**3GPP TSG RAN WG1 #101 R1-200xxxx**

**e-Meeting, May 25th– June 5th, 2020**

Agenda Item: 7.2.6.3

Source: Moderator (Apple)

Title: Feature Lead Summary on L1-SINR and SCell BFR email thread #1

Document for: Discussion/Decision

# Introduction

In this contribution, we provide a summary of issues MB2 email thread #1

# Details for TPs

## Editorial Corrections

### Group based L1-SINR report

Reason for changes

The bracket for group based L1-SINR report is retained, i.e. “where CSI-RS and/or SSB resources can be received simultaneously by the UE”, which makes current spec unclear for group based L1-SINR report.

Summary of changes

Remove the bracket of “where CSI-RS and/or SSB resources can be received simultaneously by the UE”.

Consequences if not approved

UE behavior is unclear for group based L1-SINR report.

***TP 2.1.1 for 38.214***

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| **TS 38.214** 5.2.1.4.2 Report Quantity Configurations < Unchanged parts are omitted >  If the UE is configured with a *CSI-ReportConfig* with the higher layer parameter *reportQuantity* set to 'cri-SINR' or 'ssb-Index-SINR',  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'disabled', the UE shall report in a single report *nrofReportedRSForSINR* (higher layer configured) different CRI or SSBRI for each report setting.  - if the UE is configured with the higher layer parameter *groupBasedBeamReporting* set to 'enabled', the UE shall report in a single reporting instance two different CRI or SSBRI for each report setting, ~~[~~where CSI-RS and/or SSB resources can be received simultaneously by the UE~~]~~.  < Unchanged parts are omitted > |

**Companies view and comments**

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| --- | --- |
| Company | View |
| Sony | Support |
| ZTE | Support |
| Nokia/NSB | Support. The TP exactly follows Rel-15 definition of group based reporting where L1-RSRP is replaced by L1-SINR. And it is essential for gNB to understand how UE measured CRI or SSBRI |
| Apple | Support |
| MediaTek | Support |
| CATT | Technically speaking we believe the wording of “simultaneously received” is vague and does not rise to of standard of 3GPP specification language. It is more of a philosophical wish, without a clear definition. In our view a radio signal arriving at a branch is “receivable” however weak the signal is. Even without group-based reporting turned ON, the Rx filter can be considered capable of “receiving” both beams.  Just to be clear, we understand the intention of the proposal, just so that it’s poorly formulated. The same view applies to the Rel.15 language. |
| Intel | OK |
| Qualcomm | Support |
| OPPO | Ok |
| CMCC | Support |
| LG | OK |
| vivo | Support |
| Samsung | OK |
| DOCOMO | OK |
| Lenovo, Motorola Mobility | Support |
| Huawei, HiSilicon | Ok |

### L1-SINR measurement when SSB is configured as CMR

Reason for changes

The following agreement for L1-SINR measurement NZP-IMR based interference measurement was made in RAN1#98bis, where the resources of CMR(s) and IMR(s) are 1:1 mapped.

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| Agreement RAN1#97   * When dedicated IMR is not configured,   + If CMR is based on CSI-RS, when L1-SINR is configured, and interference measurement is performed using CMR with CSI-RS only with density 3 Res/RB for 1-port CSI-RS is used     - Spec does not require UE to use SSB for interference measurement   + Note: CSI-RS above is CSI-RS for BM |

According to the agreement shown above, spec does not require UE to use SSB for interference measurement when dedicated IMR is not configured. Therefore, the UE is only required to measure channel and interference on NZP CSI-RS for L1-SINR computation when one Resource setting is configured. However, this is missing in the current spec of TS 38.214 below. Moreover, as captured in the highlighted part when two Resource Settings are configured, it is better to clearly capture this even when one Resource Setting is configured.

Summary of changes

Clarify one resource setting is only applicable for CSI-RS.

Consequences if not approved

It is unclear whether SSB can be configured when one resource setting is configured.

***TP 2.1.2 for 38.214***

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| 5.2.1.2 Resource Setting  < Unchanged parts are omitted >  For L1-SINR measurement:  - When one Resource Setting is configured, the Resource Setting (given by higher layer parameter *resourcesForChannelMeasurement*) is for channel and interference measurement on NZP CSI-RS for L1-SINR computation. UE may assume that same 1 port NZP CSI-RS resource(s) with density 3 Res/RB is used for both channel and interference measurements.  - When two Resource Settings are configured, the first one Resource Setting (given by higher layer parameter *resourcesForChannelMeasurement*) is for channel measurement on SSB or NZP CSI-RS and the second one (given by either higher layer parameter *csi-IM-ResourcesForInterference* or higher layer parameter *nzp-CSI-RS-ResourcesForInterference*) is for interference measurement performed on CSI-IM or on 1 port NZP CSI-RS with density 3 Res/RB, where each SSB or NZP CSI-RS resource for channel measurement is associated with one CSI-IM resource or one NZP CSI-RS resource for interference measurement by the ordering of the SSB or NZP CSI-RS resource for channel measurement and CSI-IM resource or NZP CSI-RS resource for interference measurement in the corresponding resource sets. The number of SSB(s) or CSI-RS resources for channel measurement equals to the number of CSI-IM resources or the number of NZP CSI-RS resource for interference measurement.  < Unchanged parts are omitted > |

**Companies view and comments**

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| --- | --- |
| Company | View |
| Ericsson | Support. |
| Sony | Support |
| ZTE | Support |
| Apple | Support |
| MediaTek | Support |
| CATT | Support |
| Intel | OK |
| Qualcomm | Support |
| OPPO | Ok |
| CMCC | Support |
| LG | OK |
| vivo | Support |
| Samsung | Support |
| DOCOMO | OK |
| Lenovo, Motorola Mobility | Support |
| Huawei, HiSilicon | Ok |

### Single-part L1-SINR report

Reason for changes

For L1-SINR report, it is unclear whether it is reported in a single part or two parts.

Summary of changes

Clarify that each L1-SINR report in PUSCH only has a single part, instead of two parts per CSI report.

Consequences if not approved

L1-SINR report format is unclear.

***TP 2.1.3 for 38.214***

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| 38.214->5.2.3 CSI reporting using PUSCH  […]  When the higher layer parameter reportQuantity is configured with one of the values 'cri-RSRP’, ~~or~~ 'ssb-Index-RSRP’, ‘cri-SINR’, or ‘ssb-Index-SINR’, the CSI feedback consists of a single part.  […] |

**Companies view and comments**

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| --- | --- |
| Company | View |
| Ericsson | Support |
| Sony | Support |
| ZTE | Support |
| Nokia/NSB | Support |
| Apple | Support |
| MediaTek | Support |
| CATT | Support |
| Intel | OK |
| Qualcomm | Support |
| OPPO | OK |
| CMCC | Support |
| LG | OK |
| vivo | Support |
| Samsung | Support |
| DOCOMO | Support |
| Lenovo, Motorola Mobility | Support |
| Huawei, HiSilicon | Ok |

## Clarification on NZP+ZP IMR

Reason for changes

NZP+ZP based interference measurement for L1-SINR is captured in the spec with a bracket. In previous meetings, companies had concerns on how to measure the single ZP IMR if CMRs are configured with different QCL-TypeD indications. To address this concern, we propose to add a restrictions that all CMR should be QCLed w.r.t ‘QCL-TypeD’ if both NZP IMRs and ZP IMR are configured for L1-SINR.

Summary of changes

Add the restriction that all CMR should be QCLed w.r.t ‘QCL-TypeD’ if both NZP IMRs and ZP IMR are configured.

Consequences if not approved

NZP+ZP based interference measurement for L1-SINR is not supported.

***Proposal 2.2: If NZP + ZP IMRs are configured for L1-SINR report, support CMRs are QCLed with respect to ‘QCL-TypeD’.***

The indicative TP is provided below.

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| < Start of the text proposal 38.214 v16.1.0 Section 5.2.1.2>  < Unchanged parts are omitted >  - When three Resource Settings are configured, the first one Resource Setting (given by higher layer *parameterresourcesForChannelMeasurement*) is for channel measurement on SSB or NZP CSI-RS. The second one (given by either higher layer parameter *csi-IM-ResourcesForInterference*) is for interference measurement performed on CSI-IM, where each NZP CSI-RS resource set for channel measurement is associated with one CSI-IM resource for interference measurement. The Third one (given by higher layer parameter *nzp-CSI-RS-ResourcesForInterference*) is for interference measurement performed on 1 port NZP CSI-RS with density 3 Res/RB.  - UE expects that the NZP CSI-RS resources in each NZP CSI-RS resource set for channel measurement are QCLed with respect to ‘QCL-TypeD’.  < Unchanged parts are omitted >  < End of the text proposal 38.214 v16.1.0 Section 5.2.1.2> |

**Companies view and comments**

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| --- | --- |
| Company | View |
| Ericsson | Do not support.  Seems like a large restriction. The issue would exist also for ZP-only interference measurement. In the end, the RAN4 tests will determine the accuracy of the measurements. |
| ZTE | Support.  In the case of CMR+ZP-IMR+NZP-IMR, only up to one ZP-IMR resource was agreed to be configured in WA. That means that the one ZP-IMR should be associated with multiple NZP-IMR(s) and CMR(s), and, in order to guarantee that the multiple NZP-IMR(s) and CMR(s) can be received by a unified UE Rx beam corresponding to the one ZP-IMR, e.g., all of the CMR(s) should be QCLed. In our views, this TP is well aligned with the previous offline agreement. |
| Nokia/NSB | Not support.  We do not want to bring additional restriction only to support ZP+NZP IMR. |
| Apple | Do not support  It appears to us that CMR + ZP-IM + NZP-IMR is broken in the specification due to the limitation of maximum one ZP-IMR can be configured.  With this restriction, what is the point for us to report CRI as part of SINR report?  But we prefer to discuss whether CMR + ZP-IM + NZP-IMR is even a useful feature |
| MediaTek | Do not support ‘ZP-IMR+NZP-IMR’. Suggest to remove the entire paragraph in the bracket. |
| Intel | It would be good if RAN1 will re-discuss the use case of this configuration in conjunction with RAN4 agreements on interference measurements. Based on the outcome of this discussion we could make more informative decision regarding this part of the specification, i.e. (1) remove the configuration or (2) remove brackets and include additional clarifications as proposed in the TP. Our current preference is (1), but we are open to discus further. |
| Qualcomm | Not support. The complexity cannot justify the additional benefit. |
| CMCC | Support.  The use case of CMR+ZP-IMR+NZP-IMR configuration is to measure the intra-cell MU-MIMO interference by NZP-IMR and inter-cell interference by ZP-IMR.  When taking both ZP-IMR and NZP-IMR for interference measurement, the working assumption made in RAN1#97 meeting restricted that the maximum number of ZP-IMR is 1. In this case, the ‘QCL-TypeD’ assumption for all CMR, NZP-IMR and ZP-IMR are totally same. Then, the interference measurement on one ZP-IMR can be reused for all of the L1-SINR calculation.  The CRI reported together with L1-SINR is used to select gNB transmission beam for CMR and NZP-IMR. |
| LG | Same view with MediaTek |
| Lenovo, Motorola Mobility | Do not support. Using both ZP-IMR and NZP-IMR increases UE complexity without performance gain. It is better to measure interference from either ZP-IMP or NZP-IMR. |
| Huawei, HiSilicon | The proposed restriction is to simplify UE Rx beamforming for interference measurement with NZP + ZP IMR. Even if CMR/NZP-IMR/ZP-IMR are all spatially QCLed (meaning UE may use same Rx beam), report of CRI is still beneficial for finding the right gNB Tx beam pair (as these CMR/NZP-IMR/ZP-IMR can be transmitted with different gNB Tx beams or from different cell).  In our view, this proposal does not introduce additional complexity but simplifies UE behavior for the case of interference measurement with NZP + ZP IMR, which has already been agreed as WA before. We failed to understand why companies still kept saying ‘not support’, ignoring the WA, being unconstructive. We can accept removing the brackets without introducing the restriction. |