEGER (0..359),
    nPRSAzimuthFine     INTEGER (0..9) OPTIONAL,
    nPRSElevation       INTEGER (0..180) OPTIONAL,
    nPRSElevationFine   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 },
    ...
}

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

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

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)),
}

```

```

    choice-Extension          ProtocolIE-Single-Container {{ PRSMutingConfiguration-EUTRA-ExtensionIE }}
}

PRSMutingConfiguration-EUTRA-ExtensionIE NRPPA-PROTOCOL-IES ::= {
    ...
}

PRSOccasionGroup-EUTRA ::= ENUMERATED {
    og2,
    og4,
    og8,
    og16,
    og32,
    og64,
    og128,
    ...
}

PRSFrequencyHoppingConfiguration-EUTRA ::= SEQUENCE {
    noOfFreqHoppingBands      NumberOfFrequencyHoppingBands,
    bandPositions             SEQUENCE(SIZE (1..maxnoFreqHoppingBandsMinusOne)) OF NarrowBandIndex,
    iE-Extensions            ProtocolExtensionContainer { { PRSFrequencyHoppingConfiguration-EUTRA-Item-IEs } } OPTIONAL,
    ...
}

PRSFrequencyHoppingConfiguration-EUTRA-Item-IEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSMuting ::= SEQUENCE {
    pRSMutingOption1         PRSMutingOption1          OPTIONAL,
    pRSMutingOption2         PRSMutingOption2          OPTIONAL,
    iE-Extensions            ProtocolExtensionContainer { { PRSMuting-ExtIEs } } OPTIONAL,
    ...
}

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

PRSMutingOption1 ::= SEQUENCE {
    mutingPattern             DL-PRSMutingPattern,
    mutingBitRepetitionFactor ENUMERATED{n1,n2,n4,n8,...},
    iE-Extensions            ProtocolExtensionContainer { { PRSMutingOption1-ExtIEs } } OPTIONAL,
    ...
}

PRSMutingOption1-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

PRSMutingOption2 ::= SEQUENCE {
    mutingPattern             DL-PRSMutingPattern,
    iE-Extensions            ProtocolExtensionContainer { { PRSMutingOption2-ExtIEs } } OPTIONAL,
    ...
}

```

```

}
PRSMutingOption2-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSResource-List ::= SEQUENCE (SIZE (1..maxnoofPRSresource)) OF PRSResource-Item

PRSResource-Item ::= SEQUENCE {
  PRSResourceID          PRS-Resource-ID,
  sequenceID             INTEGER(0..4095),
  rEOffset               INTEGER(0..11,...),
  resourceSlotOffset     INTEGER(0..511),
  resourceSymbolOffset   INTEGER(0..12),
  qCLInfo                PRSResource-QCLInfo OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { PRSResource-Item-ExtIEs } } OPTIONAL,
  ...
}
PRSResource-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSResource-QCLInfo ::= CHOICE {
  qCLSourceSSB          PRSResource-QCLSourceSSB,
  qCLSourcePRS          PRSResource-QCLSourcePRS,
  choice-Extension      ProtocolIE-Single-Container {{ PRSResource-QCLInfo-ExtIEs }}
}

PRSResource-QCLInfo-ExtIEs NRPPA-PROTOCOL-IES ::= {
  ...
}

PRSResource-QCLSourceSSB ::= SEQUENCE {
  pCI-NR                INTEGER(0..1007),
  sSB-Index             SSB-Index OPTIONAL,
  iE-Extensions          ProtocolExtensionContainer { { PRSResource-QCLSourceSSB-ExtIEs } } OPTIONAL,
  ...
}

PRSResource-QCLSourceSSB-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

PRSResource-QCLSourcePRS ::= SEQUENCE {
  qCLSourcePRSResourceSetID PRS-Resource-Set-ID,
  qCLSourcePRSResourceID    PRS-Resource-ID OPTIONAL,
  iE-Extensions             ProtocolExtensionContainer { { PRSResource-QCLSourcePRS-ExtIEs } } OPTIONAL,
  ...
}
PRSResource-QCLSourcePRS-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

```

```

PRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoofPRSresourceSet)) OF PRSResourceSet-Item

PRSResourceSet-Item ::= SEQUENCE {
    PRSResourceSetID          PRS-Resource-Set-ID,
    subcarrierSpacing         ENUMERATED{kHz15, kHz30, kHz60, kHz120, ...},
    PRSbandwidth              INTEGER(1..63),
    startPRB                  INTEGER(0..2176),
    pointA                    INTEGER(0..3279165),
    combSize                  ENUMERATED{n2, n4, n6, n12, ...},
    cPType                    ENUMERATED{normal, extended, ...},
    resourceSetPeriodicity    ENUMERATED{n4, n5, n8, n10, n16, n20, n32, n40, n64, n80, n160, n320, n640, n1280, n2560, n5120, n10240, n20480, n40960,
n81920, ..., n128, n256, n512},
    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)

-- 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,
    ...
}

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, ..., slot128, slot256, slot512, slot20480},
    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, ..., slot128, slot256, slot512, slot20480},
    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 ::= {
}
...
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-EUTRA         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 ::= {

```

```

}
...
}

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

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

SRSCarrier-List ::= SEQUENCE (SIZE(1.. maxnoSRS-Carriers)) OF SRSCarrier-List-Item

SRSCarrier-List-Item ::= SEQUENCE {
    pointA                    INTEGER (0..3279165),
    uplinkChannelBW-PerSCS-List UplinkChannelBW-PerSCS-List,
    activeULBWP                ActiveULBWP,
    pCI-NR                     INTEGER (0..1007) OPTIONAL,
    iE-Extensions              ProtocolExtensionContainer { { SRSCarrier-List-Item-ExtIEs } } OPTIONAL,
    ...
}

SRSCarrier-List-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
    ...
}

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

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

SrsFrequency ::= INTEGER (0..3279165)

SRSPosResourceID ::= INTEGER (0..63)

SRSResource ::= SEQUENCE {
    sRSResourceID             SRSResourceID,
    nrofSRS-Ports             ENUMERATED {port1, ports2, ports4},
    transmissionComb          TransmissionComb,
    startPosition              INTEGER (0..13),
    nrofSymbols                ENUMERATED {n1, n2, n4},

```

```

    repetitionFactor          ENUMERATED {n1, n2, n4},
    freqDomainPosition        INTEGER (0..67),
    freqDomainShift           INTEGER (0..268),
    c-SRS                     INTEGER (0..63),
    b-SRS                     INTEGER (0..3),
    b-hop                     INTEGER (0..3),
    groupOrSequenceHopping    ENUMERATED { neither, groupHopping, sequenceHopping },
    resourceType              ResourceType,
    sequenceID                INTEGER (0..1023),
    iE-Extensions             ProtocolExtensionContainer { { SRSResource-ExtIEs } } OPTIONAL,
    ...
}

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

SRSResourceID ::= INTEGER (0..63)

SRSResource-List ::= SEQUENCE (SIZE (1..maxnoSRS-Resources)) OF SRSResource

SRSResourceSet-List ::= SEQUENCE (SIZE (1..maxnoSRS-ResourceSets)) OF SRSResourceSet

SRSResourceID-List ::= SEQUENCE (SIZE (1..maxnoSRS-ResourcePerSet)) OF SRSResourceID

SRSResourceSet ::= SEQUENCE {
    sRSResourceSetID          INTEGER(0..15),
    sRSResourceID-List        SRSResourceID-List,
    resourceSetType           ResourceSetType,
    iE-Extensions             ProtocolExtensionContainer { { SRSResourceSet-ExtIEs } } OPTIONAL,
    ...
}

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

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

SRSResourceTrigger ::= SEQUENCE {
    aperiodicSRSResourceTriggerList    AperiodicSRSResourceTriggerList,
    iE-Extensions                      ProtocolExtensionContainer { {SRSResourceTrigger-ExtIEs} } OPTIONAL,
    ...
}

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

SRSTransmissionStatus ::= ENUMERATED {stopped, ...}

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))

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-ExtIEs } } OPTIONAL,
  ...
}

TDD-Config-EUTRA-Item-ExtIEs NRPPA-PROTOCOL-EXTENSION ::= {
  ...
}

TF-Configuration ::= SEQUENCE {
  sSB-frequency             INTEGER (0..3279165),
  sSB-subcarrier-spacing    ENUMERATED {kHz15, kHz30, kHz120, kHz240, ..., kHz60},
  -- The value kHz60 is not supported in this version of the specification.
  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 ::= {

```

```

}
...
}
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 ::= {
    ...
}
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 ::= {
    ...
}
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 },
  ...
}
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 },
    ...
}

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 },
    ...
}

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
}

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-extentions          ProtocolExtensionContainer { { TRPPositionReferenced-ExtIEs } } OPTIONAL,
  ...
}

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

TRPReferencePointType ::= CHOICE {
  trPPositionRelativeGeodetic      RelativeGeodeticLocation,
  trPPositionRelativeCartesian    RelativeCartesianLocation,
  choice-extension                 ProtocolIE-Single-Container { { TRPReferencePointType-ExtIEs } }
}

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

TRPType ::= ENUMERATED {
  prsOnlyTP,
  srsOnlyRP,
  tp,
  rp,
  trp,
  ...
}

TypeOfError ::= ENUMERATED {
  not-understood,
  missing,
  ...
}

-- U

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

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

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 ::= {
    ...
}

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)

UplinkChannelBW-PerSCS-List ::= SEQUENCE (SIZE (1..maxnoSCSs)) OF SCS-SpecificCarrier

-- 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

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-tRPIInformationExchange	ProcedureCode ::= 16
id-positioningActivation	ProcedureCode ::= 17
id-positioningDeactivation	ProcedureCode ::= 18

```
-- *****
--
-- 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

-- *****
--
-- 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-MeasurementPeriodicityNR-AoA ProtocolIE-ID ::= 105
id-SRSTransmissionStatus  ProtocolIE-ID ::= 106

END
-- ASN1STOP

```

## 9.3.8 Container definitions

```

-- ASN1START
-- *****
--
-- Container definitions
--
-- *****

NRPPA-Containers {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
ngran-access (22) modules (3) nrppa (4) version1 (1) nrppa-Containers (5)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

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

IMPORTS
    maxPrivateIEs,
    maxProtocolExtensions,

```

```

    maxProtocolIEs,
    Criticality,
    Presence,
    PrivateIE-ID,
    ProtocolIE-ID
FROM NRPPA-CommonDataTypes;

-- *****
--
-- Class Definition for Protocol IEs
--
-- *****

NRPPA-PROTOCOL-IES ::= CLASS {
    &id          ProtocolIE-ID          UNIQUE,
    &criticality Criticality,
    &Value,
    &presence    Presence
}
WITH SYNTAX {
    ID          &id
    CRITICALITY &criticality
    TYPE        &Value
    PRESENCE    &presence
}

-- *****
--
-- Class Definition for Protocol Extensions
--
-- *****

NRPPA-PROTOCOL-EXTENSION ::= CLASS {
    &id          ProtocolIE-ID          UNIQUE,
    &criticality Criticality,
    &Extension,
    &presence    Presence
}
WITH SYNTAX {
    ID          &id
    CRITICALITY &criticality
    EXTENSION   &Extension
    PRESENCE    &presence
}

-- *****
--
-- Class Definition for Private IEs
--
-- *****

NRPPA-PRIVATE-IES ::= CLASS {
    &id          PrivateIE-ID,
    &criticality Criticality,

```

```

    &Value,
    &presence           Presence
}
WITH SYNTAX {
    ID                  &id
    CRITICALITY        &criticality
    TYPE               &Value
    PRESENCE           &presence
}

-- *****
--
-- Container for Protocol IEs
--
-- *****

ProtocolIE-Container { NRPPA-PROTOCOL-IES : IEsSetParam } ::=
    SEQUENCE (SIZE (0..maxProtocolIEs)) OF
        ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Single-Container { NRPPA-PROTOCOL-IES : IEsSetParam } ::=
    ProtocolIE-Field {{IEsSetParam}}

ProtocolIE-Field { NRPPA-PROTOCOL-IES : IEsSetParam } ::= SEQUENCE {
    id                  NRPPA-PROTOCOL-IES.&id           ({{IEsSetParam}}),
    criticality        NRPPA-PROTOCOL-IES.&criticality   ({{IEsSetParam}}{@id}),
    value              NRPPA-PROTOCOL-IES.&Value        ({{IEsSetParam}}{@id})
}

-- *****
--
-- Container Lists for Protocol IE Containers
--
-- *****

ProtocolIE-ContainerList { INTEGER : lowerBound, INTEGER : upperBound, NRPPA-PROTOCOL-IES : IEsSetParam } ::=
    SEQUENCE (SIZE (lowerBound..upperBound)) OF
        ProtocolIE-Container {{IEsSetParam}}

-- *****
--
-- Container for Protocol Extensions
--
-- *****

ProtocolExtensionContainer { NRPPA-PROTOCOL-EXTENSION : ExtensionSetParam } ::=
    SEQUENCE (SIZE (1..maxProtocolExtensions)) OF
        ProtocolExtensionField {{ExtensionSetParam}}

ProtocolExtensionField { NRPPA-PROTOCOL-EXTENSION : ExtensionSetParam } ::= SEQUENCE {
    id                  NRPPA-PROTOCOL-EXTENSION.&id           ({{ExtensionSetParam}}),
    criticality        NRPPA-PROTOCOL-EXTENSION.&criticality   ({{ExtensionSetParam}}{@id}),
    extensionValue     NRPPA-PROTOCOL-EXTENSION.&Extension     ({{ExtensionSetParam}}{@id})
}

```

```
-- *****
--
-- Container for Private IEs
--
-- *****

PrivateIE-Container { NRPPA-PRIVATE-IES : IEsSetParam} ::=
  SEQUENCE (SIZE (1..maxPrivateIEs)) OF
    PrivateIE-Field {{IEsSetParam}}

PrivateIE-Field { NRPPA-PRIVATE-IES : IEsSetParam} ::= SEQUENCE {
  id                NRPPA-PRIVATE-IES.&id                ({{IEsSetParam}}),
  criticality       NRPPA-PRIVATE-IES.&criticality        ({{IEsSetParam}}{@id}),
  value             NRPPA-PRIVATE-IES.&Value              ({{IEsSetParam}}{@id})
}

END
-- ASN1STOP
```

## 9.4 Message transfer syntax

NRPPa shall use the ASN.1 Basic Packed Encoding Rules (BASIC-PER) Aligned Variant as transfer syntax, as specified in ref. ITU-T Rec. X.691 [6].

## 9.5 Timers

Void.

---

# 10 Handling of unknown, unforeseen and erroneous protocol data

Section 10 of TS 38.413 [2] is applicable for the purposes of the present document, with the following additions:

- In case of Abstract Syntax Error, when reporting the *Criticality Diagnostics* IE for not comprehended IE/IE groups or missing IE/IE groups, the *NRPPa Transaction ID* IE shall also be included;
- In case of Logical Error, when reporting the *Criticality Diagnostics* IE, the *NRPPa Transaction ID* IE shall also be included.

## Annex A (informative): Change history

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2017-08-23	RAN3#97	R3-173238				TS skeleton agreed	v0.0.0
2017-08-25	RAN3#97	R3-173374				TS 38.455 V0.1.0	v0.1.0
2017-10-18	RAN3#97bis	R3-173979				Implemented agreed pCR from R3#97bis	V0.2.0
2017-12-04	RAN3#98	R3-175064				Implemented agreed pCR from R3#98	V0.3.0
2018-01-31	RAN3 Adhoc 1801	R3-180658				Implemented agreed pCR from R3 Adhoc_1801	V0.5.0
2018-03-15	RAN3#99	R3-181595				Implemented agreed pCR's from R3#99	V0.6.0
2018-05-29	RAN3#100	R3-183598				Implemented agreed pCR's from R3#100	V0.7.0
2018-06	RAN#80	RP-181147				Submitted to RAN plenary for Approval	V1.0.0
2018-06	RAN#80	-	-	-	-	Specification approved at TSG-RAN and placed under change control	15.0.0
2018-09	RAN#81	RP-181921	0002	1	F	Rapporteur CR for TS 38.455	15.1.0
2018-12	RAN#82	RP-182446	0003	1	F	Addition of TDD UL/DL configuration to OTDOA assistance data	15.2.0
2019-01	RAN#82					Editorial Corrections: - 1 editorial correction to ASN.1 - adding "ASN1START" and "ASN1STOP" TAGs to the ASN.1	15.2.1
2020-07	SA#88-e	-	-	-	-	Update to Rel-16 version (MCC)	16.0.0
2020-09	SA#89-e	RP-201849	0008	19	B	Introduction of NR Positioning in NRPPa	16.1.0
2020-12	RAN#90-e	RP-202315	0014	2	A	Support OTDOA assistance data for case of NR serving cell	16.2.0
2020-12	RAN#90-e	RP-202311	0015	2	F	Corrections to tabular and asn.1 for NR positioning (NRPPa)	16.2.0
2020-12	RAN#90-e	RP-202311	0016	-	F	Correction of NRPPa positioning procedures	16.2.0
2020-12	RAN#90-e	RP-202311	0021	1	F	RRC alignment and various correction including ASN.1	16.2.0
2020-12	RAN#90-e	RP-202311	0022	2	F	Coupling TRP ID and Cell ID in Measurement procedures	16.2.0
2021-03	RAN#91-e	RP-210230	0024	1	F	Including SRS frequency information in Positioning Information Request	16.3.0
2021-03	RAN#91-e	RP-210230	0025	1	F	Corrections on NRPPa	16.3.0
2021-03	RAN#91-e	RP-210236	0026	-	F	Correction of NRPPa section 10	16.3.0
2021-06	RAN#92-e	RP-211333	0028	-	A	Clarification of E-CID Measurement Result	16.4.0
2021-06	RAN#92-e	RP-211327	0029	-	F	Correction of Spatial Relation Information	16.4.0
2021-06	RAN#92-e	RP-211327	0033	1	F	Correction on SFN Initialisation Time	16.4.0
2021-06	RAN#92-e	RP-211327	0034	-	F	Correction on relative cartesian coordinate	16.4.0
2021-09	RAN#93-e	RP-211883	0039	1	F	Correction of the RAN and LMF UE measurement IDs extension	16.5.0
2021-09	RAN#93-e	RP-211883	0041	1	F	Adding procedural text for System Frame Number and Slot Number	16.5.0
2021-12	RAN#94-e	RP-213173	0047	3	F	Correction on PRS-only TP	16.6.0
2021-12	RAN#94-e	RP-212867	0049	1	F	Support of providing spatial relation per SRS resource from LMF to gNB	16.6.0
2022-03	RAN#95-e	RP-220281	0052	1	F	Correction on Measurement Periodicity	16.7.0
2022-03	RAN#95-e	RP-220281	0053	1	F	Correction on PRS Beam Information	16.7.0
2022-04	RAN#95-e					Editorial Correction: - change "OPTIONAL" to "optional" to ASN.1	16.7.1
2022-06	RAN#96	RP-221152	0068	2	F	Correction for PRS Muting	16.8.0
2022-06	RAN#96	RP-221152	0073		F	Correction to SSB subcarrier spacing	16.8.0
2022-06						editorial corrections to rename the following asn.1 names as choice extension names - sRSType-extension -> choice-Extension - cause-Extension -> choice-Extension - measuredResultsValue-Extension -> choice-Extension - nG-RANCell-Extension -> hoice-Extension - oTDOACell-Information-Item-Extension -> choice-Extension - otherRATMeasuredResultsValue-Extension -> choice-Extension - pRSMutingConfiguration-EUTRA-Extension -> choice-Extension	16.8.1
2022-09	RAN#97-e	RP-222542	0078	3	F	CR to 38.455 on E-CID measurement periodicity	16.9.0
2022-12	RAN#98-e	RP-222887	0091	1	F	CR to 38.455 on SRS periodicity	16.10.0
2023-03	RAN#99	RP-230597	0098	1	F	Correction for SRS Configuration status in Positioning Information Update	16.11.0
2023-06	RAN#100	RP-231077	0104	1	F	Subcarrier Spacing correction	16.12.0
2023-12	RAN#102	RP-233850	0115	-	F	Correction of NR E-CID for OnDemand measurements	16.13.0

Change history							
Date	Meeting	TDoc	CR	Rev	Cat	Subject/Comment	New version
2023-12	RAN#102	RP-233850	0119	-	F	Correction to NRPPa for the misalignment on DL PRS	16.13.0
2024-12	RAN#106	RP-243104	0166	2	F	Positioning measurement correction related to "shall, if supported"	16.14.0
2024-12	RAN#106	RP-243104	0171	2	F	Correction on FR1 SRS Bandwidth in Requested SRS Transmission Characteristics	16.14.0
2025-03	RAN#107	RP-250141	0183	1	F	Correction on Assistance Information Control Procedure	16.15.0
2025-12	RAN#110	RP-253357	0194	3	F	Correcting the IE extension definition for bandwidth SRS	16.16.0

---

## History

<b>Version</b>	<b>Date</b>	<b>Status</b>
V16.0.0	September 2020	Publication
V16.1.0	November 2020	Publication
V16.2.0	January 2021	Publication
V16.3.0	April 2021	Publication
V16.4.0	August 2021	Publication
V16.5.0	October 2021	Publication
V16.6.0	January 2022	Publication
V16.7.1	May 2022	Publication
V16.8.1	August 2022	Publication
V16.9.0	October 2022	Publication
V16.10.0	January 2023	Publication
V16.11.0	May 2023	Publication
V16.12.0	July 2023	Publication
V16.13.0	February 2024	Publication
V16.14.0	January 2025	Publication
V16.15.0	March 2025	Publication
V16.16.0	February 2026	Publication