**3GPP TSG RAN WG1 #119 R1-2410754**

**Orlando, US, November 18th – 22nd, 2024**

**Agenda item:** 9.2.2

**Source:** Moderator (Samsung)

**Title:** Moderator Summary for 1st offline on Rel-19 CSI enhancements

**Document for:** Discussion and Decision

## Introduction

The following proposals were discussed.

## Summary of proposals

### Issue 1 (WID objective 2a and 2b): Type-I and Type-II codebook refinement for up to 128 CSI-RS ports

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| 1.5.2 | **[119] Agreement**For the Rel-19 Type-I SP codebook refinement for P=48, 64, 128 CSI-RS ports, when the UE reports or multiplexes the CSI on PUCCH, the PUCCH resource, the number of PRBs for the PUCCH resource, and/or the number of Part 2 CSI reports are determined based on the RI value that results in the largest UCI payload. * [For Scheme-B, the RI value that results in the largest UCI payload is determined as min(4, maximum configured rank per CSI reporting configuration)]
* [For Scheme-A, the RI value that results in the largest UCI payload is determined as maximum configured rank per CSI reporting configuration]
* FFS: Whether the largest UCI payload includes the CQI associated with the 2nd CW when RI>4

**Question 1.E.2**: For the Rel-19 Type-I SP codebook refinement for P=48, 64, 128 CSI-RS ports, when the UE reports or multiplexes the CSI on PUCCH, please share your view, if any, on the 3 yellow highlighted bullets* None needed: Google, Lenovo/MotM, Spreadtrum, Xiaomi, Huawei/HiSi,
* Use 1st bullet for both Scheme-A and B: Samsung, Lenovo/MotM (2nd), OPPO, Apple,
* Support the 1st 2 FFSs: NTT DOCOMO, NTT CORP, vivo
* Scheme-A rank-1, Scheme-B rank-4: Nokia/NSB, Apple, Samsung,
* 3rd FFS yes: ZTE, vivo,
* 3rd FFS no: NTT DOCOMO, NTT CORP, Nokia/NSB,
* Add “The RI value allowed by the configured RI restriction per CSI reporting configuration”: ZTE

**FL assessment**: The three bullets need some resolution |

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| 1.1.2 | **[119] Agreement**For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports, regarding per-layer scaling factor applied to each of the selected SD basis vectors associated with RI=*v=*2 for the 3-bit scaling factor(s):* …
* Regarding the configuration of the value (3-bit indicator per SD basis vector group), decide, by RAN1#119, between the following:
	+ Alt1. RI=1 and RI=2 are separately configured (RI-specific)
	+ Alt2. A same configuration is used for RI=1 and RI=2 (RI-common)

**Proposal 1.A.2:** For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports, regarding per-layer scaling factor applied to each of the selected SD basis vectors for the 3-bit scaling factor(s), the configuration of the value (3-bit indicator per SD basis vector group) is RI-common (a same configuration is used for RI=1 and RI=2)**FL assessment**: While it can be argued that RI-specific is a better choice, the only two simulation results available in this meeting (from Ericsson and Nokia) suggest that RI-common setting performs well enough. It can be argued that RI-common is the baseline due to, e.g. its lower RRC overhead. * We can also check if RI-specific is acceptable to the supporters of RI-common
 | **Support/fine:** ZTE, Huawei/HiSi, Samsung, Ericsson, Apple, Xiaomi, Qualcomm, NTT DOCOMO, NTT CORP, Intel, MediaTek, Tejas, Sharp, Nokia/NSB, Fraunhofer IIS/HHI, IDC, KDDI, Rakuten, CATT, Lenovo/MotM (ok), Fujitsu, OPPO (ok), Spreadtrum, NEC (ok), **Not support (RI-specific):** Google,[vivo, New H3C, CMCC] |

### Issue 2 (WID objective 2c): CRI-based CSI for hybrid beamforming (HBF)

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| 2.3 | **Proposal 2.C**: For the Rel-19 CRI-based CSI refinement for up to 128 CSI-RS ports, regarding wideband P/SP-CSI reported using one-part CSI, if resource-specific RI restriction is configured, the zero padding bits for each of the M reported CRI are determined as follows:* For a k-th CRI from the M reported CRIs, , where:
	+ , where *Q* is the set of CRIs corresponding to Ks resources and is the maximum payload size of associated CSI fields for a j-th CRI, and , where is the set of rank values that are allowed to be reported for the j-th CRI;
	+ , where is the reported rank for k-th CRI;
	+ Note: is the size of RI field corresponding to k-th CRI.
	+ Note: The definition of the operator B(∙) is as legacy (as defined in 38.212).

Note: Here k, j=1, 2, …, KSNote: How this is captured in the spec (including exact formulation) is up to the editor(s).**FL assessment**: The proposal is needed analogous to CSI part 1. From 1st online session, some comments on the applicability for one-part PUSCH were made and need resolution. The proposal is now further clarified that it is intended for P/SP-CSI (where MR is not applicable).  | **Support/fine**: Samsung, Google, Qualcomm, NTT DOCOMO, NTT CORP, MediaTek, Xiaomi, CMCC, NEC, Fujitsu, Tejas, ZTE, CATT, IDC, Spreadtrum, OPPO (ok), Sharp, KDDI, Intel, Rakuten, Ericsson, Apple, Huawei/HiSi (open), TCL, New H3C, Nokia/NSB (ok), Lenovo/MotM (ok), vivo (ok)**Not support**: vivo bitwidth for each RI= max(RI),  |

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| 2.1 | **[116bis] Agreement**For the Rel-19 CRI-based CSI refinement for up to 128 CSI-RS ports, on the configured KS>1 NZP CSI-RS resources, reuse the legacy CMR and IMR rules for the Rel-15 CRI-based reporting. This includes:* All the KS NZP CSI-RS resources are associated with a same CSI-RS resource set
* …

**Proposal 2.A**: For the Rel-19 CRI-based CSI refinement for up to 128 CSI-RS ports, regarding aperiodic CSI-RS resource configuration, an RRC-configured resource-level slot offset (relative to the resource-set-level slot offset, using the same design as Rel-19 Type-I/II codebook refinement for 48, 64, and 128 ports) is supported for aperiodic CSI-RS resource set* FFS: The number of bits for indicating the resource-level slot offset (relative to the resource-set-level slot offset) for KS resources, including the value(s) of the slot offset
* FFS: Whether, in addition, configuring an *available* slot offset for each CSI-RS resource within the aperiodic CSI-RS resource set
	+ Note: “*Available* slot offset” is analogous to the Rel-17 SRS triggering offset enhancement

**FL assessment**: The proposal is unclear. It was agreed that all the KS resources are associated with a same resource set. In this case, all the restrictions apply including the permitted resource-level slot offset | **Support/fine**: Huawei/HiSi, ZTE, Qualcomm, China Telecom, Samsung, [NTT DOCOMO, NTT CORP], MediaTek, CMCC, NEC, Tejas, CATT, IDC, vivo, Sharp, Intel, Rakuten, Ericsson, Apple, Huawei/HiSi, TCL, Lenovo/MotM (ok), OPPO (ok), Google (ok), Xiaomi (ok),**Not support**: Fujitsu, Spreadtrum, New H3C,  |

### Issue 3 (WID objective 3): CJT calibration reporting for non-ideal synchronization and backhaul

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| 3.2.1 | **[119] Agreement**For the Rel-19 aperiodic standalone CJT calibration (CJTC) reporting, when linking CJTC Dd and Rel-18 eType-II CJT CSI reports is configured with a joint trigger, the timeline (Z/Z’) is determined as Z/Z’ associated with the Rel-18 eType-II CJT, plus Drelax * The value of Drelax is a UE capability, taken from {0, drelax}
	+ FFS: The value of drelax (>0), including whether it depends on SCS
* For linking CJTC Dd and Rel-18 eType-II CJT CSI, joint triggering is a separate UE feature group from separate triggering

**Proposal 3.B.4:** For the Rel-19 aperiodic standalone CJT calibration (CJTC) reporting, when linking CJTC Dd and Rel-18 eType-II CJT CSI reports is configured with a joint trigger, drelax is Z1’ of table 5.4-2 in TS38.214 (corresponding to WB Type I CSI report with at most 4 ports)**FL assessment**: The FFS needs to be resolved**Question 3.B.4:** For the Rel-19 aperiodic standalone CJT calibration (CJTC) reporting, when linking CJTC Dd and Rel-18 eType-II CJT CSI reports is configured with a joint trigger, please share your view, if any, on the value of drelax (>0):* Z1’ of table 5.4-2 in TS38.214 (corresponding to WB Type I CSI report with at most 4 ports): MediaTek, Google, Lenovo/MotM, ZTE,
* *Z2/Z2’:* ZTE
* *:* ZTE
* *Z1/Z1’:* ZTE
* UE feature session: Samsung, CATT, OPPO, Spreadtrum, Apple,
 | **Support/fine**: MediaTek, Google, Lenovo/MotM, ZTE, Xiaomi, NEC, OPPO, **Not support (UE feature session, or need more time):** vivo, Samsung, CATT, Spreadtrum, Apple, Ericsson |

# References