**3GPP TSG RAN WG1 #110bis-e R1-2210266**

**e-Meeting, October 10th – 19th, 2022**

**Agenda item:** 8.5

**Source:** Moderator (CATT)

**Title:** Summary for preparation phase on maintenance of Rel-17 WI on NR positioning enhancements

**Document for:** Discussion and Decision

## Introduction

This document provides a summary of maintenance maintenance issues of Rel-17 WI on NR positioning enhancements for the following email discussion.

[110bis-e-R17-Pos-01] Email discussion to determine maintenance issues to be handled in RAN1#110bis-e by October 12 – Ren (CATT)

* Additional email discussions will be set up once the maintenance issues for RAN1#110bis-e are determined

## Issues on NR positioning enhancements

The issues submitted to RAN1#110bis-e are summarized in the following tables. The initial assessment on each of the maintenance issues is also provided by the Rel-17 FLs, where

* *High priority (H):* high-priority item (essential, pending issues, broken spec components) and proposed editorial changes that either enhance the clarity of the specs or correct mistakes
* *Non-essential (N)*: all other purposes such as spec optimization and low priority issues
* *Editorial (E)*: editorial issues that will be handled as editorial CRs (to be communicated to the editors/chairs)

Interested companies are encouraged to provide these initial views, if any, to the last column of the table views by 23:59 (UTC) on Day1 of RAN1#110bis-e.

**Table 1 - Accuracy improvements by mitigating UE Rx/Tx and/or gNB Rx/Tx timing delays**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 1-1 | The tdocs propose some correction of Tx TEG reporting based on RAN1’s agreement. | R1-2208939[10]  R1-2208940[11] | H | [ZTE] We are OK to discuss the issue  [Nokia] We are okay to discuss but question if this is really an essential correction.  [CATT] We support the proposed correction.  [QC]: OK to discuss  [Ericsson] OK with the FL assessment. |
| 1-2 | The tdoc proposes adding the description of TEG margin reporting to TS 38.214 based on RAN4’s LS on TEG frame work | R1-2209211[14] | H | [ZTE] Support to discuss this issue. All UE procedure should be captured in 38.214  [Nokia] We are okay to discuss but question if this is really an essential correction.  [CATT] OK to discuss the issue  [QC]: OK to discuss  [Ericsson] OK with the FL assessment. |
| 1-3 | The tdoc proposes the clarification of the Tx timing error difference in UE Tx TEG definition.  **FL comment:**   * The title in cover page seems not correct. | R1-2210101[26] | H | [ZTE] We prefer not to have such CR because TEG can also be used for one resources in different times.  [Nokia] We also prefer not to have this CR.  [CATT] OK to discuss the issue  [QC]: OK to discuss  [vivo]: same view as ZTE and Nokia  [Ericsson] OK with the FL assessment. |

**Table 2 - Accuracy improvements for UL-AoA positioning solutions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 2-1 | None |  |  |  |
| 2-2 |  |  |  |  |

**Table 3 - Accuracy improvements for DL-AoD positioning solutions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 3-1 | Correction on missing descriptions for timestamp of DL PRS-RSRPP  FL : align RAN1 specs with RAN2 specifications. | R1-2208601  R1-2210211 | H | [ZTE] We are OK to discuss the issue  [Nokia] Okay to discuss.  [CATT] OK to discuss the issue  [QC]: OK to discuss  [Ericsson] OK with the FL assessment. |
| 3-2 | Correction to the Rx beam reporting condition for DL-AoD  FL: RSRPP should support use of the same rx beam index | R1-2209837 | H | [ZTE] We support this draft CR. However, since this issue was discussed before, to avoid repeating discussion, we prefer to conclude this issue in this meeting.  [Nokia] Okay to discuss.  [CATT] OK to discuss the issue  [QC]: OK to discuss  [Ericsson] OK with the FL assessment. |
| 3.3 | Clarification of the limitation of 24 RSRP/RSRPP reports for AOD  FL: OK to discuss but not sure if the spec is broken without it. | R1-2210212 | H | [ZTE] We don’t think the change is needed. If we change it, all positioning methods such as TDOA, RTT should be clarified in TS 38.214 as well.  [Nokia] Okay to discuss.  **[**CATT] OK to discuss the issue.  [QC]: Not really see the to discuss this  [HW] As the proponent of the issue, we support to discuss it.  [Ericsson] OK with the FL assessment. |

**Table 4 - Information reporting from UE and gNB for multipath/NLOS mitigation**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 4-1 | LOS/NLOS Indicator details | R1-2208603 [4] | N/E | [ZTE] Can be part of alignment CR  [CATT] Agree with FL  [QC]: Alignment CR |
| 4-2 | RSRPP and RSTD measurement alignment | R1-2208732 [7]  R1-2208731 [6] | H | [ZTE] We support this draft CR. However, since this issue was discussed before, to avoid repeating discussion, we prefer to conclude this issue in this meeting.  **[**CATT] OK to discuss the issue.  [QC]: OK to discuss  [vivo]: we are not sure it is necessary, in our view, the description in TS 37.355 is clear.  [Ericsson] OK with the FL assessment. |
| 4-3 | Alginment on RSRPP parameters | R1-2209458 [15] | E | [ZTE] Agree with FL  [CATT] Agree with FL  [QC]: Editorial |

**Table 5 - Latency improvements for both DL and DL+UL positioning methods**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 5-1 | PRS and UL collision timeline | R1-2208472 [1]  R1-2209705 [20]  R1-2209706 [21]  R1-2209838 [23]  R1-2209839 [24] | H | [ZTE] We don’t think the issue really happens. It can be avoided by network implementation. The PRS should always be on DL symbols. If so, the UL/DL collision can be handled by the current TS 38.213.  [NOK] Okay to discuss.  [CATT] OK to discuss the issue.  [QC]: OK to discuss  [SS]: need to discuss  [Ericsson] OK with the FL assessment. |
| 5-2 | SSB priority within the PPW  FL comments: Seems RAN4 business | R1-2209701 [16]  R1-2209702 [17] | N | **[**NOK] Agree with FL.  [QC] Leave it up to RAN4  [SS]: RAN1 left the decision for SSB vs PRS to be made by RAN4, and RAN4 made it eventually. This CR is to complete our RAN1 spec according to the agreement made in RAN4. This is not to build new rules, so we think it’s needed.  [vivo] Agree with FL  [Ericsson] OK with the FL assessment. |
| 5-3 | Description of DL signals/channels | R1-2208602 [3] | E | [ZTE] Agree with FL  [NOK] Agree with FL.  **[**CATT] Agree with FL. |
| 5-4 | Capturing CBM for FR2  FL comments: It appeared that RAN4 made some agreement in the last meeting. | R1-2209209 [12] | H | [ZTE] Support the discussion. Yes, RAN4 made the agreement, but it impacts much on RAN1’s specification. If not having the change, 38.214 is not complete on collision issue between DL PRS and other signals in PPW for capability 1B and 2.  [CATT]OK to discuss the issue.  [QC]: OK to discuss  [vivo]: we are not sure it is necessary since no requirement for CBM case based on the RAN4 requirement  [ZTE2] @vivo RAN4 made a new agreement in last meeting, please check our tdoc. The agreement you mentioned is earlier. |
| 5-5 | Associating priority state with UE capability  FL comments: The agreement on TP in RAN1#110 tended to align with state description irrespective of UE capability options. | R1-2209210 [13] | N | [ZTE] This issue should be discussed. @FL, the issue is on misalignment between 38.331 and 38.214  As we can see, “**State 2” in Option 1 and that in Option 2 are different** but TS 38.214 does not capture the representative of “st1, st2, st3” under different options.  Also, the description of priority in TS 38.331 directly refers to RAN1’s specification.  TS 38.331   |  | | --- | | priority-r17 ENUMERATED {st1, st2, st3}  *priority*  Indicates the priority between PDCCH/PDSCH/CSI-RS and PRS as specified in TS 38.214 [19]. |   If not having this CR, **the description for st2 is missed in 38.214**.  [NOK] Agree with FL. No need to discuss.  [QC]: OK to discuss  [ZTE 2] @NOK and FL, this issue is related to the issue raised by some companies in UE feature. We prefer to solve the issue here rather than in UE feature which impacts on RAN2. |
| 5-6 | PPW higher layer parameters | R1-2209840 [25] | E | [ZTE] We don’t this CR is needed.  **[**CATT] Agree with FL.  [QC]: Not needed  [HW]: We think it can be included in the alignment CR. |

**Table 6 - RRC\_ INACTIVE positioning**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 6-1 | Switchingt time for option 2 | R1-2208731 [6] | H | [NOK] Agree with FL. This issue should be discussed.  [CATT] Okay to discuss. Need to add “R1-2208733 [8]” in the references.  [QC]: OK to discuss  [Ericsson] OK with the FL assessment. |
| 6-2 | SRS-UL collision timeline | R1-2209703 [18]  R1-2209704 [19] | H | [ZTE] Not support the CR. N2 symbol is not needed at all. Furthermore, why DL signals are transmitted on UL symbols and collide with SRS, the motivation is unclear.  [NOK] Agree with ZTE.  [QC]: Not needed. Our comments from previous email discussion still remain (Topic 3.2 here)  [SS]: need to discuss, there will be flexible symbols in TDD configuration. And in inactive state, there is no SFI indication or others. So the collision (related timeline) of possible DL and UL with the SRS is needed.  [vivo] if it is for dynamic SFI indication, it has been discussed in 5-1, it may not be necessary to repeat the discussion at 5-1 and 6-1  [Ericsson] OK with the FL assessment. |

**Table 7 - On-demand DL PRS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 7-1 | None |  |  |  |
| 7-2 |  |  |  |  |

## Conclusion

Based on the email discussion, the list of issues recommended to be handled in RAN1#110bis-e is provided in the following tables.

**Table 8 - FL recommendation (Accuracy improvements by mitigating UE Rx/Tx and/or gNB Rx/Tx timing delays)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL Final assessment** | **Comments** |
| 1-1 | The tdocs propose some correction of Tx TEG reporting based on RAN1’s agreement. | R1-2208939[10]  R1-2208940[11] | H | All feedbacks (5) are okay to discuss it |
| 1-2 | The tdoc proposes adding the description of TEG margin reporting to TS 38.214 based on RAN4’s LS on TEG frame work | R1-2209211[14] | H | All feedbacks (5) are okay to discuss it |
| 1-3 | The tdoc proposes the clarification of the Tx timing error difference in UE Tx TEG definition.  **FL comment:**   * The title in cover page seems not correct. | R1-2210101[26] | N | No majority support  (3 out of 6 feedbacks are not supportive to discuss it) |

**Table 9 - FL recommendation (Accuracy improvements for DL-AoD positioning solutions)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL Final assessment** | **Company inputs and FLs’ responses** |
| 3-1 | Correction on missing descriptions for timestamp of DL PRS-RSRPP  FL : align RAN1 specs with RAN2 specifications. | R1-2208601  R1-2210211 | H | All feedbacks (4) are okay to discuss it |
| 3-2 | Correction to the Rx beam reporting condition for DL-AoD  FL: RSRPP should support use of the same rx beam index | R1-2209837 | H | All feedbacks (5) are okay to discuss it |
| 3.3 | Clarification of the limitation of 24 RSRP/RSRPP reports for AOD  FL: OK to discuss but not sure if the spec is broken without it. | R1-2210212 | H | Majority support  (4 out of 6 feedbacks are supportive to discuss it) |

**Table 9 - FL recommendation (Information reporting from UE and gNB for multipath/NLOS mitigation)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 4-1 | LOS/NLOS Indicator details | R1-2208603 [4] | E | All feedbacks (3) consider it as alignment CR. |
| 4-2 | RSRPP and RSTD measurement alignment | R1-2208732 [7]  R1-2208731 [6] | H | Majority feedbacks (3 out of 4) support further discussion |
| 4-3 | Alginment on RSRPP parameters | R1-2209458 [15] | E | All feedbacks (3) consider it as alignment CR |

**Table 10 - - FL recommendation (Latency improvements for both DL and DL+UL positioning methods)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 5-1 | PRS and UL collision timeline | R1-2208472 [1]  R1-2209705 [20]  R1-2209706 [21]  R1-2209838 [23]  R1-2209839 [24] | H | All feedbacks (6) are okay to discuss it |
| 5-2 | SSB priority within the PPW | R1-2209701 [16]  R1-2209702 [17] | N | No majority support  (1 out of 5 feedbacks is supportive to discuss it) |
| 5-3 | Description of DL signals/channels | R1-2208602 [3] | E | All feedbacks (3) consider it as alignment CR |
| 5-4 | Capturing CBM for FR2 | R1-2209209 [12] | H | Majority feedbacks (3 out of 4) support further discussion |
| 5-5 | Associating priority state with UE capability | R1-2209210 [13] | H | Majority feedbacks (2 out of 3) support further discussion. |
| 5-6 | PPW higher layer parameters | R1-2209840 [25] | N | No majority support  (2 out of 4 feedbacks are supportive to discuss it). |

**Table 11 - RRC\_ INACTIVE positioning**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Description of the issue** | **References** | **FL initial assessment** | **Company inputs and FLs’ responses** |
| 6-1 | Switchingt time for option 2 | R1-2208731 [6]  R1-2208733 [8] | H | Majority feedbacks (3 out of 4) support further discussion. |
| 6-2 | SRS-UL collision timeline | R1-2209703 [18]  R1-2209704 [19] | N | No majority support for further discussion  (2 out of 6 feedbacks support further discussion). |

*Note: The following tdocs are related to FR2-2, and will be discussed in the email thread [110bis-e-R17-Pos-02]:*

* R1-2208604, Correction on SCS for NR DL PRS vivo
* R1-2208734 Correction on DL PRS subcarrier spacings for FR2-2 Nokia, Nokia Shanghai Bell

# References

1. R1-2208472 Maintenance of Rel-17 NR positioning Huawei, HiSilicon
2. R1-2208601 Correction on missing of DL PRS-RSRPP vivo
3. R1-2208602 Correction on description alignment of ‘DL signals and channels‘ vivo
4. R1-2208603 Correction on description of LoS/NLoS indicator vivo
5. R1-2208604 Correction on SCS for NR DL PRS vivo
6. R1-2208731 Maintenance of NR Positioning Enhancements Nokia, Nokia Shanghai Bell
7. R1-2208732 Correction on PRS RSTD and PRS RSRPP reporting Nokia, Nokia Shanghai Bell
8. R1-2208733 Correction on SRS for positioning switching time Nokia, Nokia Shanghai Bell
9. R1-2208734 Correction on DL PRS subcarrier spacings for FR2-2 Nokia, Nokia Shanghai Bell
10. R1-2208939 Correction on UE Tx TEG association information reporting CATT
11. R1-2208940 Discussion on UE Tx TEG association information reporting CATT
12. R1-2209209 Draft CR on collision in PPW for inter-band case ZTE
13. R1-2209210 Draft CR on priority issue in PPW ZTE
14. R1-2209211 Draft CR on UE TEG framework ZTE
15. R1-2209458 Alignment CR on positioning for 38.214 ZTE
16. R1-2209701 Discussion on SSB priority on PRS Samsung
17. R1-2209702 Draft CR for SSB priority on PRS Samsung
18. R1-2209703 Discussion on SRS collisition timeline check in inactive state Samsung
19. R1-2209704 Draft CR for SRS collisition timeline check in inactive state Samsung
20. R1-2209705 Discussion on PRS collision handling for UL signals in PPW Samsung
21. R1-2209706 Draft CR for PRS collision handling for UL signals in PPW Samsung
22. R1-2209837 Correction to the Rx beam reporting condition for DL-AoD Huawei, HiSilicon
23. R1-2209838 Correction to the collision timeline for PRS and UL - 38.214 Huawei, HiSilicon
24. R1-2209839 Correction to the collision timeline for PRS and UL - 38.213 Huawei, HiSilicon
25. R1-2209840 Correction to the PRS processing window Huawei, HiSilicon
26. R1-2210101 Draft CR to 38.214 on definition of UE Tx TEG Ericsson
27. R1-2210211 Adding DL PRS-RSRPP to the applicable measurements Huawei, HiSilicon
28. R1-2210212 Correction to the applied positioning method for RSRP and RSRPP reporting Huawei, HiSilicon
29. R1-2210213 Correction to numerology and CP for positioning in RRC\_INACTIVE state Huawei, HiSilicon