**3GPP TSG-RAN WG4 Meeting # 100-e R4-2115203**

**Electronic Meeting, August 16-27, 2021**

**Agenda item:** 6.1.8

**Source:** Moderator (CATT)

**Title:** Email discussion summary for [100-e][213] NR\_CSIRS\_L3meas

**Document for:** Information

# Introduction

The documents in agenda items 6.1.8 contain the following topic:

* Topic #1: CSI-RS RRM core requirements maintenance

# Topic #1: CSI-RS RRM core requirements maintenance

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2111980 | CATT | **Proposal 1: The conclusions of time domain restriction in FR1 are also applied for FR2.**  **Proposal 2: For UE behavior when the timing offset exceeds the threshold, no spec updates are needed.** |
| R4-2111981 | CATT | **DraftCR** |
| R4-2111982 | CATT | **Cat A of R4-2111981** |
| R4-2112119 | Apple | **DraftCR on CSSF** |
| R4-2112120 | Apple | **Cat A of R4-2112119** |
| R4-2112395 | MediaTek inc. | **Proposal 1: For FR2 inter-frequency measurement, Rel-16 L3 CSI-RS requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window.**  **Proposal 2: For CSI-RS based L3 measurement on FR2 intra-frequency, Rel-16 requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window. Further extension can be considered in later releases.** |
| R4-2112396 | MediaTek inc. | **DraftCR on 2 windows** |
| R4-2112397 | MediaTek inc. | **Cat A of R4-2112396** |
| R4-2112515 | CMCC | **DraftCR on requirements applicability** |
| R4-2112516 | CMCC | **Cat A of R4-2112515** |
| R4-2112539 | vivo | ***Proposal 1: No UE behaviour is specified when timing offset exceeds the threshold.*** |
| R4-2112879 | Nokia, Nokia Shanghai Bell | **Proposal1: In Rel16, the UE is not required to measure or report the CSI-RS resource if the timing difference exceeds a threshold, hence Option 1 is preferred.** |
| R4-2112880 | Nokia, Nokia Shanghai Bell | **DraftCR on timing offset impact** |
| R4-2112881 | Nokia, Nokia Shanghai Bell | **Cat A of R4-2112880** |
| R4-2112882 | Nokia, Nokia Shanghai Bell | **DraftCR on resource periodicity** |
| R4-2112883 | Nokia, Nokia Shanghai Bell | **Cat A of R4-2112882** |
| R4-2112884 | Nokia, Nokia Shanghai Bell | **DraftCR** |
| R4-2112885 | Nokia, Nokia Shanghai Bell | **Cat A of** **R4-2112884** |
| R4-2114299 | Huawei, HiSilicon | **Proposal 1: For FR2 intra-frequency CSI-RS measurement, use the same applicability condition regarding measurement window alignment as SSB measurement.**  **Observation 1: The extra complexity in planning the measurement and Rx beam sweeping due to support of 2 measurement windows for CSI-RS is limited.**  **Observation 2: From NW side, support of 2 measurement windows in FR2 is as necessary as in FR1.**  **Proposal 2: Support 2 measurement windows for FR2 CSI-RS intra-frequency measurement.**  **Proposal 3: No spec update for UE behavior when the timing offset exceeds threshold.** |
| R4-2114300 | Huawei, HiSilicon | **DraftCR on measurement window** |
| R4-2114301 | Huawei, HiSilicon | **Cat A of** **R4-2114300** |

## Open issues summary

### Sub-topic 1-1 Time domain restriction for CSI-RS configuration

Agreements in RAN4#99e meeting:

* + FR1
    - For inter-frequency measurements, Rel-16 L3 CSI-RS requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window
    - For intra-frequency measurements: Rel-16 L3 CSI-RS requirements are defined under assumption that CSI-RS resources in the same MO can be configured in up to two separated 5ms windows during one CSI-RS resource period
      * 1/ The overlapping status with MG is same for the two windows.
        + FFS how to capture this in the specification
      * 2/ The periodicity of the configured CSI-RS resources is 20ms or 40ms.
      * 3/ The gap between two 5ms windows shall be half of the CSI-RS periodicity
      * 4/ Measurement requirements are not impacted by separated 5ms windows.
      * The conditions 1, 2, 3, 4 apply for the case of two separated 5ms windows during one CSI-RS period only.
  + FFS for FR2

**Issue 1-1-1: Whether the conclusions in FR1 are applied to FR2?**

* Proposals
  + Option 1: (CATT, Huawei)
    - Yes
  + Option 2: (MTK)
    - Not applied for intra-frequency measurement.
      * For FR2 inter-frequency measurement, Rel-16 L3 CSI-RS requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window.
      * For CSI-RS based L3 measurement on FR2 intra-frequency, Rel-16 requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window. Further extension can be considered in later releases.
* Recommended WF
  + *Need more discussion.*

**Issue 1-1-2: The applicability condition of CSI-RS measurement window alignment for CSSF requirements?**

* Proposals
  + Option 1: (Huawei)
    - For FR2 intra-frequency CSI-RS measurement, use the same applicability condition regarding measurement window alignment as SSB measurement. (refer to the text in R4-2114300)
* Recommended WF
  + *Need more discussion.*

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| **Sub-topic 1-1 Time domain restriction for CSI-RS configuration** | |
| **Company** | **Comments** |
| CATT | **Issue 1-1-1: Whether the conclusions in FR1 are applied to FR2?**  Support option 1. As discussed in our paper R4-2111980, we think the periodicity of CSI-RS is quite limited compared to SSB which has reduced the UE implementation complexity. And we agree the Huawei’s analysis on the Rx beam scheduling in R4-2114299. So it should be reasonable to apply the same time restriction to FR2.  **Issue 1-1-2: The applicability condition of CSI-RS measurement window alignment for CSSF requirements?**  Fine with option 1. And we are fine with the applicability condition of CSI-RS time window mentioned in R4-2114300. |
| MTK | **Issue 1-1-1 & Issue 1-1-2:**  We are fine with Option 1 in both issues, but would like to agree both 1-1-1 and 1-1-2 as a package. |
| apple | Issue 1-1-1: ok with option 1  Issue 1-1-2: ok with option 1 |
| Intel | Issue 1-1-1: Fine with option 1  Issue 1-1-2: Fine with option 1 |
| Nokia | **Issue 1-1-1: Whether the conclusions in FR1 are applied to FR2?**  Option 1.  We see it even more important to support more than one CSI-RS window in FR2. As the FR2 measurements take longer time due to beam sweeping, single 5ms window is not sufficient. As for the UE complexity, we understood that different SMTC windows have been supported in FR2 measurements. We can apply the same principle to the additional CSI-RS measurement window.  **Issue 1-1-2: The applicability condition of CSI-RS measurement window alignment for CSSF requirements?**  Option 1.  We are fine with the principle. How to capture this in the spec and the text in R4-2114300 need further discussion. |
| OPPO | Issue 1-1-1: ok with option 1  Issue 1-1-2: ok with option 1 |
| Qualcomm | **Issue 1-1-1: Whether the conclusions in FR1 are applied to FR2?**  Option1 can be supported.  **Issue 1-1-2: The applicability condition of CSI-RS measurement window alignment for CSSF requirements?**  Option1 can be supported. |
| Huawei | Issue 1-1-1: support option 1  Issue 1-1-2: support option 1 |

### Sub-topic 1-2 UE behavior when the timing offset exceeds the threshold with single FFT assumption

* Proposals
  + Option 1: (CATT, vivo, Huawei)
    - No spec updates are needed
  + Option 2: (Nokia)
    - For intra-frequency measurement, the UE is not required to report the configured CSI-RS resources of a neighbour cell if the symbol level misalignment between serving and the corresponding neighbour cell exceeds the threshold.
    - For inter-frequency measurement, UE can pick up any cell as the reference cell per frequency layer. UE is not required to report the configured CSI-RS resources of a neighbour cell if the symbol level misalignment between the reference cell and the corresponding neighbour cell belonging to the same frequency layer exceeds the threshold.
* Recommended WF
  + *Need more discussion.*

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| **Sub-topic 1-2 UE ehaviour when the timing offset exceeds the threshold with single FFT assumption** | |
| **Company** | **Comments** |
| CATT | Support option 1. Although we understand the concern on the uncertainty of the reported results when the timing offset exceeds the threshold from NW perspective, we think the measurement should be left to UE implementation as there are not performance requirements when the timing offset exceeds the threshold. Also as other companies mentioned in the meeting, there is no requirement how UE to estimate the timing offset, even if the UE ehaviour when the timing offset exceeds the threshold is defined, the measurement is still up to UE implementation. |
| MTK | Support Option 1. This should be left to UE implementation. |
| Apple | Option 2 makes more sense. However, we are OK with option 1 too. |
| Intel | Prefer option 1. It’s better to left to UE implementation. |
| Nokia | This has been discussed for several meetings and we believe the intention was well understood by companies. Before discussing the spec change, we like to understand how the UE behaves when timing offset is larger than a threshold (i.e. side condition is not fulfilled). We now see following options on the table:  Option 1: the UE may keep measurements and reporting up to implementation. Hence network is not aware of the performance of received measurement results and may lead to wrong mobility decision (this is our concern)  Option 2: the UE is not required to report the results if side condition is not fulfilled.  According to 38.133 section 9.2.4, if the UE sends the report, it “shall” meet the performance requirements, which is mandatory. In other words, the report shall not be sent if it does not fulfil the accuracy requirements. So we think Option 2 should be the correct understanding on UE behaviour. Is it agreeable?  *Reported RSRP, RSRQ, and RS-SINR measurements contained in periodic measurement reports shall meet the requirements in clauses 10.1.2.1 (RSRP for FR1), 10.1.3.1 (RSRP for FR2), 10.1.7.1 (RSRQ for FR1), 10.1.8.1 (RSRQ for FR2), 10.1.12.1 (RS-SINR for FR1) and 10.1.13.1 (RS-SINR for FR2).*  If option 2 is the common understanding, we can further discuss if spec changes are required. We think “UE is not required to meet the accuracy requirements” does not clearly reflect the UE behaviour. But we are fine to not define the exact behaviour in core. Probably we may add a note as below stating the “UE is not required to meet accuracy requirements” implies not measure or report the resource?  - The timing offset between the reference measurement timing and the target CSI-RS in one layer is no larger than CP.  Note: The UE is not required to measure or report the CSI-RS resource if the timing offset side condition is not fulfilled. |
| OPPO | Prefer option 1. We understand the concern proposed by Nokia, but the same UE behaviour can happen for other measurements, if UE is not required to meet the accuracy requirements under a bad timing offset. The spec impact could be not limited to just CSI-RS L3 measurements. |
| Qualcomm | Option1 is supported. We understand the concern behind option2 but the note could be limiting the UE implementations. Just as an example, UE can always measure the resource for continuous L3 filtering, and the side condition check can happen at different frequencies and/or occasions. This is no different from SSB based measurement, the requirements of which is subject to the other side condition as well. |
| Huawei | We slightly prefer option 1. |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2111981 (CATT) | Nokia: The change to 9.10.2.5 needs further discussion. We are concerned on introducing new parameter TCSI-RS\_SFN\_intra if it serves the same purpose as existing parameter TCSI-RS\_SFN\_intra, Other changes are fine. |
| Qualcomm: we understand TCSI-RS\_SFN\_intra is in line with TCSI-RS\_SFN\_inter, both representing the SFN detection time by acquiring the SSB index. So the CR is agreeable to us. |
| Huawei: We have some concern on change 3 and 4.  With the changes, it now reads that the PSS/SSS detection time of associatedSSB would be zero, if neighbour cell is synchronous with the serving cell. We do not think this is the intention.  Also, the highlighted part should be removed.  *The time period used to acquire the SFN information is TCSI-RS\_SFN\_intra as shown in Table 9.10.2.5-3 for FR1 and is intra-frequency TSSB\_time\_index\_intra in Clause 9.2.5.1.*  *- Note: TSSB\_time\_index\_intra in 9.2.5.1 is not applicable to FR1 TDD and FR2.*  The CR is conflicting with Nokia R4-2112884. |
| R4-2112119 (Apple)  (CR on CSSF) | CATT: Can the modification be covered by ‘Note 6: NPCC\_CSIRS=1 if PCC is with either both SSB and CSI-RS based L3 configured or only CSI-RS based L3 measurement configured; otherwise, NPCC\_CSIRS =0.’? |
| Nokia: Is this already solved by NSCC\_CSIRS\_FR2\_NCM? |
| To CATT and Nokia:  This issue cannot be addressed by Note 6 (NPCC\_CSIRS) or Note 8(NSCC\_CSIRS\_FR2\_NCM). The reason is:   * Note 6 cannot control the calculation of “2x(1+NSCC\_CSIRS\_FR2\_NCM)” * Note 8(NSCC\_CSIRS\_FR2\_NCM) cannot cover the case of 2x(1+NSCC\_CSIRS\_FR2\_NCM) = 1   The current note 3 is not correct: “Note 3: CSSFoutside\_gap,i =1 if only one SCell is configured and no inter-frequency MO without gap”, because it did not take in account any MO of SSB or CSI-RS or both. |
| R4-2112396 (MTK)  (CR on 2 windows) | CATT: Pending on issue 1-1-1 |
| MTK: We will not pursue the CR. |
|  |
| R4-2112515 (CMCC)  (CR on applicability) | Nokia: OK. |
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| R4-2112880 (Nokia)  (CR on timing offset impact) | CATT: Pending on sub-topic 1-2 |
| MTK: Do not see the need of this CR |
| Qualcomm: it’s not necessary to capture this. |
| R4-2112882 (Nokia)  (CR on resource periodicity) | Qualcomm: suggest adding “*The gap between two 5ms windows is half of the CSI-RS resource periodicity.*” |
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| R4-2112884 (Nokia) | CATT: As intra-frequency CSI-RS measurements are always performed without gap, we think TSSB\_time\_index\_intra with gap and Tidentify\_inter\_with\_index with gap is not needed.  For table 9.10.2.5-3, it was added in RAN4#98e meeting (CR R4-2103633) for the SFN acquisition time for FR1. It seems the sentence was deleted accidentally in last meeting. We have given the correction in CR R4-2111981. |
| MTK: We have concern on this CR. The change to remove SFN is wrong. The SSB index is not sufficient for UE to identify the CSI-RS location in time. One quick example is on the case when the CSI-RS resource periodicity is 20ms or 40ms. In this case, CSI-RS will not come in every radio frame. And UE has to get the SFN to identify the right radio frame for measurement. |
| Qualcomm: understand the intention of the CR to align the spec. To be precise, SFN is the direct relevant information we need although it is the same operation by reading MIB as the procedure of obtaining the SSB index. So maybe we could say “*The time period used to acquire the SFN information is the same as intra-frequency TSSB\_time\_index\_intra*” |
| Huawei:  We have similar view as MTK that SFN acquisition should be kept. The CR is conflicting with CATT R4-2111981.  To QC, we think the time period used to acquire the SFN information is not always same as SSB index reading time, i.e. in FR1 case. |
| R4-2114300 (Huawei)  (CR on measurement window) | Nokia: This depends on the conclusion in sub-topic 1-1. |
| Qualcomm: should this be “*The starting point of the first 5ms window and the second window, if present, for CSI-RS measurement as defined in clause 9.10.1 on all CCs in FR2 is same and one of following conditions is met*"? |
| Huawei:  To QC, we agree with the comments, but we understand it is already captured in the current wording in cyan. We know this may not be the best wording, but we are just re-using the same wording as the existing SMTC alignment condition.  *- If any CSI-RS resource is configured in the second 5ms window for CSI-RS measurement as defined in clause 9.10.1 on any FR2 CC,*  *- All CCs with CSI-RS resources only in the first 5ms window have the same CSI-RS resource periodcity, and*  *- All CCs with CSI-RS resources both in the first and the second 5ms window have the same CSI-RS resource periodcity* |

## Summary for 1st round

### Open issues

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| --- | --- |
|  | **Status summary** |
| **Sub-topic #1-1** | **Issue 1-1-1: Whether the conclusions in FR1 are applied to FR2?**  **Issue 1-1-2: The applicability condition of CSI-RS measurement window alignment for CSSF requirements?**  *Moderator: Capture the agreements of above two issues as a package.*  *Tentative agreements:*   * The conclusions of time domain restriction for FR1in RAN4#99e meeting are also applied to FR2. * For FR2 intra-frequency CSI-RS measurement, use the same applicability condition regarding measurement window alignment as SSB measurement.   *Candidate options:* None.  *Recommendations for 2nd round:* *Discuss the specification content based on CR revision.* |
| **Sub-topic #1-2** | **Sub-topic 1-2 UE behavior when the timing offset exceeds the threshold with single FFT assumption**  *Moderator: This issue has been discussed for several meeting and the intention on both options has been clear. Most companies still agree to keep the current requirements. Suggest to conclude in this meeting.*  *Tentative agreements:*  No spec updates are needed.  *Candidate options:* None.  *Recommendations for 2nd round: Check the tentative agreement.* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
| WF on CSI-RS based L3 measurement requirements | CATT |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-2111981 | Draft CR on CSI-RS based measurement requirements | CATT | Revised |  |
| R4-2112119 | Draft CR on CSSF for CSI-RS L3 RRM R16 | Apple | Return to | *If no further comments in 2nd round, the CR will be endorsed* |
| R4-2112396 | CR on 2 windows for CSI-RS L3 measurement R16 | MediaTek inc. | Not Pursued |  |
| R4-2112515 | Draft CR on requirements applicability for CSI-RS based L3 measurement | CMCC | Agreeable |  |
| R4-2112880 | 38.133 CR on the timing offset impact to CSI-RS based measurement | Nokia, Nokia Shanghai Bell | Return to |  |
| R4-2112882 | 38.133 CR on the CSI-RS resource periodicity | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2112884 | 38.133 CR on the CSI-RS based measurement requirements | Nokia, Nokia Shanghai Bell | Merged | *Merged to R4-2111981 and R4-2114300* |
| R4-2114300 | CR on CSI-RS measurement window | Huawei, HiSilicon | Revised |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents

# Annex

Contact information

|  |  |  |
| --- | --- | --- |
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| Apple | Yang Tang | yang.tang@apple.com |
|  |  |  |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)