**3GPP TSG RAN WG1 #119 R1-2410755**

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

**Agenda item:** 9.2.2

**Source:** Moderator (Samsung)

**Title:** Moderator Summary for 2nd 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

|  |  |  |
| --- | --- | --- |
| 1.1.3 | **[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):* The scaling formula is $ρ.s\_{i}$ where $ρ$ is a multiplicative factor independent of *i*
	+ Reuse legacy precoder normalization (per discretion of the spec editor)
	+ FFS (RAN1#119): Whether min($ρ.s\_{i}$ , 1) operation is needed
	+ FFS (RAN1#119): Whether $ρ$ other than 1 (baseline) is needed (e.g. $\sqrt{v}$ or ${1}/{\sqrt{v}}$)
* ...

**Proposal 1.A.3:** 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),$ ρ=1$* Note: In this case, the min(si,1) operation is not needed

**FL assessment**: If no consensus is reached on something else different from ρ=1 (baseline), ρ=1 is the natural outcome. In this case min(.) operation is not needed. **Question 1.A.3:** 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), please share your view, if any, on the following issues:* Whether $ρ$ other than 1 (baseline) is needed (e.g. $\sqrt{v}$ or ${1}/{\sqrt{v}}$)
	+ 1 when b0=b1, else $\sqrt{v}$: Qualcomm, Xiaomi, NTT DOCOMO, NTT CORP,
	+ $\sqrt{v}$: Huawei/HiSi
	+ No ($ρ=1$ only): Ericsson, Intel, Rakuten, Samsung, vivo, NTT DOCOMO, NTT CORP, Lenovo/MotM, ZTE, Fujitsu, OPPO, Nokia/NSB, MediaTek,
* Whether min($ρ.s\_{i}$ , 1) operation is needed
	+ Yes: NTT DOCOMO, NTT CORP,
	+ No: Samsung, NTT DOCOMO, NTT CORP, Lenovo/MotM, ZTE, Fujitsu, OPPO, Nokia/NSB, MediaTek,
 | **Support/fine:** Ericsson, Intel, Rakuten, Samsung, vivo, NTT DOCOMO, NTT CORP, Lenovo/MotM, ZTE, Fujitsu, OPPO, Nokia/NSB, MediaTek, Spreadtrum, Apple (ok), **Not support:**  |

|  |  |  |
| --- | --- | --- |
| 1.2 | **Proposal 1.B**: For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports, extend the agreed Scheme-A and Scheme-B to 16, 24, and 32 CSI-RS ports, for all applicable RI values with K=1 only, and without any further modification/enhancement of the sub-features pertinent to the Rel-19 Type-I SP design (including, e.g. the Rel-19 Type-I SP CBSR, soft scaling).* For the Rel-19 Type-I SP codebook, the support for 16, 24, and 32ports are 3 separate UE capabilities from the support for the previously agreed number of ports (48, 64, 128 ports)
* The Rel-18 SD NES schemes applicable to Rel-15 Type-I SP codebooks are also applicable to the extension of the Rel-19 Type-I SP codebook to 16, 24, and 32 ports
* FFS: whether to adopt the extended orthogonal set for the 2nd SD basis for Scheme-A, RI=2-4 and 16, 24, and 32 CSI-RS ports

**Strong concern:** vivo (whatever Eko wants), CATT (small gain), OPPO (small gain)**FL assessment**: This was discussed OFFLINE [1].FFS:* Yes: Nokia/NSB,
* No: NTT DOCOMO, NTT CORP, ZTE, Tejas,
 | **Support/fine:** ZTE, IDC, Samsung, Xiaomi, Nokia/NSB, NEC, Fujitsu, NTT DOCOMO, NTT CORP, Spreadtrum, UNISOC, CMCC, MediaTek, Ericsson, Apple, Google, IDC, Tejas, Sharp, Orange, Lenovo/MotM (ok, low priority), China Telecom, KDDI, Intel (ok), New H3C,**Strong concern:** vivo, CATT, OPPO |

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

--

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

|  |  |  |
| --- | --- | --- |
| 3.2.3 | **Proposal 3.B.3**: 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 triggering carried on a same PUSCH (hence on a same slot), the UCI associated with the CJTC Dd report is multiplexed in CSI Part 1 * The previously agreed UCI design and mapping order for CJTC Dd report are reused
* The legacy UCI design, UCI mapping order, and UCI omission for the Rel-18 eType-II CJT CSI are reused

Note: The above proposal reuses the legacy UCI design principles, where the UCI associated with the CJTC Dd is placed in the part of UCI as TS 38212 Table 6.3.1.1.2-13; the CSI part 1 of Rel-18 eType-II CJT CSI is placed in the part of UCI as TS 38.212 Table 6.3.1.1.2-13 and the CSI part 2 of Rel-18 eType-II CJT CSI is placed in the part of UCI as TS 38.212 Table 6.3.1.1.2-14**FL assessment**: This proposal is needed since joint triggering introduces a new PUSCH reporting format within 1 slot. | **Support/fine**: CMCC, Samsung (ok), Qualcomm, NTT DOCOMO (ok), NTT CORP, Xiaomi, TCL, Nokia/NSB (ok), Huawei/HiSi (ok), Ericsson, OPPO, ZTE**Not support**: Fujitsu, (spec impact?),  |

|  |  |  |
| --- | --- | --- |
| 3.6 | **[117] Agreement**For the Rel-19 aperiodic standalone CJT calibration reporting, regarding the applicable type(s) of the configured NTRP NZP CSI-RS resources/resource sets when ReportQuantity is ‘cjtc-P’ (DL/UL phase offset),* all the ‘CSI-RS for CSI’ resources within each resource set follow the legacy pre-Rel-19 rules of CSI-RS resources associated with a same resource set
* all the resources across the NTRP CSI-RS resources/resource sets are configured with the same bandwidth

**Proposal 3.F**: For the Rel-19 aperiodic standalone CJT calibration (CJTC) reporting, when *ReportQuantity* is *‘cjtc-P’* (DL/UL phase offset), the UE assumes that the NTRP CSI-RS resources are transmitted without DL/UL switching in between the NTRP resources**FL assessment**: This is analogous to legacy CMR behaviours for Rel-17 NCJT and Rel-18 Type-II CJT. **[From JD] This proposal may be helpful to identify NTRP CSI-RS occasions linked to a latest SRS occasion for reference antenna port determination.** | **Support/fine**: Qualcomm, OPPO, NTT DOCOMO, NTT CORP, Nokia/NSB, Apple, Huawei/HiSi, Google, MediaTek, Xiaomi, Sharp, KDDI, TCL, Samsung, Ericsson, ZTE, CATT, vivo**Not support**: Fujitsu, Intel |

# References