**3GPP TSG RAN WG1 #104-e R1-2104143**

**e-Meeting, January 25th – February 5th, 2021**

**Agenda item:** 8.1.1

**Source:** Moderator (Samsung)

**Title:** Moderator summary for LS to RAN2 on Timing Assumption for Inter-Cell DL Measurement

**Document for:** Discussion and Decision

## Introduction

In this summary, inputs from participating companies on the following DRAFT LS to RAN4:

Email discussion on an LS to RAN4 to ask their views on DL measurement timing assumptions for L1/L2-centric inter-cell mobility and inter-cell mTRP. Until April 26th~~28~~~~th~~, Eko (Samsung).

The following version of the companion DRAFT LS were provided:

* DRAFT R1-210xxxx LS\_RAN4\_XC timing (init): 1st initial version
* DRAFT R1-210xxxx LS\_RAN4\_XC timing (init2): 2nd initial version
* DRAFT R1-210xxxx LS\_RAN4\_XC timing (revised): revised version
* DRAFT R1-210xxxx LS\_RAN4\_XC timing (revised2): revised version
* DRAFT R1-210xxxx LS\_RAN4\_XC timing (revised3/b): revised version
* R1-2104141 LS\_RAN4\_XC timing (final)

## Summary

### Inputs on the initial version

Table 1 Companies’ inputs: initial

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| **Company** | **Input** |
| Huawei, HiSilicon | Our comments are provided based on “DRAFT R1-210xxxx LS\_RAN4\_XC timing (init2).docx” (it seems the introduction part needs to be updated). 1. We suggest to copy-n-paste relevant agreements, without underlining to only certain parts of the agreements or cutting off the FFS points – to let RAN4 know what the latest situation is and what are being considered at RAN1 side. 2. Rather than limiting to SSB, as captured in RAN1 agreement, we suggest mentioning to RAN4 that RAN1 is discussing but have not agreed on using CSI-RS (for e.g. mobility and/or tracking) of non-serving cell(s) as a measurement RS. In our understainding, RAN4 input on the timing assumption for measuring CSI-RS (for e.g. mobility and/or tracking) can also help RAN1 discussion on whether or not to support these cases. With this, we suggest generalizing “SSB of non-serving cell” in Question 1/2 as “meansurement RS” (and menion that SSB was agreed and CSI-RS is under study). 3. We are not sure if it is strongly motivated to mention the amount of support or majority view at RAN1 side. We prefer to remove such statements from the draft LS and let RAN4 make their decision by themselves. 4. In Question 1/2, the restriction of intra-frequency seems to come from nowhere. We undersand the inter-frequency case has not been agreed in RAN1, but to put it into some context, perhaps it is worthwhile to brieftly re-state the situation in RAN1 that intra-frequency case has been agreed and inter-frequency case is under study (or copy the agreement, or refer to preivous LS(s) in R1-2102008/R1-2102248). 5. Question 1, to add some clarity and avoid mis-interpretation, we suggest rephrasing “with L1-RSRP reporting framework” as “for the abovementioned extended ~~with~~ L1-RSRP reporting framework”, and similarly for Question 2 🡪 “with the abovementioned extended ~~agreed~~ L1-RSRP reporting framework”. |
| Apple | We suggest we remove inter-cell mTRP in scope of the LS.Based on conclusion in RAN1 #104, there should be no timing related issues for inter-cell mTRP.**Conclusion**The UE may assume received DL transmission from multiple TRP within a CP in FR1 and FR2.* Note: This does not imply that RAN1 intends to ask RAN4 to tighten network synchronization requirements.
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| OPPO | 1. Suggest to delete those two sub-bullets as follows. They are not RAN1 conclusion or agreement and such information are not useful for RAN4 discssion. Related to the timing assumption for SSB measurement, the following issues were discussed and no consensus was reached. It was reckoned that RAN4 guidance will be beneficial:* Whether the measurement for SS-RSRP is limited within SMTC
	+ ~~RAN1 is almost evenly divided on this issue~~
* Whether the receive timing of the SSB from the non-serving cell can be different from the receive timing of the signals from the serving cell
	+ ~~Allowing different timing assumption represents the majority view in RAN1~~

2. Share the same view as Apple and suggest to remove “inter-cell mTRP” since the timing issue for inter-cell mTRP has been dicussed a lot and we do have a concludion on that.  |
| Mod V04 | Revised based on the above inputs 🡪 (revised) version |
| Ericsson | After discussing the draft LS with my RAN4 colleague, I propose the following clarification:Related to the timing assumption for SSB measurement, the following issues were discussed and no consensus was reached. It was reckoned that RAN4 guidance will be beneficial:* Whether the measurement for SS-RSRP is limited to be carried out within the SMTC window

**Question 1**: What are the implications (from RAN4 perspective) of limiting the measurement for L1-RSRP on measurement RS of a non-serving cell to be carried out within the SMTC window for the aforementioned extended L1-RSRP reporting framework? Conversely, what are the implications of not limiting the measurement for L1-RSRP within SMTC? |
| vivo | The agreement is about both inter-cell MTRP operation and L1/L2-centric inter-cell mobility. It is not RAN1 common understanding to remove inter-cell MTRP out of the scope.The LS is only related to measurement on RS of non-serving cell. We could make it general as following.

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| RAN1 has agreed to support L1-RSRP reporting (and its respective SSB measurement) for ~~L1/L2-centric inter-cell mobility~~ non-serving cell. |

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| For the aforementioned purpose ~~(in the context of L1/L2-centric inter-cell mobility operations)~~, RAN1 seeks a few answers from RAN4 on the following questions in order to proceed further. Note that thus far (cf. R1-2102008, R1-2102248):* Only SSB has been agreed to be used for non-serving cell measurement RS. CSI-RS is still TBD
* Only intra-frequency measurement has been agreed and inter-frequency measurement is still TBD
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[Mod: To offer a more balanced perspective I can follow the above suggestion, but will add the conclusion per Apple’s earlier comment] Moreover, we would still like to focus on SSB measurement in the question.

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| **Question 1**: What are the implications (from RAN4 perspective) of limiting the measurement for L1-RSRP on measurement RS (SSB) of a non-serving cell within SMTC for the aforementioned extended L1-RSRP reporting framework? Conversely, what are the implications of not limiting the measurement for L1-RSRP within SMTC? **Question 2**: For measurement on measurement RS (SSB) of a non-serving cell, with the aforementioned extended L1-RSRP reporting framework, if the receive timing of the measurement RS (SSB) from the non-serving cell can be different from the receive timing of the signals from the serving cell for both the cases within SMTC and outside SMTC, what are the implications from RAN4 perspective? |

[Mod: Per Huawei’s suggestion, the explanation before the questions have been added, i.e. SSB is agreed and CSU-RS is TBD. RAN4 can simply look at the explanation and understand the whole context. This should suffice. Adding SSB into the questions would skew the context.] |
| Nokia | * We propose to add RAN2 in the cc. While there are no actions to RAN2 as such, this is part of the use case discussion and can help the RAN2 discussion to progress as well.
* Having full RAN1 agreements is better indeed.
* We think even the whole paragraph below can be deleted, we should inform RAN4 of the decisions we made, other discussions are not really bringing any value. We discuss many things in RAN1 at the end of the day…

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| ~~Related to the timing assumption for SSB measurement, the following issues were discussed and no consensus was reached. It was reckoned that RAN4 guidance will be beneficial:~~* ~~Whether the measurement for SS-RSRP is limited within SMTC~~
* ~~Whether the receive timing of the SSB from the non-serving cell can be different from the receive timing of the signals from the serving cell~~
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* On the questions section, we have the following edits:

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| **Question 1**: What are the implications (from RAN4 perspective) of limiting the measurement for L1-RSRP on measurement RS of a non-serving cell within SMTC for above agreed L1-RSRP reporting? Conversely, what are the implications of not limiting the measurement for L1-RSRP within SMTC? **Question 2**: For measurement on measurement RS of a non-serving cell, with the above agreed L1-RSRP reporting, if the receive timing of the measurement RS from the non-serving cell can be different from the receive timing of the signals from the serving cell for both the cases within SMTC and outside SMTC, what are the implications from RAN4 perspective? |

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| Qualcomm | Suggest a few wording changes based on the version (revised)* Suggest to emphasize that the context is only for L1/L2 mobility, since the agreements mentioned both L1/L2 mobility and inter-cell mTRP, but our intention here is only for L1/L2 mobility
* Suggest to add “benefit, if any” to make the question more concrete, and also allows RAN4 to answer no benefit for one option.
* Suggest to change the “aforementioned extended L1-RSRP reporting” to “extended L1-RSRP reporting in aforementioned agreements” to be more specific on the definition.

**Question 1**: In the context of L1/L2-centric inter-cell mobility, ~~W~~what are the implication~~s~~(s)/benefit(s), if any, (from RAN4 perspective) of limiting the measurement for L1-RSRP on measurement RS of a non-serving cell within SMTC for the aforementioned extended L1-RSRP reporting framework? Conversely, what are the implication~~s~~(s)/benefit(s), if any, of not limiting the measurement for L1-RSRP within SMTC? **Question 2**: In the context of L1/L2-centric inter-cell mobility, ~~F~~for measurement on measurement RS of a non-serving cell, with the ~~aforementioned~~ extended L1-RSRP reporting framework in the aforementioned agreements, if the receive timing of the measurement RS from the non-serving cell can be different from the receive timing of the signals from the serving cell for both the cases within SMTC and outside SMTC, what are the implication~~s~~(s)/benefit(s), if any, from RAN4 perspective?[Mod: While I sympathize with your comment on narrowing the context to L1/L2-centric inter-cell mobility, vivo and Futurewei want to make it more general. Besides, all the agreements on measurement/reporting affect both L1/L2-centric inter-cell mobility and inter-cell mTRP. Other inputs have been included.] |
| Futurewei | We shared the same view as Vivo that the agreement covers both inter-cell MTRP operation and L1/L2-centric inter-cell mobility, and the LS is only related to measurement on RS of non-serving cell. Therefore we support Vivo’s revision to make the statement general.There is a typo on the date for the next RAN1 meeting: TSG RAN WG1 Meeting #105-e 10th – 27th May, 2021 E-meeting |
| Intel | In the first paragraph, inter-cell mTRP can be retained since it is part of the RAN1 agreement which is copied below. However, in the 2nd paragraph after the agreements, we don’t see the need to stress on the scenarios within brackets and they can be deleted. We do not need to further state L1/L2 mobility in the rest of the LS. The context should be pretty clear from the agreements copied in the LS. For the aforementioned purpose ~~(in the context of L1/L2-centric inter-cell mobility operations)~~, RAN1 seeks a few answers from RAN4 on the following questions in order to proceed further. Note that thus far (cf. R1-2102008, R1-2102248):* Only SSB has been agreed to be used for non-serving cell measurement RS. CSI-RS is still TBD
* Only intra-frequency measurement has been agreed and inter-frequency measurement is still TBD

Since inter-frequency measurement is still FFS, it may be good to add a third question to ask RAN4’s input if inter vs. intra frequency measurement has any bearing on their answers to Q1 and Q2. [Mod: At this point, before we receive any reply from RAN4 on the previous LS x2248 re inter-frequency, it is better to wait. We can send another LS if needed once we receive the response from RAN3] |
| Mod V11 | Revission based on the above inputs 🡪 (revised2) version |
| Apple | We suggest to make it clear that this is only for inter-cell mobility, as there would be no such kind of issue for inter-cell multi-TRP. If we cannot reach a conseusns, we are also fine not to send this LS. Based on current discussion status and scenario assumed in RAN2, there seems to be no DL measurement timing related issue, but UE behavior for TA selection seems to be an open issue.[Mod: Focus on mobility is added since that’s the common agreeable factor][Mod: The UL timing issue (TA/TAG) was removed since it was requested to make it more related to DL (as it relates to measurement). It is not within the scope of this LS. Perhaps this issue can be further discussed in May and another LS can be sent] |
| ZTE | After checking our RAN4 colleagues, the measurement requirement for L1-mobility and inter-cell multi-TRP may be different. In general, when multiple SSBs from different physical cells are configured within a given SMTC, SSB from which cell is measured in the SMTC can NOT be controlled by gNB and up to UE implementation. * For L1-mobility, this DL measurement is to provide initial beam/T/F sync, and within the SMTC should be fine if considering the candidate NSCs may be much more;
* But for inter-cell multi-TRP, it is for real-time data transmission, and so we may need to consider outside SMTC for guaranteeing the efficiency of DL measurement and reporting).

We do not have strong preference on which topics this LS corresponds to, but it seems better if we can provide clear information of which scenarios are considered by RAN4 in this LS. |
| Huawei, HiSilicon (2nd round) | Comments based on “DRAFT R1-210xxxx LS\_RAN4\_XC timing (revised2).docx”.Question 1/2:* We support the modification/clarification from Ericsson, i.e., replace “withtin SMTC” as “to be carried out within the SMTC window”. It seems the 1st occasion of “within SMTC” in Question 1 has not been updated. And we suggest adding “(s)” after “window”, as there can be two configured SMTC windows.
* The fact that SSB has been agreed and CSI-RS is TBD has been clearly captured in the agreement and summary, to avoid narrowing down to SSB before further discusisons, we prefer not to add “(SSB)” in the questions (2nd comment from vivo), as commented by the moderator.

Question 2: * We suggest considering removing “for both the cases within SMTC and outside SMTC” to shorten the question and make it generally applicable.

In addition, we agree with Apple that UL timing seems also relevant and important, but somehow it seems the LS is to focus on DL part only. We recall there were discussions in TA/TAG in RAN1#104b-e, but somehow they got lost during the discussions. [Mod: Please see my comment to Apple] |
| Sony | Comments based on “DRAFT R1-210xxxx LS\_RAN4\_XC timing (revised2).docx” and above as good discussions as in RAN1 meetings.1. For **Q1,** we understand and sympathize the reason why to apply “measurement RS” (SSB agreed and CSI-RS under FFS) instead of “SSB” only. But since we are asking the question related to “within or out of SMTC window” which in my memory is only applicable to SSB, so is the intention to confine CSI-RS (e.g. CSI-RS for mobility or TRS from NSC) within an associated SMTC widow as well? Then ask RAN4 the implication/benefit(s). If not, then we feel it would be better to clarify Q1 a little**Question 1**: What are the implication(s)/benefit(s), if any, (from RAN4 perspective) of limiting the measurement for L1-RSRP on measurement RS of a non-serving cell within the SMTC window (only applicable to SSB) for the above agreed L1-RSRP reporting? Conversely, what are the implication(s)/benefit(s), if any, of not limiting the measurement for L1-RSRP to be carried out within the SMTC window?[Mod: Done]2. For **Q2,** we think the issue of DL measurement timing is only applicable to L1/L2 inter-cell mobility, given the issue of inter-cell M-TRP concluded already. By mentioning non-serving cell (NSC) in Q2 seems implicitly confining to inter-cell mobility in our view. [Mod: We decided to limit the context to L1/L2-centric inter-cell mobility]In addition, we are okay not to mention SMTC window in Q2 in order to decouple Q1 and Q2. But if RAN1 would prefer to do so, we think we better mark it with “only applicable to SSB”.Regarding the issue of UL TA to M-TRP/NSC, we admit that it’s an open issue which was discussed but not even FFS in RAN1. So we somehow feel hesitated to ask RAN4 when it’s not thoroughly discussed in RAN1. Perhaps in RAN1 we will have a similar conclusion sooner or later as that of inter-cell M-TRP. |
| Qualcomm | Suggest to add the following context to the action, because the answers may be different for different use cases. **ACTION:** RAN1 respectfully asks RAN4 to provide answers for the above questions related to timing assumption for inter-cell DL measurement in the context of L1/L2-centric inter-cell mobility and inter-cell mTRP, respectively, with additional details that RAN1 shall further consider. [Mod: Added but only for inter-cell mobility] |
| LG | We sympathize with the comments from Apple, Huawei and Sony that UL timing issue would be also critical and relevant not only for inter-cell DL measurement. Note that different TA for inter-cell would be considered by taking the different propagation delay into account especially for MP-UE with inter-panel delay. While this LS is mainly focusing on DL part, it would be also beneficial to ask UL TA-related issues together.[Mod: Since this isn’t discussed much, it will not be added to this LS. Please see comment for Apple] |
| Xiaomi | We share same view as vivo and Sony that SMTC is only applied for SSB, thus it is better to add “(SSB)” after “measurement RS” .[Mod: Please see comment for Sont] |
| Mod V19 | Revised based on inputs. Given that some companies would like to include both L12XCM and XCmTRP as the context of the LS while other can agree only to L12XCM (reasonable due to the conclusion made for XCmTRP), I only include L12XCM since that’s the only agreeable part. If the companies wanting to include both could not agree with limiting this LS to L12XCM, there would be no consensus on the content of this LS, i.e. the LS would be withdrawn. The situation with including the UL TA is similar. If the companies proposing to also include UL timing could not agree to the LS without it, there would be no consensus on the content of this LS, i.e. the LS would be withdrawn. |
| Vivo | We would like to point out that: * the first “scale up” (including XCmTRP) is aligned with previous understanding that the measurement would be applied to both mTRP and L12XCM.
* the second scale up (including ) is against the explicit agreement that the LS is focused on DL measurement part.

However, we are fine with the latest version with the understanding that how the measurement results associated non-serving cell is applied for inter-cell MTRP is separately discussed and thus not within the scope of this LS.With such understanding we would like to delete the conclusion related to inter-cell MTRP from the LS. |
| Futurewei | For progress, we can accept this version with the condition that (as Peng suggested) the conclusion on received DL transmission timing is removed from the LS since this conclusion is made for XCmTRP only. |
| Mod (final) | Removed conclusion related to inter-cell mTRP |