**3GPP TSG RAN WG1 #110bis-e R1-22NNNN**

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

**Agenda item:** 8.5

**Source:** Moderator (Ericsson)

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

**Document for:** Discussion and Decision

## Introduction

This document captures the discussion on the identified maintenance issues on accuracy improvements for DL-AOD positioning solutions based on the preparation phase documented in R1-2210266, and triggered by the following chair decision:

[110bis-e-R17-ePos-04] Email discussion for maintenance on accuracy improvements for DL-AoD positioning solutions for issues 3-1, 3-2, 3-3 in R1-2210266 – Florent (Ericsson)

-          Check points: October 14, October 19

## Issues on NR positioning enhancements

## List of issues

**Table 1 - 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. |

## Issue 3-1 Correction on missing descriptions for timestamp of DL PRS-RSRPP

In [1] and [3] DL PRS RSRPP is added to the list of measurement which can include a time stamp, as well as to assistance data reference information, LOS/NLOS reporting, and multiple measurement insteance in a single report.

Please comment below on whether the CRs can be endorsed as is in a merged CR or potential changes needed:

|  |  |
| --- | --- |
| Company | comment |
| Qualcomm | OK to have a merged CR with both changes |
| Huawei, HiSilicon | OK. The title could be updated as it is not only timestamp.  For the below change in R1-2208601, the following typo should be corrected.  When the UE reports DL PRS-RSRPP measurements for a DL PRS resource, the reported multiple DL PRS-RSRPP measurements associated with the same or different higher layer parameter *nr-DL-PRS-RxBeamIndex* may have the same or different timestamps. |
| vivo | Ok and thanks for Huawei‘s modification |
| ZTE | OK to have a merged CR with both changes |
| CATT | OK to have a merged CR with both changes |

## Issue 3-2 Correction to the Rx beam reporting condition for DL-AoD

In [2] the CR captures that 2 DL PRS RSRPP measurement can be, if reported, indicating the same Rx beam index through *DL-PRS-RxBeamIndex*.

Please comment below on whether the CRs can be endorsed as is or potential changes needed:

|  |  |
| --- | --- |
| Company | comment |
| Qualcomm | Generally supportive, but just to make sure, doesn’t it have the RAN2 description also to change?  ***Nr-DL-PRS-RxBeamIndex***  This field provides an index of the target device receive beam used for DL-PRS measurements. If the value of the receive beam index for two or more DL PRS measurements is the same, it indicates that the target device receive beam for the two or more DL PRS measurements were made with the same RX beam. The field is mandatory present if at least two DL-PRS RSRP measurements from the same DL-PRS Resource Set have been made with the same RX beam by the target device; otherwise it is not present.  Also, so that we are all on the same page, and in relation to the related dsicsusion that we had in August meeting, this doesn’t mean that the UE cannot report RSRPP for resources of 2 different sets right? The specification allows that. The condition above is related to when the UE will report RxBeamIndex, but not when it will report RSRPPs from different sets. |
| Huawei, HiSilicon | To Qualcomm  We think RAN2 is discussing a CR from Nokia to align with this.  On the report of RSRP/RSRPP measurement from two sets of the same TRP, our understanding is that   1. The total number of PRS resources associated with the RSRP/RSRPP measurements across resource sets of a TRP is not relevant to whether Rx beam index should be reported. 2. What only matters on Rx beam reporting is whether ≥2 PRS resources associated with the RSRP/RSRPP measurements are from a single PRS resource set. 3. We can accept the above understanding given most companies did not think it was essential to further optimize the first bullet as above in August meeting.   On top of it, we think it should be common understanding that   1. PRS-RSRP measurements from multiple resource sets of a TRP is supported even in Rel-16. 2. The same Rx beam index, if provided, points to the same Rx beam for RSRP/RSRPP measurements from one DL PRS resource set. 3. The same Rx beam index, if provided, may or may not point to the same Rx beam for measurements across two DL PRS resource sets.   ZTE and we have been proposing to optimize bullet 6 to clarify it for a number of meetings, but there was no consensus to specify it. One potential problem of extending the applicable region of Rx beam index beyond a single PRS resource set is to handle multiple resource sets across positioning frequency layers for a TRP. |
| vivo | We are confused about the discussion between Qualcomm and Huawei, the CR seems about whether the *nr-DL-PRS-RxBeamIndex* needs to be reported if more than two RSRPP use it in one resource set, but the discussion seems about the issue of the different sets. If the CR is only for one set issue, we are okay with it, otherwise, more clarification is needed  The UE may be configured to measure and optionally report, subject to UE capability, up to 24 DL PRS RSRPP for the first detected path on DL PRS resources associated with the same *dl-PRS-ID*. When the UE reports DL PRS-RSRPP measurements from one DL PRS resource set, the UE may indicate which DL PRS-RSRPP measurements associated with the same higher layer parameter *nr-DL-PRS-RxBeamIndex* [17, TS 37.355] have been performed using the same spatial domain filter for reception if for each *nr-DL-PRS-RxBeamIndex* reported there are at least 2 DL PRS-RSRPP measurements associated with it within the DL PRS resource set. |
| ZTE | This CR and ‘two sets’ discussion between QC and Huaei are separate issues. We are OK for this CR.  We are also supportive of reporting  *nr-DL-PRS-RxBeamIndex* when two RSRP/RSRPPs from two sets. However, if there is no consensus for this issue, we hope we can stop the discussion from this meeting. |
| CATT | For this CR, it extend the application of *Nr-DL-PRS-RxBeamIndex* to RSPRR, it is OK for us.  Abou the issue of “two sets”, we don’t need to discuss it in this thread. |

## Issue 3-3 Clarification of the limitation of 24 RSRP/RSRPP reports for AOD

In [4], it is clarified that the number of RSRP/RSRPP measurements limit of 24 only applies to DL AOD.

Please comment below on whether the CR can be endorsed as is or potential changes needed:

|  |  |
| --- | --- |
| Company | comment |
| Qualcomm | Not really needed. 37.355 is clear enough it seems. |
| Huawei, HiSilicon | We think that this maximum of 24 is contradictory to the allowed RSRPP number for DL-TDOA and Multi-RTT, which is 32.  We believe the change is essential. |
| vivo | OK |
| ZTE | Not needed. For TDOA and Multi-RTT, it is clear timing measurement is reported as well. |
| CATT | Do dot support. This CR is not essential, LPP specs has the clear descriptions on this issue. |
| Huawei, HiSilicon | We want to ask one question to those companies claiming this is not needed.  How many DL PRS-RSRP and first path DL PRS-RSRPPs can be reported for DL-TDOA and Multi-RTT according to LPP?  Even if the change is not agreeable, we would suggest to write the following conclusion in the Chair’s Notes  **Conclusion**  It is RAN1 understanding that the maximum number of DL PRS-RSRP and DL PRS-RSRPP for the first path per TRP in the measurement report of DL-TDOA and Multi-RTT is 32. |

## Conclusion

## References

1. R1-2208601, Correction on missing of DL PRS-RSRPP, vivo
2. R1-2209837, Correction to the Rx beam reporting condition for DL-AoD, Huawei, HiSilicon
3. R1-2210211, Adding DL PRS-RSRPP to the applicable measurements, Huawei, HiSilicon
4. R1-2210212 Correction to the applied positioning method for RSRP and RSRPP reporting. Huawei, HiSilicon