**3GPP TSG RAN WG1 #109-e R1-22NNNNN**

**e-Meeting, May 9th – 20th, 2022**

**Agenda item:** **8.5.1**

**Source: Moderator (Ericsson)**

**Title: Moderator Summary for [109-e-R17-ePos-01] on LS in R1-2203040**

**Document for:** **Discussion and Decision**

## Introduction

This summary documents the email discussion on questions to RAN1 received in LS R1-2203040 and captured as issues 1-5 and 7-1 in the preparation phase summary R1-2205097, as per the following chairman decision:

[109-e-R17-ePos-01] Email discussion under 8.5 on LS in R1-2203040, covering issues 1-5 and 7-1 in R1-2205097 – Florent (Ericsson) by May 13.

## Discussion

## issues 1-5 and 7-1 in R1-2205097

for convenience, issues 1-5 and 7-1 from the preparation phase are copied below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Issue#** | **Issue** | **References** | **FL initial assessment**  | **Company inputs (if any)** |
| 1-5 | **SRS port index for TEG**In LS [R1-2203040](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203040.zip), RAN3 asks RAN to feedback “if information on the SRS port index needs to be signalled to LMF when SRS resource for MIMO is used.” The response to RAN3’s question was discussed in [4] and [11]. **FL comments:**RAN1 needs to provide the response back to RAN3 in this meeting. It is unclear at this moment on whether the issue will be discussed under AI 8.1 or in a separate email thread.  | [R1-2203436](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203436.zip) [4][R1-2203864](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203864.zip)[11]  | H | **[vivo]**:H**[CATT]**: H. Reply LS from RAN1 is needed.OPPO: Discussion is needed as RAN1 needs to reply RAN3 LSQC: Agree with FL’s initial assessmentEricsson: Ok with FL’s assessment.**FL Comments:** According to the Prep Phase discussion in AI 5, we will have separated email thread under AI 8.5 to discuss the response to RAN3’s LS. **FL Final assessment:** Further discussion under the email thread for discussing the response to RAN3 LS R1-2203040. |
| 7-1  | Update of agreement on parameter level for On-demand PRSProposal 9:* ***Update the following agreement regarding on demand PRS.***

|  |
| --- |
| **Agreement*** From RAN1 perspective, for LMF-initiated request of on-demand DL PRS, the following group of on-demand DL PRS parameters is defined and signaled
	+ per resource set per positioning frequency layer per FR
1. DL PRS Periodicity
2. DL PRS Resource Bandwidth
3. DL PRS Resource Repetition Factor
4. Number of DL PRS Resource Symbols per DL PRS Resource
5. DL-PRS CombSizeN

Two options for indication of DL PRS QCL-Info, either* + Option 1: per resource set per positioning frequency layer per FR
* LMF recommends a list of QCL sources
	+ Option 2: per resource set per positioning frequency layer per FR
		- LMF requests to provide the QCL information in the assistance data in NRPPa
	+ per FR
		- Number of DL PRS frequency layers
	+ either per resource set per positioning frequency layer or per ~~UE~~TRP
		- Start/end time of DL PRS transmission
	+ either per resource, or per resource set, or per ~~UE~~TRP
		- ON/OFF indicator (for LMF initiated request only)
 |

 | [7] R1-2203516  | [H]Might be related to reply LS to RAN3 | **[vivo]:H****OPPO:** There is the maintenance of R17 positioning. If RAN3 agreement has impact on RAN1 specifications, we can revise RAN1 spec accordingly. There is no need to revise previous RAN1 agreement directly. RAN2 also received the same LS, and they can revise RAN2 spec accordingly if necessary.QC: H**FL Final assessment: H** FL comment: Assume we can discuss as part of discussion if any LS or update is needed but will be good for RAN1 to clarify.  |
|  |  |  |  |  |

##  issues 1-5: SRS port index for TEG

in the RAN3 LS to RAN1[1], the following question is asked:

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| --- | --- | --- |
| **TEG** | Some companies in RAN3 believe it is beneficial to signal the SRS port index to the LMF, so that LMF can group measurements based on Port index. RAN3 would like to know if SRS Port Index needs to be signalled to the LMF when SRS resource for MIMO is used? | **RAN1 to feedback if information on the SRS port index needs to be signalled to LMF when SRS resource for MIMO is used.** |

The issue is commented in [3] and [4]. In [3], it is argued that TEGs are associated at the resource level and therefore all TEG changes on any of the ports under an SRS resource will also mean a change in the reported TEG. In [4], the authors recall that the issue was deadlocked in RAN1#108, with 5 companies either supporting or not supporting the proposal to attach SRS port ID to the report. From the RAN3 LS, it seem the situation is similar in RAN3.

Given the request from RAN3 LS, RAN1 should provide an answer to close the issue.

## First round of discussion

The question from RAN3 should be discussed. For the sake of progress, companies are invited to provide argumented answers beyond yes or no.

**Question 2.2.1:** should the SRS Port Index needs to be signalled to the LMF when SRS resource for MIMO is used?

**Question 2.2.1:**

|  |  |
| --- | --- |
| company | comment |
| vivo | We found it seems to conflict with section 4 in 【109-e-R17-ePos-02】, and suggest to only discuss the issue in one threadBut, we are okay with proposal 4.1 in 【109-e-R17-ePos-02】as a starting point for the issue |
| ZTE | No. Based on the agreements, it seems the feature of TEG is only applicable for positioning SRS rather than MIMO SRS.  |
| Qualcomm | No, similar views with ZTE.  |
| CATT | To vivo: # issues 1-5 should be covered in this email thread. It will be removed from email thread [109-e-R17-ePos-02] in the updated version of FL summary.  |
| Huawei, HiSilicon | Yes. At least we think that reporting the port information can be optional.So far as we concerned, this enhancement of RAN3 has nothing to do with **UE TEG reporting**, and it should be a common understanding that UE will not provide the TEG association with MIMO-SRS.For MIMO SRS, we defined that TEG is associated with UL SRS resource for the positioning purpose.* **UE Tx ‘timing error group’ (UE Tx TEG):** A UE Tx TEG is associated with the transmissions of one or more UL SRS resources for the positioning purpose, which have the Tx timing errors within a certain margin.

Even without UE reporting, network may assume different SRS ports of MIMO SRS can be different Tx TEG, and the RTOA measurement can be associated with an SRS port, so that LMF could combine the RTOA measurement for the same SRS port for the same time-stamp to cancel the UE Tx timing error.We think this is an important feature, and with a slight modification to the reporting, it can enable Rel-15 UE to support high accuracy positioning. |
| Nokia/NSB | No. This is not needed.  |
| OPPO | No. The benefit is not justifiedBTW: Title of this document seems wrong.  |
| Huawei, HiSilicon2 | The benefit is clear.For positioning SRS* UE may transmit two positioning SRS resources via different Tx, and the two SRS may have different group delays. gNB may report the positioning SRS resource ID associated with RTOA measurement.

For MIMO SRS* UE may transmit a 2-port MIMO-SRS with two Tx, and the two SRS port may also have different group delays. gNB may report the MIMO SRS resource ID associated with RTOA measurement.

We did not see any technical reason why it is not needed, while we provided sufficient explanation why it is useful even this can be transparent to the UE.Huawei submitted the evaluation in RAN1#104b showing this can be beneficial on accuracy if the RTOA can be tagged with port ID using MIMO SRS and has been proposing port reporting in RAN1 ever since. The proposal was given way to other TEG related discussion, and was never seriously treated in RAN1.Now RAN3 is considering this given there is only a small addition in NRPPa, asking RAN1 whether this can be supported. Companies, who refused to discuss it in RAN1 ever since April 2021, are now saying this was not justified or divert it to another discussion of MIMO-SRS and TEG, which is not acceptable to us and is against the technical spirit of 3GPP RAN WG1.We will not accept to provide a response that is not technically debated. |
| FL | the majority opinion is that the port index signalling is not needed, with one company in disagreement.  |

## Issues 7-1

In the RAN3 LS to RAN1[1], the following observation from RAN3 is given:

|  |  |  |  |
| --- | --- | --- | --- |
| **On demand PRS** | RAN3 has observed the following RAN1 agreement on On-demand PRS ON/OFF indicator (for LMF initiated request only):

|  |
| --- |
| “In “On-demand PRS information for LMF-initiated on-demand DL PRS requests"; either per resource, or per resource set, or per UE” |

RAN3 would like to inform RAN1 that the procedures defined by RAN3 for on-demand PRS transmission are non-UE-associated (i.e., cell specific) and thus an ON/OFF indication per UE does not make sense. Instead, it is considered to have an OFF indication per TRP to minimize the transmission power. | **RAN1 to take into account and update their agreed parameter lists for On-demand PRS.** |

In [4], it is proposed to correct the agreement by replacing “per UE” with “per TRP”.

## First round of discussion

It is proposed to discuss the update to the agreement suggested by RAN3:

**Proposal 2.3.1: the agreement from RAN1#108e on LMF initiated request of on-demand PRS is amended as follow:**

|  |
| --- |
| **Agreement*** From RAN1 perspective, for LMF-initiated request of on-demand DL PRS, the following group of on-demand DL PRS parameters is defined and signaled
	+ per resource set per positioning frequency layer per FR
1. DL PRS Periodicity
2. DL PRS Resource Bandwidth
3. DL PRS Resource Repetition Factor
4. Number of DL PRS Resource Symbols per DL PRS Resource
5. DL-PRS CombSizeN

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* LMF recommends a list of QCL sources
	+ Option 2: per resource set per positioning frequency layer per FR
		- LMF requests to provide the QCL information in the assistance data in NRPPa
	+ per FR
		- Number of DL PRS frequency layers
	+ either per resource set per positioning frequency layer or per ~~UE~~TRP
		- Start/end time of DL PRS transmission
	+ either per resource, or per resource set, or per ~~UE~~TRP
		- ON/OFF indicator (for LMF initiated request only)
 |

Companies are encouraged to provide their comments in the table below:

**Proposal 2.3.1:**

|  |  |
| --- | --- |
| company | comment |
| vivo | Okay  |
| ZTE | Agree. Alternatively, RAN1 does not do anything since RAN1 spec change is not needed. |
| Qualcomm | Support |
| CATT | Support |
| Huawei, HiSilicon | Support. |
| Nokia/NSB | Is any RAN1 spec change needed? If not we suggest not to do anything.  |
| OPPO | In our understanding, there is no RAN1 spec impact so far. We are open to the proposal.  |
| FL | Seems the proposal is agreeable.  |

## Issue on overhead consideration for beam information for DL AOD

In the RAN3 LS to RAN1[1], the last paragraph contains a question that remains to be answered:

|  |
| --- |
| Based on the assistance information for DL-AoD specified by RAN1/RAN2, the corresponding NRPPa signaling could require, in the case where maximum granularity is used uniformly in azimuth and elevation, an excess of 6 million relative powers per TRP / resource to be signaled over NRPPa and, as consequence, via F1-AP and per NG-RAN design, over NG transport. RAN3 assumes (and would like to confirm) that realistic implementations would not require this high level of data volume traffic and would also use this function sparingly.RAN3 has agreed to include some mitigations over NRPPa/F1AP, e.g. allowing for the indication of “no change” if a previous TRP beam antenna configuration is still valid.Note that, as with other TRP configuration items, RAN3 has agreed that OAM is also a possible option for providing such information to LMF. |

## First round of discussion

In order to complete the LS response, we should discuss overhead considerations for the beam information to be send to the LMF by the gNB. RAN3 considers the following issues:

* Question 1) What is the expected use of the available granularity available in the specification for beam information
* Question 22) How often will beam information be transferred / updated from the gNB to the LMF

We can start by collecting companies view on the two question, before formulating a response to RAN3.

Companies are encouraged to provide their comments in the table below:

|  |  |
| --- | --- |
| company | comment |
|  | Question 1)Question 2) |
| vivo | Question 1) extent to 1 degree can significantly reduce the overheadQuestion 2) one-shot, at least one shot for static information  |
| Qualcomm | 1. We should not discuss an “expected use” of the available granularities. This is left up to the LMF/RAN implementation, scenarios, product needs, requirements. Our answer should be that RAN1 cannot confirm such statement.
2. This is left again up to the LMF/RAN implementation, scenarios, product needs, requirements.
 |
| ZTE | It is sufficient to say something like:RAN1 thinks the data volume traffic and whether to use this function sparsingly is up to LMF/RAN implementation. It is up to RAN3 to include some mitigations for signaling overhead reduction. |
| CATT | Question 1) In our view, the granularity of 1 degree should be sufficient in AOD assistance for beam information, similar to the assistance.Question 2) We do not expect gNB frequently change DL beam direction. The information needs to be sent only when there is changes in gNB configuration of DL beams. So, we don’t there is a need for periodic reporting, but can be event triggered.  |
| Nokia/NSB | The Action to RAN1 from the RAN3 LS is: * RAN3 respectfully asks RAN1/RAN2 to provide feedback, if any, on the issue of signalling load for DL-AoD information.

Our view is that a RAN1 reply is not strictly necessary on this topic.  |
| Huawei, HiSilicon | Question 1) Even though the angle resolution may be 0.1 degree, it does not mean that all values of angles needs to be present. The expected use of the evailable granularity is up to gNB implementation.Question 2) The beam information may be static, but it depends on whether LMF is required to store the information. |
| FL | Summary of the receivd comments so far:three companies mention that the use of the granularity is up to implementation of the LMF/RAN. Two companies commented that 1degree resolution allowed to reduce overhead, and that static information need not be updated. 1 company does not see a RAN1 reply as necessary for this topic.  |

## Second round of discussion

Based on the received feedback, it seems difficult to give a better reply than saying the issue of the signalling load for DL AOD is up to the LMF and gNB implementation.

**Proposal 2.4.2: on the issue of signalling load for DL-AoD information. Is is RAN1’s view that it is up to the LMF and gNB implementation.**

|  |  |
| --- | --- |
| company | comment |
|  |  |

## Conclusion

TBD

## References

1. R1-2205097, Moderator Summary for preparation phase on maintenance of Rel-17 WI on NR positioning enhancements, Moderator (CATT), RAN1#109e
2. R1-2203040, Questions concerning the implementation of RAN1 agreements in NRPPa (RAN3 LS), RAN3, RAN1#109e
3. [R1-2203864](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203864.zip) Maintenance on accuracy improvement related enhancement Samsung
4. [R1-2203516](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203516.zip) Discussion on other maintenance issues on NR positioning enhancements vivo