**3GPP TSG-RAN WG3 Meeting #112-e *R3-212779***

**Online, 17 – 28 May 2021**

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| *CR-Form-v12.1* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **38.455** | **CR** | **0037** | **rev** | **-** | **Current version:** | **16.3.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME |  | Radio Access Network | **x** | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Introduction of NR Positioning enhancements to NRPPa | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Ericsson | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh | | | | |  | ***Date:*** | | |  |
|  |  | | | |  | |  | | |  |
| ***Category:*** | B |  | | | | | ***Release:*** | | | 7 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-15 (Release 15) Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | Introduce a new non-UE associated NRPPa procedure (class 1) to support on-demand PRS. Details FFS.  The new NRPPa procedure enables LMF to request gNB to (re)configure PRS transmission, and gNB to indicate the updated PRS configuration to LMF. Details FFS.  Details regarding information (e.g. parameters, PRS utilization, measurements in general, etc.) to be exchanged by the procedure is pending RAN1/RAN2.  **Editor’s note: all details on procedures and IEs are FFS** | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Introducing new PRS Configuration Exchange class 1 procedure. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | No support of on-demand PRS transmission in NRPPa. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | TBD | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | | **X** |  | Other core specifications | | | | TS/TR 38.473 CR 0767 | | |
| ***affected:*** | |  | **x** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **x** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

**START OF CHANGES**

7 Functions of NRPPa

The NRPPa protocol provides the following functions:

- E-CID Location Information Transfer. This function allows the NG-RAN node to exchange location information with LMF for the purpose of E-CID positioning and NR E-CID positioning.

- OTDOA Information Transfer. This function allows the NG-RAN node to exchange information with the LMF for the purpose of OTDOA positioning.

- Reporting of General Error Situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.

- Assistance Information Transfer. This function allows the LMF to exchange information with the NG-RAN node for the purpose of assistance information broadcasting.

- Positioning Information Transfer. This function allows the NG-RAN node to exchange positioning information with the LMF for the purpose of positioning.

- Measurement Information Transfer. This function allows the LMF to exchange measurement information with the NG-RAN node for the purpose of positioning.

- TRP Information Transfer. This function allows an LMF to obtain TRP related information from an NG-RAN node.

- PRS Information Transfer. This function allows the LMF to exchange PRS related information with the NG-RAN node.

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

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

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

8 NRPPa procedures

8.1 Elementary procedures

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

**Table 8.1-1: Class 1 Elementary Procedures**

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

**NEXT CHANGE**

8.2.X PRS Configuration Exchange

8.2.X.1 General

The PRS Configuration Exchange procedure is initiated by the LMF to request the NG-RAN node to configure PRS transmission. This procedure applies only if the NG-RAN node is a gNB.

8.2.X.2 Successful Operation



**Figure 8.2.X.2-1: PRS Configuration Exchange procedure, successful operation**

The LMF initiates the procedure by sending a PRS CONFIGURATION REQUEST message to the NG-RAN node. The NG-RAN node shall respond with a PRS CONFIGURATION RESPONSE message.

If the *PRS TRP List* IE is included in the PRS CONFIGURATION REQUEST message, the NG-RAN node may take this information into account when configuring PRS transmissions for the indicated TRP, and it shall include the *PRS Transmission TRP List* IE in the PRS CONFIGURATION RESPONSE message.

8.2.X.3 Unsuccessful Operation



**Figure 8.2.X.3-1: PRS Configuration Exchange procedure, unsuccessful operation**

If the *Requested PRS TRP List* IE is included in the PRS CONFIGURATION REQUEST message and the NG-RAN node is unable to configure the PRS transmissions for any of the indicated TRPs, it shall respond with a PRS CONFIGURATION FAILURE message.

8.2.X.4 Abnormal Conditions

Void.

**NEXT CHANGE**

9.1.1.a1 PRS CONFIGURATION REQUEST

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

Direction: LMF → NG-RAN node.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| NRPPa Transaction ID | M |  | 9.2.4 |  | - |  |
| **PRS TRP List** |  | [FFS] |  |  | YES | ignore |
| **>PRS TRP Item** |  | *1 .. <maxnoTRPs>* |  |  | EACH | ignore |
| >>TRP ID | M |  | 9.2.24 |  | - |  |
| >>Requested DL PRS Transmission Characteristics | [FFS] |  | 9.2.X |  | YES | ignore |

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

9.1.1.a2 PRS CONFIGURATION RESPONSE

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

Direction: NG-RAN node → LMF.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** | **Criticality** | **Assigned Criticality** |
| Message Type | M |  | 9.2.3 |  | YES | reject |
| NRPPa Transaction ID | M |  | 9.2.4 |  | - |  |
| **PRS Transmission TRP List** |  | [FFS] |  |  | YES | ignore |
| **>PRS Transmission TRP Item** |  | *1 .. <maxnoTRPs>* |  |  | EACH | ignore |
| >>TRP ID | M |  | 9.2.24 |  | - |  |
| >>On-demand PRS information | [FFS] |  | 9.2.Y |  | YES | ignore |

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

9.1.1.a3 PRS CONFIGURATION FAILURE

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

Direction: NG-RAN node → LMF.

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

**NEXT CHANGE**

### 9.2.X Requested DL PRS Transmission Characteristics [FFS]

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |

### 9.2.Y On-demand PRS information [FFS]

This IE contains the updated PRS configuration.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **IE/Group Name** | **Presence** | **Range** | **IE type and reference** | **Semantics description** |

**NEXT CHANGE**

**ASN.1 to be added later**

**END OF CHANGES**