[101-e][210] Maintenance_NR_CSIRS_L3meas_NWM - Version 0.0.5
RAN4

3GPP TSG-RAN WG4 Meeting # 101-e R4-2120353

Electronic Meeting, November 1-12, 2021

Agenda item: 5.1.5

Source: Moderator (CATT)

Title: Email discussion summary for [101-e][210] Maintenance_NR_CSIRS_L3meas_NWM

Document for: Information

1 Introduction

The document includes the discussions in agenda item 5.1.5 which contains the following topic:

- Topic #1: CSI-RS based L3 RRM requirements maintenance

2 RRM requirements maintenance

2.1 Companies' contributions summary

Table 1: Companies' contributions

T-doc number	Company	Proposals / Observations
R4-2117340	CATT	**Proposal 1: For UE behavior when the timing offset exceeds the threshold, option 2 is more reasonable and depend on UE implementation.**
R4-2117341	CATT	**CR on the relation between SSB layer and CSI-RS layer**
R4-2117342	CATT	**Cat A**

R4-2117753	vivo	***Proposal 1: UE is not required to report CSI-RS based L3 measurements when timing offset exceeds the threshold. If UE reports CSI-RS based L3 measurement, then the UE may not meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption.***
R4-2118420	Nokia, Nokia Shanghai Bell	**Proposal1: If timing offset exceeds the threshold, both of the options are acceptable:** **Option 1: UE does not report CSI-RS based L3 measurements** **Option 2: UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE shall meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption**
R4-2118421	Nokia, Nokia Shanghai Bell	**CR on the condition of "the gap between two 5ms windows" and CSI-RS period**
R4-2118422	Nokia, Nokia Shanghai Bell	**Cat A**

R4-2119339	Huawei, HiSilicon	**Proposal: Adopt option 3:** **If timing offset exceeds the single FFT threshold, UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE may not meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption.**

2.2 Open issues summary

2.2.1 UE behavior when the timing offset exceeds the threshold with single FFT

Issue 1-1-1 UE behavior when the timing offset exceeds the threshold with single FFT assumption

Proposals

- Option 1: (Nokia)
  - UE does not report CSI-RS based L3 measurements.
- Option 2: (CATT, Nokia)
  - UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE shall meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption.
- Option 3: (vivo, Huawei)
  - UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE may not meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption.
- Recommended WF
  - *Need more discussion.*

2.3 Companies views' collection for 1st round

2.3.1 Open issues

Comment on the issue 1-1-1 in feedback form 1 below:

Feedback Form 1: Issue 1-1-1 UE behavior when the timing offset exceeds the threshold with single FFT assumption

1 – MediaTek Inc.

Support Option 3.

Options 1 and 2 are actually introducing new UE behavior which was not discussed in the Rel-16. As companies commented in previous meetings, this issue is nothing different to SNR side condition. We never mandate UE not to report SS-RSRP nor to meet the accuracy requirement if the side condition is not met.

BTW, this issue has been discussed for many meetings. Hope that we do not need to comeback in the next meeting again.

2 – Nokia Korea

Either Option 1 or Option 2.

We do think the discussion is valuable as the reported measurement results will impact the network decision and the mobility performance. Reading below citation from 38.133, the measurement reporting requirements are defined as ”reported CSI-RSRP..... shall meet the requirements”. We understood this is well aligned with Option 2.

9.10.2.4 Measurement Reporting Requirements

9.10.2.4.1 Periodic Reporting

Reported CSI-RSRP, CSI-RSRQ, and CSI-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.3, 10.1.3.3, 10.1.7.2, 10.1.8.2, 10.1.12.2 and 10.1.13.2.

3 – vivo Mobile Communication (S)

In the last meeting, it was agreed that no accuracy requirements will be defined for the case when the timing offset exceeds the threshold with single FFT assumption. Therefore, for the case when timing offset exceeds the threshold, UE with single FFT implementation is not required to meet any accuracy requirements as it is not defined.

The accuracy requirements for CSI-RS based measurement are only valid for the case when timing offset is no larger than the threshold. When UE reports measurement results for the case when timing offset exceeds the threshold, there is no accuracy requirements to meet. If option 2 is followed it means there are accuracy requirements to meet if timing offset exceeds threshold, which would contradict the spec that no accuracy requirements are defined for the case.

If UE does not report measurement results when the timing offset exceeds threshold as in option 1, UE may never perform CSI-RS based measurement due to large timing offset, especially in Heterogenous network. The reason of no reported measurement results is unknown to network. If event triggered measurement is configured then it may be due to event condition is not met, or it could be due to timing offset threshold is not met. This may also highly degrade UE mobility performance.

Therefore, we think option 3 is a more appropriate way to conclude the issue. UEs with multiple FFT implementation can still meet the measurement reporting requirements and accuracy requirements. UEs with single FFT implementation may or may not meet accuracy requirements.

4 – Qualcomm Incorporated

We support option 3. Currently the UE is not required to evaluate whether the relative timing offset side-condition is met for reporting purposes. E.g. for periodic reporting of intra-frequency CSI-RSRP measurements the UE is required to meet the accuracy requirements in 10.1.2.3 and 10.1.3.3. Those requirements

apply **only** when timing side-condition is met. There are no requirements otherwise and that is exactly what option 3 states. Both options 1 and 2 would add new requirements for the UE.

5 – Apple AB

we support option 2. UE can choose not to report if the time offset is challenging for single FFT. However, if UE does report, the related delay and accuracy requirements should meet. Otherwise, it may impact NW's decision and UE mobility performance. For example, low accurate reporting can mistakenly trigger some events including HO decision.

6 – CATT

Support option2. option 2 is our understanding of the current reporting requirements. We think no requirements for large timing offset case means UE can choose not to perform or report the measurement. But if UE chooses to report, it means UE has the capability to handle the timing offset, the reported results should meet the accuracy which we had defined. Because NW has no idea about the side condition, it will not estimate whether the results are correct under the condition. Even for SINR side condition, NW will not estimate whether the condition is met and whether the results fulfill the requirements under the condition and NW just use the reported results to make decisions. So if the reported results didn't meet the requirements, it will impact the UE mobility performance.

7 – Nokia Korea

Adding some response to vivo: What was agreed is about measurement accuracy, i.e. How the UE measures CSI-RS when the timing offset exceeds the threshold is up to UE implementation. But here is more about reporting requirements. As the reports impact the network decision, the possible unqualified reports may disable the usage of all the CSI-RS based measurement results...

8 – HuaWei Technologies Co.

We support option 3.

We have same understanding as QC about the applicability of the accuracy requirements. RAN4 should only define what UE should do or what requirements UE should meet when side condition is met, but option 1 and 2 are defining UE requirements when side condition is not met.

We also agree with option 1 and 2 require UE to determine whether the timing offset side condition is met or not, which is a new requirement e.g. UE was not required to determine whether Es/Iot for a resource is larger than -6dB or not for measurement reporting.

2.3.2 CRs/TPs comments collection

Comment on CR R4-2117341 in feedback form 2 below:

Feedback Form 2: Comment on CR R4-2117341

1 – MediaTek Inc.

The [] for DRX cycle ≤ 320ms in Table 9.10.3.5-3 can also be removed.

2 – Nokia Korea

As for "SSB and CSI-RS for mobility configured in the same MO should be considered as 2 layers.", the

principle is fine, but a better wording is needed. It is not ”SSB and CSI-RS... are considered as 2 layers”, but rather ”SSB-based measurement and CSI-RS based measurements”?

3 – vivo Mobile Communication (S)

1. All the brackets, including those in the text in change #2, should be removed.
2. For ”SSB and CSI-RS for mobility configured in the same MO should be considered as 2 layers.”, it would be better to change to as below.

”SSB-based measurement and CSI-RS based measurement for mobility that configured in the same measuremet object are considered as different layers.”

4 – CATT

We are fine with the wording suggested by vivo and Nokia.

Comment on CR R4-2118421 in feedback form 3 below:

Feedback Form 3: Comment on CR R4-2118421

1 – MediaTek Inc.

ok

2 – vivo Mobile Communication (S)

To make the spec clearer, it seems a little bit editorial change is needed.

Either the ”, and” above the change is removed, or the two sub-bullets below the change is indented furhter.

3 – CATT

OK

4 – Nokia Korea

To vivo: Thanks for the comments. We will do further cleaning-up in revised version.

2.4 Summary for 1st round

2.4.1 Open issues

Table 2: Summary of 1st round

	Status summary

Sub-topic #1-1	**Issue 1-1-1 UE behavior when the timing offset exceeds the threshold with single FFT assumption** *Tentative agreements: None.* *Candidate options:* Option 1: (CATT, Nokia, Apple) UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE shall meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption. Option 2: (vivo, Huawei, MTK, Qualcomm) UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE may not meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption. *Recommendations for 2nd round: Check the following tentative agreement. If it is not agreeable, discuss other solutions to converge the issue.* *This issue has been discussed for many times. Suggest to conclude in this meeting and avoid coming back in next meeting.* *Tentative agreements:* *Add a note in the specification:* *NW has no idea about the timing offset and therefore could not estimate whether the reported measurements meet the requirements.*

2.5 Discussion on 2nd round (if applicable)

Issue 1-1-1 UE behavior when the timing offset exceeds the threshold with single FFT assumption

Tentative agreements:

- *Add a note in the specification:*
  - *NW has no idea about the timing offset and therefore could not estimate whether the reported measurement meet the requirements.*

Comment on the tentative agreement in feedback form 4 below:

Feedback Form 4: Comment on the tentative agreement

1 – MediaTek Inc.

Thank the moderator for providing the tentative agreement. We have the following comments.

- This is the uncertainty only for neighboring cell measurement (regardless intra-freq or inter-freq). Measurements for serving cell do not encounter this issue. Suggest to revise it as
  - *NW has no idea about the timing offset and therefore could not estimate whether the reported measurement for* ***neighboring cells*** *meet the requirements.*
- As TS38.133 is a UE requirement spec, it is strange to capture network behavior or understanding in it. We slightly prefer to make it as an agreement without written in spec. But if all companies are OK to do this, we can also compromise.

2 – CATT

We are fine to capture it in the WF. And after offline discussion, there is another suggestion on the wording as below which can also be considered. I would include it here for discussion.

"Add the clarification in the WF/specification:

- *NW has no idea about the timing offset and therefore can only follow the reported measurement directly to make the decision for mobility. "*

3 – CATT

One additional approach is provided:

Approach 1: Add the clarification in the WF/specification:

- *NW has no idea about the timing offset and therefore can only follow the reported measurement directly to make the decision for mobility.*

Approach 2:

- *UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE shall meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold* ~~*with single FFT assumption*~~*.*

4 – Nokia Korea

With the notes as in Approach 1, we don't believe any network would implement CSI-RS based measurements. This is at the cost of unpredictable performance degradation. Suggest discussing it on GTW.

5 – HuaWei Technologies Co.

We are fine with Approach 1 assuming it is to be captured in the WF and with the following change:

- *NW has no idea about the timing offset and therefore* ~~***can only***~~ ***may*** *follow the reported measurement directly to make the decision for mobility.*

6 – Qualcomm Incorporated

We would be OK adding a note as suggested by the moderator but it doesn't look like there is consensus. In the end, it seems that we have just added another option so we may as well keep option 2 above on the table.

Approach 3:

UE is not required to report CSI-RS based L3 measurements. If UE reports CSI-RS based L3 measurement, then the UE may not meet CSI-RS based L3 measurement reporting requirements in TS 38.133 section 9.10.2.4 and 9.10.3.4 based on the accuracy requirements for the case when the timing offset is below the threshold with single FFT assumption.

3 Recommendations for Tdocs

3.1 1st round

Table 3: Recommendation after 1st round

Title	Source	Comments
WF on CSI-RS based L3 measurement requirements	CATT	

Existing tdocs

Table 4: Recommendation after 1st round

Tdoc number	Title	Source	Recommendation	Comments
R4-2117341	Draft CR on CSI-RS based L3 measurement requirements	CATT	Revised	
R4-2118421	38.133 draftCR on CSI-RS based measurement requirements	Nokia	Revised	

3.2 2nd round

Table 5:

Tdoc number	Title	Source	Recommenda-tion	Comments
R4-2120277	WF on CSI-RS based L3 measure-ment requirements	CATT	Return to	
R4-2120278	Draft CR on CSI-RS based L3 measurement requirements	CATT	Agreeable	
R4-2120279	38.133 draftCR on CSI-RS based measurement requirements	Nokia	Agreeable	