3GPP TSG RAN WG2 Meeting #117-e R2-220xxxx

**Electronic meeting, 21 Feb- 3 March, 2022**

**Agenda item:** 8.11.1

**Source:** Intel Corporation

**Title:** Report of [AT117-e][604][POS] RAT-dependent positioning running CR to 38.305 (Intel)

**Document for:**  Discussion and decision

# Introduction

This is the report of following offline discussion:

* [AT117-e][604][POS] RAT-dependent positioning running CR to 38.305 (Intel)

      Scope: Review and update the CR in R2-2202490.

      Intended outcome: Endorsable CR

      Deadline:  Friday 2022-02-25 1000 UTC

Please provide your comments in the discussion report before Thursday 2022-02-24 1000 UTC, i.e. one day before the deadline, so we have time to update the CRs accordingly.

# Annex: companies’ point of contact

|  |  |  |
| --- | --- | --- |
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# Discussion

## 3.1 Proposals in RAN2#117

### 3.1.1 TEG

#### 3.1.1.1 FFS on TEG definition

R2-2202489 and R2-2203462 discussed how to update the open issue on TEG definition.

**Proposal 1**: RAN2 to discuss the following text proposals for definitions of timing errors, timing delays and different TEGs and capture the definitions in clause 3.1 in TS 38.305:

|  |
| --- |
| **Tx timing error**: Result of Tx time delay (defined below) involved in the transmission of a signal. It is the uncalibrated Tx time delay, or the remaining delay after the TRP/UE internal calibration/compensation of the Tx time delay, involved in the transmission of the DL PRS/UL SRS signals. The calibration/compensation may also include the calibration/compensation of the relative time delay between different RF chains in the same TRP/UE and may also possibly consider the offset of the Tx antenna phase centre to the physical antenna centre  **Tx time delay**: From a signal transmission perspective, the time delay from the time when the digital signal is generated at baseband to the time when the RF signal is transmitted from the Tx antenna  **Rx timing error**: Result of Rx time delay (defined below) involved in the reception of a signal before reporting measurements that are obtained from the signal. It is the uncalibrated Rx time delay, or the remaining delay after the UE/TRP internal calibration/compensation of the Rx time delay, involved in the reception of the DL PRS/UL SRS signals. The calibration/compensation may also include the calibration/compensation of the relative time delay between different RF chains in the same UE/TRP and may also possibly consider the offset of the Rx antenna phase centre to the physical antenna centre  **Rx time delay**: From a signal reception perspective, there will be a time delay from the time when the RF signal arrives at the Rx antenna to the time when the signal is digitized and time-stamped at the baseband  **UE Tx ‘timing error group’ (UE Tx TEG)**: Tx timing errors, associated with UE transmissions on one or more UL SRS resources for positioning purpose, that are within a certain margin  **UE Rx ‘timing error group’ (UE Rx TEG)**: Rx timing errors, associated with UE reporting of one or more DL measurements (RSTD), that are within a certain margin  **UE RxTx ‘timing error group’ (UE RxTx TEG)**: Rx timing errors and Tx timing errors, associated with UE reporting of one or more UE Rx-Tx time difference measurements and one or more UL SRS resources for positioning purpose, that are within a certain margin  **TRP Tx ‘timing error group’ (TRP Tx TEG)**: Tx timing errors, associated with TRP transmissions on one or more DL PRS resources, that are within a certain margin  **TRP Rx ‘timing error group’ (TRP Rx TEG)**: Rx timing errors, associated with TRP reporting of one or more UL measurements, that are within a certain margin  **TRP RxTx ‘timing error group’ (TRP RxTx TEG)**: Rx timing errors and Tx timing errors, associated with TRP reporting of one or more gNB Rx-Tx time difference measurements and one or more DL PRS resources, that are within a certain margin |

**Discussion point 3.1.1.1-1: Do companies agree to capture the TEG definition as above? i.e. capture RAN1 agreements directly in stage 2 CR.**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | See comments | Wait the reply LS from RAN1 since we already ask RAN1 to confirm the above definition. |
| CATT |  | Wait for the reply LS from RAN1. |
| Apple | Yes, with comments | We can capture these definitions and then revise them, if needed, if RAN1 provide a revised definition.  Also an editorial comment – I think we are generally using American English in the specs, so “centre” -> “center”. |
| ZTE |  | Wait for the reply LS from RAN1. |

**Summary:**

5 companies provided inputs. 2 companies are ok to update TEG definition based on RAN1 agreements. 3 companies would like to wait for RAN1 since RAN2 has sent LS to them.

**Proposal 3.1.1.1-1: Wait for RAN1 inputs on TEG definition.**

#### 3.1.1.2 FFS Description for information transfer gNB and UE is not needed. For example, previously we also have PosSRS configuration sent from gNB to the UE. But that is not captured here.

R2-2202489 mentioned that

*we only captured the general information between UE and LMF (for LPP protocol) and the information between gNB and LMF (for NRPPa protocol) in the table. We did not capture RRC related information in the table. Therefore the information between UE and gNB for TEG in 8.13.2.4 and 8.13.2.5 shall be deleted.*

And therefore proposed

**Proposal 5: Remove section 8.13.2.4 and 8.13.2.5 (the information between UE and gNB for TEG)**

**Discussion point 3.1.1.2-1: Do companies agree to Remove section 8.13.2.4 and 8.13.2.5 (the information between UE and gNB for TEG)?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | Yes |  |
| CATT | No | It will help reader understand the TxTEG info between UE and gNB. But we are fine to follow the majority. |
| Apple |  | No strong view, but we slightly prefer to keep it. OK to go with the majority view. |
| ZTE | Yes | Ok to not capture them since 7.4.1.z has introduced this new feature |

**Summary:**

5 companies provided inputs. 1 company would like to keep but can also follow majority view. 1 company has no strong view. 3 companies would like to remove it.

**Proposal 3.1.1.2-1:** **Remove section 8.13.2.4 and 8.13.2.5 (the information between UE and gNB for TEG) .**

#### 3.1.1.3 Other changes

**R2-2202593 proposed**

**Proposal 3: to revise the stage-2 “Sequence of Procedure for UL-TDOA positioning” in TS 38.305 to include RRC message exchange to convey the UE Tx TEG association information to the gNB.**

The TP is shown as

Figure 8.13.3.4-1 shows the messaging between the LMF, the gNBs and the UE to perform UL-TDOA procedure.

1. 

Figure 8.13.3.4-1: UL-TDOA positioning procedure

0. The LMF may use the procedure in Figure 8.13.3.2.1-2 to obtain the TRP information required for UL-TDOA positioning.

1. The LMF may request the positioning capabilities of the target device using the LPP Capability Transfer procedure as described in clause 8.13.3.1.

2. The LMF sends a NRPPa POSITIONING INFORMATION REQUEST message to the serving gNB to request UL-SRS configuration information for the target device as described in Figure 8.13.3.2.1-1.

3. The serving gNB determines the resources available for UL-SRS and configures the target device with the UL-SRS resource sets at step 3a. If the gNB requests the UE TxTEG association information in step 3b, the target device reports it in step 3c (and upon the change in the association).

**Discussion point 3.1.1.3-1: Do companies agree the TP shown as above (proposed in R2-2202593)?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes, see comments | Yes, in principle, it is fine, but it raises other questions like whether it is mandatory to have step 3b and step 3c or if more text is needed to elaborate when it is used. Also, one could abstract step 3b and step 3c by replacing these steps with just a box and text in the box saying, “UE Tx TEG association information exchange”. |
| Xiaomi | Yes |  |
| CATT | Yes with comments | At least two messages are expected within 3c because of the periodic report. |
| Apple | Yes |  |
| ZTE | Yes |  |

**Summary:**

5 companies provided inputs. All companies are ok to add TEG in 8.13.4.4-1, but with some suggestions.

Rapporteur would like to change it as:

* Add text in box “UE Tx TEG association information exchange
* ~~If t~~The gNB may request~~s~~ the UE TxTEG association information in step 3b, the target device reports it ~~in step 3c~~ (and upon the change in the association).

**Proposal 3.1.1.3-1:** **to revise the stage-2 “Sequence of Procedure for UL-TDOA positioning” in TS 38.305 to include RRC message exchange to convey the UE Tx TEG association information to the gNB.**

### 3.1.2 On-Demand PRS

#### 3.1.2.1 premeeting discussion 608

2 comments were received in R2-2202236 as

*In 7.x.1, saying “LMF to request” is not correct. LMF does not request UE or any other entity. We propose the following text:*

*On-Demand PRS transmission procedure allows to control 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.*

Rapporteur considers the suggestion is correct. But would like to check companies’ view on this.

**Discussion point 3.1.2.1-1: Do companies agree the change suggested on 7.x.1 as above (highlighted in yellow)?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | See comments | Regarding the *change the characteristics of an ongoing PRS transmission,* does this mean gNB shall use the new on-demand PRS configuration instead of current PRS configuration? Maybe the gNB can keep the ongoing PRS transmission and transmit the new PRS based on on-demand PRS configuration simultaneously.  [Rapp] The intention is to say, the PRS transmission could be changed. To my understanding, the gNB could store two configurations, but can only transmit one of them at once. |
| CATT | Yes |  |
| Apple | Yes |  |
| ZTE | No | ‘On-Demand PRS transmission procedure allows to control whether PRS is transmitted or not’ this is unclear what it means. How can on-demand PRS procedure control the transmission status of PRS?  [Rapp] suggest to change it as  On-Demand PRS transmission procedure allows the LMF to control whether PRS is transmitted or not’ |
| Ericsson | No | We have already agreed that UE initiated is also handled by LMF; soif we say can be initiated by UE then we need to also mention the initial agreement; that even for UE initiated; LMF decides.  Basically UE initiation is a request; that essence should be captured.  [Rapp1] We can add “decide” as “the LMF to control and decide “ |

**Summary:**

6 companies provided inputs. 3 companies are ok with change. 3 companies have comments.

Rapporteur would like to change it as:

* 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.

**Proposal 3.1.2.1-1: revise the stage-2 7.x.1 as “- 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.”**

In 7.x.2:

***Change 1:*** *Step 1 and 2a both covers UE-initiated ODPRS. So, the figure needs to be updated to put both steps under one dotted box for UE-initiated ODPRS.*

*[Rapp] Looks ok.*

**Discussion point 3.1.2.1-2: Do companies agree the change 1 above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | No | The existing figure is correct. No need to put step 1 and 2a in one dotted box. |
| CATT | No | Step 1 is a pre-condition. It's up to UE to make a decision to initiate on-demand PRS in step 2a. |
| Apple | Yes |  |
| ZTE | Yes | For LMF initiated on-demand PRS, there is no ‘pre-defined PRS configuration’ as step 1 |

**Summary:**

5 companies provided inputs. 3 companies are ok with change.

2 companies commented that current figure is correct.

1 company commented that “For LMF initiated on-demand PRS, there is no ‘pre-defined PRS configuration’ as step 1”, and therefore it would be good to put step in the same box with UE-initiated On-Demand PRS.

Rapporteur tend to agree that step 1 does not apply for LMF initiated On Demand PRS, and therefore would be good to put it in the box of UE Initiated On-Demand PRS.

**Proposal 3.1.2.1-2:** **revise the stage-2 7.x.2 as “-put step1 in the box of UE Initiated On-Demand PRS. ”**

***Change 2:*** *Step 2a: The last sentence about sending in MO-LR should be a NOTE as it is a caveat addressing a different procedure covered in LCS specification, i.e. put*

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

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

*[Rapp] No strong opinion.*

**Discussion point 3.1.2.1-3: Do companies agree the change 2 above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | No strong view. | Both are OK. |
| CATT | No | Step 2a is better than a note. |
| Apple | Yes |  |
| ZTE | Yes | To match with change 5, step 7 |
| Ericsson | This is not agreed yet | [Rapp1] We have agreed that  Proposal 1: RAN2 to agree to support the UE originated request of on-demand PRS via MO-LR for autonomous self location. (11/14)  The open issue is whether the UE can do this without predefined configuration, i.e. blind request. |

**Summary:**

6 companies provided inputs. 3 companies are ok with change. 1 company has no strong opinion. 1 company think normative text is better than a Note.

Rapporteur tend to agree that we should avoid to mention different location service mode, and therefore a Note is better.

**Proposal 3.1.2.1-3:** **revise the stage-2 7.x.2 as “-put The LPP Request Assistance Data message for On-Demand PRS may also be sent in an MO-LR location service request message. As a Note”**

***Change 3:*** *Step 2b: In the figure, it is shown as LMF-initiated ODPRS but it is not mentioned in the description of step 2b. Also, what is “available PRS configuration” mentioned in step 2b? How does that relate to step 1? Add “In case of LMF-initiated On-Demand PRS to step 2b and remove the text “or to provide available On-Demand PRS configurations to the UE”*

*[Rapp] Step 2b can be applied for both UE initiated and LMF initiated case. Therefore we should “remove LMF-Initiated On-Demand PRS and the dot box” instead of adding “LMF-initiated ODPRS ” in the procedure part; Agree to remove “available PRS configuration” since it has been covered by step 1*

**Discussion point 3.1.2.1-4: Do companies agree suggestion from Rapporteur highlighted in yellow as above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | See comments | This is still the most confusing step in the call flow. If step 2b is common for both UE-initiated and LMF-initiated and if the common LPP procedures are for LMF to obtain UE measurement and UE PRS processing capabilities (I still don’t understand what the provide available ODPRS configurations to the UE refers to), then it is strange for LMF to obtain the UE PRS processing capabilities after step 1 where it already configures the UE with pre-defined PRS configuration. Also, in the UE-initiated case, what is the need for LMF to obtain UE measurement after the UE sends the Request Assistance Data in step 2a? We have been thinking step 2b is a LMF-initiated specific step to show that the LMF obtains the measurements from UE to help with decision in step 3. If a common LPP procedures step is required, then a new step should be added outside step 2b but we think step 2b should be a LMF-initiated specific step. |
| Xiaomi | See comments | Step 2b is specific step for LMF-initiated on-demand PRS since obtaining UE measurements and the DL-PRS positioning capabilities of the UE are not needed for UE-initiated on-demand PRS. We agree to remove “available PRS configuration”. |
| CATT | Yes | LMF-initiated on-demand PRS can be finalized by RAN3. |
| Apple |  | Agree to remove “available PRS configuration”.  Do we need the word “possible” in “Possible LPP procedures”?  Also agree with Nokia that “DL-PRS positioning capabilities of the UE” is strange. |
| ZTE |  | If step 2b is common for UE-initiated and LMF-initiated request, then it seems no procedure is specific for LMF-initiated request |

**Summary:**

5 companies provided inputs. 3 companies commented that step 2b should be dedicated for LMF initiated case. 4 companies agreed to remove “available PRS configuration. ”

Rapporteur would suggest to change it as:

* Add “In case of LMF-initiated On-Demand PRS” at the beginning of stage 2b, and remove “available PRS configuration.”

**Proposal 3.1.2.1-4: revise the stage-2 7.x.2 as “-step 2b, - Add “In case of LMF-initiated On-Demand PRS” at the beginning of stage 2b, and remove “available PRS configuration.”**

***Change 4:*** *Step 3: Change “or change to PRS transmission characteristics” to “or change to the transmission characteristics of an ongoing PRS transmission”*

*[Rapp] Looks ok.*

**Discussion point 3.1.2.1-5: Do companies agree the change 4 as above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | See response to Discussion point 3.1.2.1-1. |  |
| CATT | Yes |  |
| Apple | Yes |  |
| ZTE | Yes |  |

5 companies provided inputs. 4 companies agree the changes.

**Proposal 3.1.2.1-5:** **revise the stage-2 7.x.2 as “-step 3, -Change “or change to PRS transmission characteristics” to “or change to the transmission characteristics of an ongoing PRS transmission”**

***Change 5:*** *Step 7 does not fit in this 38.305 call flow. The treatment of ODPRS request for assistance data via MO-LR and reference to SA2 specification can be put under a NOTE.*

That is, put

7. 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.

As a Note:

Note: 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.

**Discussion point 3.1.2.1-6: Do companies agree the change 5 as above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | Yes |  |
| CATT | Yes | We are fine with the note on step2a. The description in step 2a on MO-LR can be removed. |
| Apple | Yes |  |
| ZTE | Yes |  |

5 companies provided inputs. 5companies agree the changes.

**Proposal 3.1.2.1-6:** **revise the stage-2 7.x.2 as “-put step 7, as a Note”**

***Change 6:*** *Editor’s Note with FFS to step 6 can be removed as I believe we concluded the response to a ODPRS request cannot be a posSIB.*

*[Rapp] We do not have conclusion yet. But there is clear majority [13/14] in Pre117-e608, see R2-2202236, Proposal 7: The posSI message cannot be the response for a UE’s On-Demand PRS request. Therefore would suggest to agree this, i.e. remove*

Editor's Note: Step 6, FFS on whether posSIB can be the response or not..

And remove “or posSI ” from step 6

6. LMF provides the updated PRS configuration used for PRS transmission via LPP Provide Assistance Data message or posSI to the UE.

**Discussion point 3.1.2.1-7: Do companies agree the change 6 as above ?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | Yes |  |
| CATT | Yes |  |
| Apple | yes |  |
| ZTE | Yes |  |
|  |  |  |

5 companies provided inputs. 5companies agree the changes.

**Proposal 3.1.2.1-7:** **revise the stage-2 7.x.2 as “-remove posSI”**

The suggestion

#### 3.1.2.2 Others

R2-2203361 proposed to capture in stage 2 “Proposal 7 LMF indicates indicate explicit on-demand PRS parameters (and the corresponding value ranges for each parameter) to the UE.”, i.e.

**Figure 7.x.2-1: Procedures to support On-Demand PRS transmission [1].**

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

1. In case of UE-initiated On-demand PRS, the LMF may configure the UE with pre-defined PRS configurations and/or indicate PRS parameters (together with value range) that can be explicitly requested 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 if the UE has pre-defined PRS configurations or configurable on-demand PRS parameter indication. The On-Demand PRS request may be a request for PRS transmission or change to the PRS transmission characteristics for positioning measurements.

**Discussion point 3.1.2.2-1: Do companies agree the TP shown as above?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | No | There was an agreement made that the UE may or may not send the request for AD with explicit parameters and the LMF may or may not accept the request. With that agreed, we are not sure if this configurable ODPRS parameter indication is needed for the UE-initiated ODPRS with explicit parameter request. Also, it seems to mimic the same functionality provided by pre-defined PRS configuration. Such exchange of configurable ODPRS parameters capability seems to be useful between gNB and LMF and if the LMF takes that into account in step 3 when it determines the need for PRS transmission or change to PRS transmission characteristics, then the configurable ODPRS indication is not needed. |
| Xiaomi | No | In the running CR, UE can request explicit parameter for PRS configuration based on pre-defined PRS configuration, so the additional PRS parameters indication is not necessary. |
| CATT | No | The steps should not be so specific and we agree with Nokia and Xiaomi’s comments. |
| Apple | No |  |
| ZTE | No | The decision of description should be made after CB session with remaining on-demand PRS issues solved |

5 companies provided inputs. 5companies disagree the change.

### 3.1.3 Preconfigured MG

#### 3.1.3.1 FFS on whether we need to capture PPW, MG configuration procedure in stage 2 since we did not do that for posSRS and proposed

R2-2202489 discussed open issue that FFS on whether we need to capture PPW, MG configuration procedure in stage 2 since we did not do that for posSRS and proposed

**Proposal 3: add the procedure for MG as 7.y Procedures for Pre-configured Measurement Gap i.e.:**

## 7.y Procedures for Pre-configured Measurement Gap

### 7.y.1 General

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

### 7.y.2 Pre-configured Measurement Gap procedures

Figure 7.y.2-1 shows the general positioning procedure for Pre-configured Measurement Gap.



Figure 7.y.2-1: Pre-configured measurement gap configuration procedure

1. Based on the assistance information from the LMF and the UE capability, the serving gNB 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];

2. The UE sends RRC Reconfiguration complete message to the gNB to confirm the reception of pre-configured measurement gap configuration;

3. If the UE requires measurement gaps for performing the requested location measurements while measurement gaps are either not configured or not sufficient, the UE sends UL MAC CE Activation/Deactivation Request to the gNB and indicates the requested measurement gap configuration based on the ID configured in step 1;

4. Based on the quest from the UE in step 3a or the request from the LMF in step 3b, the gNB may send DL MAC CE Activation/Deactivation command containing an ID to activate the associated measurement gap;

Editor's Note: FFS on details of MAC CE, NRPPa, RRC;.

**Proposal 4: add the procedure for PPW as 7.z Procedures for Pre-configured PRS processing window, i.e.:**

## 7.z Procedures for Pre-configured PRS processing window

### 7.z.1 General

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

### 7.z.2 Pre-configured PRS processing window procedures

Figure 7.z.2-1 shows the general positioning procedure for Pre-configured PRS processing window.



Figure 7.z.2-1: Pre-configured PRS processing window configuration procedure

1. Based on the assistance information from the LMF and the UE capability, the serving gNB 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];

2. The UE sends RRC Reconfiguration complete message to the gNB to confirm the reception of pre-configured PRS processing window configuration;

4. Based on the request from the LMF in step 3, the gNB sends DL MAC CE Activation/Deactivation command containing an ID to activate the associated PRS processing window;

Editor's Note: FFS on details of MAC CE, NRPPa, RRC;.

**Discussion point 3.1.3.1-1: Do companies agree the TP shown as above?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company’s name** | **Yes/No** | | **Remark** |
| Nokia | Yes, in principle | | 1) NRPPa signalling is unclear as to what information the LMF provides to gNB in step 0.  [Rapp] Let’s wait for RAN3 on this.  2) Need to specify when step 3a and when step 3b is used when both options are there for activation/deactivation of pre-configured MG.  [Rapp] It is also related to open issue whether LMF can activate MG without preconfigured. I assume for now, if we ignore the open issues, then it is up to UE/LMF to decide whether to trigger the activation, and therefore we do not need to specify in which condition, which option should b e used. It is also related to the issue discussed in 629.  Similarly, for PPW, need to specify when step 3 and when step 4 is used when both options are there for activation/deactivation.  [Rapp] Same as above. |
| Xiaomi | See comments | | Agree to capture the pre-configure MG and pre-configured PPW procedure in stage 2 specification.  For the pre-configured MG procedure, if step 3b is performed by LMF, it should indicate UE not to perform step 3a.  [Rapp] We did not agree this. The issue is still under the discussion in 628 as Which of the following options to cancel a triggered UL MAC CE for MG activation and deactivation should be captured in the spec?  For the pre-configured PPM procedure, we think the gNB couldn’t perform step 4 without step 3, so we suggest to add the description of step 3 and use solid line instead of [dotted-line](javascript:;).  [Rapp] agree |
| CATT |  | | The text of step 3 is missed.  [Rapp] Agree |
| Apple | Yes in principle | Probably needs to be revised based on the outcome of the MG discussion  [Rapp] Agree | |
| ZTE |  | | 1. For 7.y.2 step 3 the first sentence, ‘while measurement gaps are either not configured or not sufficient’ is conflicting with step 1. Suggest to delete this part.   [Rapp] ok   1. Editorial changes in 7.z.1:   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 gNB may activate the pre-configured PRS processing window upon receiving the request from LMF.  [Rapp] ok   1. Step 3 for PPW is missing   [Rapp] ok |

5 companies provided inputs. 5 Companies agreed to capture MG and PPW in section 7.y, 7.z. However there are some detailed comments. Rapporteur would update it as

* . For the pre-configured PPM procedure, add the description of step 3
* Delete 7.y.2 step 3 the first sentence, ‘while measurement gaps are either not configured or not sufficient’ is conflicting with step 1.
* Editorial changes in 7.z.1:

**Proposal 3.1.3.1-1: capture MG and PPW in section 7.y, 7.z. Add step 3 for PPW and use solid line, remove first sentence from step 3 of 7.y.2, editorial changes in 7.z.1.**

#### 3.1.3.2 other changes

R2-2203181 proposed

***Proposal 4: A clarification note should be added in the stage 2 running CR 7.4.1.x that: if none of the pre-configured MGs satisfies UE’s need or there are no pre-configured measurement gaps provided to the UE, UE can trigger LocationMeasurementIndication procedure.***

7.4.1.x Pre-configured Measurement Gap

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



Figure 7.4.1.x-1: Pre-configured measurement gap configuration procedure

1. Based on the assistance information from the LMF and the UE capability, the serving gNB 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];

2. The UE sends RRC Reconfiguration complete message to the gNB to confirm the reception of pre-configured measurement gap configuration;

3. If the UE requires measurement gaps for performing the requested location measurements, the UE sends UL MAC CE Activation/Deactivation Request to the gNB and indicates the requested measurement gap configuration based on the ID configured in step 1;

Note: if none of the pre-configured MGs satisfies UE’s need or there are no pre-configured measurement gaps provided to the UE, UE can trigger *LocationMeasurementIndication* procedure as specified in 7.4.1.1.

4. If UE transmits UL MAC CE containing pre-configured MG ID, based on the request from the UE in step 3a or the request from the LMF in step 3b, the gNB may send DL MAC CE Activation/Deactivation command containing an ID to activate the associated measurement gap;

**Discussion point 3.1.3.2-1: Do companies agree the TP shown as above?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | No | (Feature) Interactions between new pre-configured measurement gap configuration procedure and legacy Location measurement Indication procedure are not needed to be specified. Such decisions as to when to use different procedures or features can be left to implementation. |
| Xiaomi | No | Using Pre-configured MG or legacy MG should be based on UE implementation. |
| CATT | Yes with comments | 1.gNB should be LMF in Figure 7.4.1.x-1  2. 3b is earlier that 3a, so will be names exchanged?  3. the Note in step 3 is not required.  4. no need to specify “based on the request from the UE in step 3a” in step 4. |
| Apple | No | Agree with Nokia, such level of detail is not needed here |
| ZTE | Yes | For step 3 the first sentence, ‘while measurement gaps are either not configured or not sufficient’ is conflicting with step 1. Suggest to delete this part.   1. If not clarified, UE may receive pre-configured MGs(r17), and then trigger *LocationMeasurementIndication* procedure(r16). A note can better illustrate UE’s behaviour |

5 companies provided inputs. 2 Companies would like to specify the interaction between preconfigured MG and legacy MG. 3 companies do not see the need and would like to leave it to UE implementation. Therefore Rapporteur will not capture the change.

### 3.1.4 Storing UE LPP capability in AMF

R2-2202489 mentioned that

Currently storing capability in AMF is captured in section 5.4.4 as

The LMF may interact with the AMF to support the provision of UE positioning capability to the AMF as described in TS 23.273 [35].

It would be good to align with TS23.273, i.e. change it as

The LMF may interact with the AMF to support reception of stored UE Positioning Capability from AMF and providing updated UE Positioning Capability to AMF as described in TS 23.273 [35].

And therefore proposed

**Proposal 6: In section 5.4.4, change the description on storing UE capability in AMF from “The LMF may interact with the AMF to support the provision of UE positioning capability to the AMF as described in TS 23.273 [35].” to “The LMF may interact with the AMF to support reception of stored UE Positioning Capability from AMF and providing updated UE Positioning Capability to AMF as described in TS 23.273 [35]”**

**Discussion point 3.1.4-1: Do companies agree the proposal 6 shown as above?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes, with comment | The text in 23.273 does not clearly say who is responsible i.e., the source for the UE positioning capabilities stored in the AMF. It seems to imply that the original source of the UE positioning capabilities stored in the AMF is NOT the LMF. So, the modified text needs to make it clear that the LMF is the original source for the UE positioning capabilities stored in the AMF. May be something like this:  “**The LMF may interact with the AMF to support provisioning in AMF and retrieval of stored UE Positioning Capability from AMF and providing updated UE Positioning Capability to AMF as described in TS 23.273 [35]**”  [Rapp] try to combine the suggest from Nokia and Apple |
| Xiaomi | Yes |  |
| CATT | Yes |  |
| Apple | Yes, with [editorial] comments | Suggest revising it as follows “The LMF may interact with the AMF to receive stored UE Positioning Capability from AMF and to provide updated UE Positioning Capability to AMF as described in TS 23.273 [35].’  [Rapp] try to combine the suggest from Nokia and Apple |
| ZTE | Yes |  |

5 companies provided inputs. 5 Companies agreed to update the description. However there are some detailed comments. Rapporteur would update it as

* . The LMF may interact with the AMF to provide (updated) UE Positioning Capability to AMF and to receive stored UE Positioning Capability from AMF as described in TS 23.273 [35]:

**Proposal 3.1.4-1: Update storing UE capability as The LMF may interact with the AMF to provide (updated) UE Positioning Capability to AMF and to receive stored UE Positioning Capability from AMF as described in TS 23.273 [35]**

### 3.1.5 Anything is missing?

**Discussion point 3.1.5-1: Companies are invited to indicate whether any stage 2 proposals are missing in the discussion?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
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|  |  |  |
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## 3.2 Positioning in RRC\_INACTIVE

RAN2 agreed

Proposal 1: Add clarification note (as below) in Stage 2 specification:

Note: Positioning may be performed when a UE is in RRC\_INACTIVE state. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP message and RRC message (e.g. to configure SRS for positioning, if UL positioning is supported) to the UE.

Rapporteur would suggest to capture it as normative text in section 7.w as

|  |
| --- |
| 7.w Positioning in RRC\_INACTIVE Positioning may be performed when a UE is in RRC\_INACTIVE state. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP message and RRC message (e.g. to configure SRS for positioning, if UL positioning is supported) to the UE. |

**Discussion point 3.2: Do companies agree the TP shown as above? If no, please indicate your preference.**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
| Nokia | Yes |  |
| Xiaomi | Yes |  |
| CATT | Yes |  |
| Apple | Yes, with [editorial] comments | Suggest rephrasing a bit as follows “Positioning may be performed when a UE is in RRC\_INACTIVE. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP and RRC message (e.g. to configure SRS for positioning for UL positioning) to the UE.”  [Rapp] for the last change, would suggest to  . to configure SRS for UL positioning, if it ~~UL positioning~~ is supported) to the UE. |
| ZTE | Yes |  |

5 companies provided inputs. 5 Companies agreed to capture RRC-INACTIVE in section 7.w. 1 company suggested to change the wording a bit, and looks ok to Rapporteur.

* . “Positioning may be performed when a UE is in RRC\_INACTIVE. Any uplink LCS or LPP message can be transported in RRC\_INACTIVE. If the UE initiated data transmission using UL SDT, the network can send DL LCS, LPP and RRC message (e.g. to configure SRS for UL positioning, if it ~~UL positioning~~ is supported) to the UE.”

**Proposal 3.2:** **Capture positioning in RRC\_INACTIVE in section 7.w**

## 3.3 running CR in R2-2202490

**Discussion point 3.3: Companies are invited to provide view on running TS38.305 CR R2-2202490?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company’s name** | **Section** | **Identified issues** | **Change suggestion** |
|  |  |  |  |
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# 2nd Round discussion

**Discussion point 4-1: Companies are invited to provide view on the updated TS38.305 CR?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company’s name** | **Section** | **Identified issues** | **Change suggestion** |
| Ericsson | 7.X.1 | 1. On-Demand PRS transmission procedure allows the LMF to control 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  2. Below should not be deleted,  In case of LMF-initiated On-Demand PRS or UE-initiated On-Demand PRS, the LMF may obtain measurements from the UE using some existing positioning methods to assist step 3 e.g., the LMF may obtain SSB/CSI-RS RSRP measurements (NR-ECID) or DL-PRS RSRP measurements (DL-AoD).  3. This Note is not agreed yet.  NOTE 1: The LPP Request Assistance Data message for On-Demand PRS may also be sent in an MO-LR location service request message.  4. Step 7 MO-LR response from the figure needs to be deleted. | 1. We have already agreed that UE initiated is also handled by LMF; soif we say can be initiated by **UE then we need to also mention the initial agreement; that even for UE initiated; LMF decides.**  Basically, UE initiation is a request; that essence should be captured.  [Rapp1] Has add “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.”  2. This should not be deleted. It is unclear as why this is not needed. This was captured based upon consensus of majority company. It is essential to know as how on-demand PRS works. This is fundamental step and should be clear.  2 [Rapp1] It was updated in post meeting RAN2#116bis 629 based on QC’s comments  R”eplace Step 2b with "Possible LPP Procedure" which includes LPP Location Information Transfer, LPP Capability Transfer and LPP Assistance Data Transfer. A proposal is described in R2-2200964, section 7.”  Currrent description is more generic.  3 Rapp1] We have agreed that  Proposal 1: RAN2 to agree to support the UE originated request of on-demand PRS via MO-LR for autonomous self location. (11/14)  The open issue is whether the UE can do this without predefined configuration, i.e. blind request.  4 Rapp1, done |
|  |  |  |  |

**Discussion point 4-2: Companies are invited to indicate whether any stage 2 proposals are missing in the discussion?**

|  |  |  |
| --- | --- | --- |
| **Company’s name** | **Yes/No** | **Remark** |
|  |  |  |
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# Summary report and proposals