**3GPP TSG-RAN WG2 Meeting #121 *R2-2302129***

**Athens, Greece, 27th February – 3rd March 2023**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **38.305** | **CR** | **0118** | **rev** | **1** | **Current version:** | **17.3.0** |  |
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| *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 | **X** | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Corrections to stage 2 descriptions for NR positioning | | | | | | | | | |
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| ***Source to WG:*** | Lenovo | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_pos\_enh-Core | | | | |  | ***Date:*** | | | 2023-02-28 |
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| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-17 |
|  | *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-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)* | |
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| ***Reason for change:*** | | 1. Procedures for On-Demand PRS transmission, clause 7.6:   In Figure 7.6.2-1 the typo in step 1 (“configurtaions”) should be fixed.  The title of Figure 7.6.2-1 can be improved since the procedure as shown in the Figure is not only about on-demand PRS request.   1. Procedures for Pre-configured Measurement Gap, clause 7.7:  * Figure 7.7.2-1 shows the procedure for the successful pre-configuration and activation of positioning measurement gap. This should be clarified in the description. * In clause 7.7.2 the descriptions of step 1, 2 should be corrected. The reason is that in the NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message there is no explicit indicator to request the gNB to pre-configure measurement gap. When the gNB receives the message from LMF, it is left to gNB to either pre-configure measurement gap or PRS processing window to the UE. * In Figure 7.7.2-1, step 6 the word “Command” should be added to the DL MAC CE name. * In clause 7.7.1 and clause 7.7.2, step 3, 4, 5a, 5b, 6 it should be clarified that the gNB refers to the serving gNB. * In clause 7.7.2, step 5a “… configured in step 1” should be corrected to “… configured in step 2”.  1. Procedures for Pre-configured PRS processing window, clause 7.8:  * In clause 7.8.1 the deactivation of pre-configured PRS processing window by gNB upon receiving the request from LMF is missing. * Figure 7.8.2-1 shows the procedure for the successful pre-configuration and activation of PRS processing window. This should be clarified in the description. * In clause 7.8.2 the descriptions of step 1, 2 should be corrected. The reason is that in the NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message there is no explicit indicator to request the gNB to pre-configure PRS processing window. When the gNB receives the message from LMF, it is left to gNB to either pre-configure measurement gap or PRS processing window to the UE. * In clause 7.8.1 and clause 7.8.2, step 3, 4, 5, 6 it should be clarified that the gNB refers to the serving gNB.  1. Positioning in RRC\_INACTIVE state, clause 7.9:  * To be complete it should be clarified that the MAC CE that can be sent to the UE in RRC\_INACTIVE state without the need of state transition refers to the SP Positioning SRS Activation/Deactivation MAC CE.  1. Miscellaneous editorial issues should be fixed (typos in descriptions). | | | | | | | | |
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| ***Summary of change:*** | | 1. Procedures for On-Demand PRS transmission, clause 7.6:   In Figure 7.6.2-1 the typo in step 1 has been fixed.  The title of Figure 7.6.2-1 has been corrected to “On-Demand PRS transmission procedure”.   1. Procedures for Pre-configured Measurement Gap, clause 7.7:  * It has been clarified that the procedure in Figure 7.7.2-1 shows the procedure for the successful pre-configuration and activation of positioning measurement gap. * The descriptions of step 1, 2 have been corrected clarifying that the LMF requests the serving gNB to configure the UE with measurement pre-configurations and the serving gNB decides to pre-configure the UE with measurement gap. * In Figure 7.7.2-1, step 6 the word “Command” has been added to the DL MAC CE name. * In step 3, 4, 5a, 5b, 6 “gNB” has been corrected to “serving gNB”. * In step 5a “step 1” has been corrected to “step 2”.  1. Procedures for Pre-configured PRS processing window, clause 7.8:  * In clause 7.8.1 the missing deactivation of pre-configured PRS processing window by gNB has been added. * It has been clarified that the procedure in Figure 7.8.2-1 shows the procedure for the successful pre-configuration and activation of PRS processing window. * The descriptions of step 1, 2 have been corrected clarifying that the LMF requests the serving gNB to configure the UE with measurement pre-configurations and the serving gNB decides to pre-configure the UE with PRS processing window. * In clause 7.8.1 and clause 7.8.2, step 3, 4, 5, 6 “gNB” has been corrected to “serving gNB”.  1. Positioning in RRC\_INACTIVE state, clause 7.9:  * It has been clarified that the SP Positioning SRS Activation/Deactivation MAC CE can be sent to the UE in RRC\_INACTIVE state without the need of state transition.  1. Miscellaneous editorial issues have been fixed.   **Impact analysis**  Impacted functionality:   * On-Demand PRS transmission * Pre-configured Measurement gap * Pre-configured PRS processing window * Positioning in RRC\_INACTIVE state   Inter-operability:  There are no interoperability issues. | | | | | | | | |
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| ***Consequences if not approved:*** | | * To change 1) Minor issues in the description of On-Demand PRS transmission remain in the specification. * To change 2) The description of pre-configured measurement gap remains misaligned with stage 3 and inconsistencies in the description of the procedure remain in the specification. * To change 3) The description of pre-configured PRS processing window remains misaligned with stage 3 and inconsistencies in the description of the procedure remain in the specification. * To change 4) Ambiguity of the MAC CE that can be sent to the UE in RRC\_INACTIVE state without the need of state transition remains in the specification. * To change 5) Miscellaneous editorial issues remain in the specification. | | | | | | | | |
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| ***Clauses affected:*** | | 6.3.1, 7.6, 7.7, 7.8, 7.9 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***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*

## 6.3 NG-RAN Node terminated protocols

### 6.3.1 NR Positioning Protocol A (NRPPa)

The NR Positioning Protocol A (NRPPa) carries information between the NG-RAN Node and the LMF. It is used to support the following positioning functions:

- E-CID for E-UTRA where measurements are transferred from the ng-eNB to the LMF.

- Data collection from ng-eNB's and gNB's for support of OTDOA positioning for E-UTRA.

- Cell-ID and Cell Portion ID retrieval from gNB's for support of NR Cell ID positioning method.

- Exchange of information between LMF and NG-RAN node for the purpose of assistance data broadcasting.

- NR E-CID where measurements are transferred from the gNB to the LMF.

- NR Multi-RTT where measurements are transferred from the gNB to the LMF.

- NR UL-AoA where measurements are transferred from the gNB to the LMF.

- NR UL-TDOA where measurements are transferred from the gNB to the LMF.

- Data collection from gNBs for support of DL-TDOA, DL-AoD, Multi-RTT, UL-TDOA, UL-AoA.

- Measurement Preconfiguration Information Transfer which allows the LMF to request the NG-RAN node to pre-configure and activate/deactivate measurement gap and/or PRS processing window.

The NRPPa protocol is transparent to the AMF. The AMF routes the NRPPa PDUs transparently based on a Routing ID corresponding to the involved LMF over NG-C interface without knowledge of the involved NRPPa transaction. It carries the NRPPa PDUs over NG-C interface either in UE associated mode or non-UE associated mode.

In case of a split gNB architecture, the NRPPa protocol is terminated at the gNB-CU.

*Next change*

## 7.6 Procedures for On-Demand PRS transmission

### 7.6.1 General

On-Demand PRS transmission procedure allows the LMF to control and decide whether PRS is transmitted or not and to change the characteristics of an ongoing PRS transmission. The on-demand PRS transmission procedure can be initiated either by the UE or LMF. The actual PRS changes are requested by the LMF irrespective of whether the procedure is UE- or LMF-initiated.

### 7.6.2 On-Demand PRS transmission procedures

Figure 7.6.2-1 shows the general positioning procedure for On-Demand PRS transmission.



Figure 7.6.2-1: On-Demand PRS transmission procedure

0. The LMF may receive information on the possible On-Demand PRS configurations that the gNB can support during the TRP Information Exchange procedure.

1. In case of UE-initiated On-Demand PRS, the LMF may configure the UE with pre-defined PRS configurations via LPP Provide Assistance Data message or via posSI.

2a. In case of UE-initiated On-Demand PRS, the UE sends an On-Demand PRS request to the LMF via LPP Request Assistance Data message. The On-Demand PRS request can be a request for a pre-defined PRS configuration indicated with pre-defined PRS configuration ID or explicit parameter for PRS configuration and may be a request for PRS transmission or change to the PRS transmission characteristics for positioning measurements.

NOTE 1: The LPP Request Assistance Data message for On-Demand PRS may also be sent in an MO-LR location service request message.

NOTE 2: If the NW has provided the pre-defined On-Demand PRS configurations to the UE, the UE is allowed to request On-Demand PRS parameters based on pre-defined PRS configuration ID (index-based request) or explicit parameter requests that is within the scope of the received pre-defined On-Demand PRS configurations. Otherwise, the UE may blindly request On-Demand PRS parameters via an explicit request within the scope of the allowed parameter list, as specified in TS37.355 [42].

2b. In case of LMF-initiated On-Demand PRS, the LMF and the UE may exchange LPP messages e.g., to obtain UE measurements or the DL-PRS positioning capabilities of the UE, etc.

3. The LMF determines the need for PRS transmission or change to the transmission characteristics of an ongoing PRS transmission.

4. The LMF requests the serving and non-serving gNBs/TRPs for new PRS transmission or PRS transmission with changes to the PRS configuration via NRPPa PRS CONFIGURATION REQUEST message.

5. The gNBs/TRPs provide the successfully configured or updated PRS transmission in the NRPPa PRS CONFIGURATION RESPONSE message accordingly.

6. LMF may provide the PRS configuration used for PRS transmission or error cause via LPP Provide Assistance Data message to the UE.

NOTE 3: If the LPP Request Assistance Data for On-Demand DL-PRS at Step 2a was sent in an MO-LR location service request message, the LMF provides a MO-LR response as described in clause 7.3.3.

NOTE 4: It is up to Network (LMF) implementation on the steps to follow (accept/reject/ignore) on receiving UE-initiated On-Demand PRS request.

NOTE 5: It is up to Network (TRP) implementation on the steps to follow (accept/reject/ignore) on receiving LMF-initiated On-Demand PRS requests.

*Next change*

## 7.7 Procedures for Pre-configured Measurement Gap

### 7.7.1 General

The pre-configured measurement gap procedure is used by the network to provide measurement gap for NR DL-PRS measurements. The serving gNB may activate/deactivate the pre-configured measurement gap upon receiving the request from a UE or LMF.

### 7.7.2 Pre-configured Measurement Gap procedures

Figure 7.7.2-1 shows the procedure for the successful pre-configuration and activation of measurement gap.



Figure 7.7.2-1: Pre-configured measurement gap configuration and activation procedure

0. LMF obtains the TRP information required for positioning services from the gNBs.

1. The LMF provides the PRS information of the neighbour TRPs to the serving gNB and requests the serving gNB to configure the UE with measurement pre-configurations via NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message.

2. Based on the assistance information from the LMF and the UE capability, the serving gNB decides to pre-configure the UE with measurement gap and provides pre-configured measurement gap configuration(s) with associated ID(s) to the UE by sending RRC Reconfiguration message specified in TS 38.331 [14].

3. The UE sends RRC Reconfiguration complete message to the serving gNB to confirm the reception of pre-configured measurement gap configuration(s).

4. The serving gNB sends the confirmation message to the LMF to indicate the success of the pre-configuration via NRPPa MEASUREMENT PRECONFIGURATION CONFIRM message.

5a. If the UE requires measurement gaps for performing the requested location measurements, and the triggering condition for UL MAC CE as specified in TS 38.331 [14] is met, the UE sends UL MAC CE Positioning Measurement Gap Activation/Deactivation Request to the serving gNB and indicates the requested measurement gap configuration based on the ID configured in step 2.

5b. LMF may send the NRPPa MEASUREMENT ACTIVATION message to request the serving gNB to activate pre-configured measurement gap.

6. Based on the request from the UE in step 5a or the request from the LMF in step 5b, the serving gNB may send DL MAC CE Positioning Measurement Gap Activation/Deactivation Command containing an ID to activate/deactivate the associated measurement gap.

*Next change*

## 7.8 Procedures for Pre-configured PRS processing window

### 7.8.1 General

The pre-configured PRS processing window procedure is used by the network to provide PRS processing window for NR DL-PRS measurements to the UE without measurement gap. The serving gNB may activate/deactivate the pre-configured PRS processing window upon receiving the request from LMF.

### 7.8.2 Pre-configured PRS processing window procedures

Figure 7.8.2-1 shows the procedure for the pre-configuration and activation/deactivation of PRS processing window.



Figure 7.8.2-1: Pre-configured PRS processing window configuration and activation procedure

0. LMF obtains the TRP information required for positioning services from the gNBs.

1. The LMF provides the PRS information of the neighbour TRPs to the serving gNB and requests the serving gNB to configure the UE with measurement pre-configurations via NRPPa MEASUREMENT PRECONFIGURATION REQUIRED message.

2. Based on the assistance information from the LMF and the UE capability, the serving gNB decides to pre-configure the UE with PRS processing window and provides pre-configured PRS processing window configuration(s) with associated ID(s) to the UE by sending RRC Reconfiguration message specified in TS 38.331 [14].

3. The UE sends RRC Reconfiguration complete message to the serving gNB to confirm the reception of pre-configured PRS processing window configuration(s).

4. The serving gNB sends the confirmation message to the LMF to indicate the success of the pre-configuration via NRPPa MEASUREMENT PRECONFIGURATION CONFIRM message.

5. The LMF sends the NRPPa MEASUREMENT ACTIVATION message to request the serving gNB to activate the pre-configured PRS processing window.

6. Based on the request from the LMF in step 5, the serving gNB sends DL MAC CE PPW Activation/Deactivation Command containing ID(s) to activate/deactivate the associated PRS processing window configuration(s).

*Next change*

## 7.9 Positioning in RRC\_INACTIVE state

Positioning may be performed when a UE is in RRC\_INACTIVE state. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE state. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP, RRC Release message (e.g. to configure SRS for UL positioning, if it is supported) and SP Positioning SRS Activation/Deactivation MAC CE to the UE without the need of state transition.

Periodic and Semi-persistent UL-SRS transmission for positioning can be supported in RRC\_INACTIVE.

*End of changes*