**3GPP TSG RAN WG1 #118 R1-2407283**

**Maastricht, The Netherlands, August 19th – 23rd, 2024**

**Agenda item:** 9.2.2

**Source:** Moderator (Samsung)

**Title:** Moderator Summary on Wednesday offline for 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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| 1.5.3 | **[117] Agreement**For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports with RI=5-8, support the following schemes:* The same O1=O2 value(s) as RI=1-4 are supported
* Scheme-A (based on Scheme3 described in RAN1#116bis):
	+ W1 structure:
		- The 1st SD basis vector is freely selected and subsequent 2 (RI=5-6) or 3 SD basis vectors (RI=7-8) are freely selected such that they are orthogonal in at least one dimension (horizontal or vertical).
		- …

**Proposal 1.E.3**: For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports, for Scheme-A RI=5-8, the UCI parameters for the selection scheme for the other $n\_{SDBV}$ SD basis vectors (in Part 2 UCI, wideband) are as follows:* Comprising a 1-bit beam group indicator i3∈{0,1} and for each of the *nSDBV* other selected SD basis vectors,
	+ If i3=0:
		- $\left⌈log\_{2}\left(N\_{1}\right)\right⌉$-bit, $\left⌈log\_{2}\left(N\_{2}\right)\right⌉$-bit, and $\left⌈log\_{2}\left(O\_{2}\right)\right⌉$-bit (q2) indicators
			* In this case, q1 = mod(i1,O1) of the first SD basis vector
	+ If i3=1:
		- $\left⌈log\_{2}\left(N\_{1}\right)\right⌉$-bit, $\left⌈log\_{2}\left(N\_{2}\right)\right⌉$-bit, and $\left⌈log\_{2}\left(O\_{1}\right)\right⌉$-bit (q1) indicators
			* In this case, q2 = mod(i2,O2) of the first SD basis vector

Note: It is up to the editor how this is captured in the specification Note: (q1,q2) is analogous to (q1,q2) for Type-II CSINote (from previous agreement): *nSDBV*=2 (*v*=5-6) or 3 (*v*=7-8)**FL assessment**: This needs to be resolved. The previous agreement leaves the details on indication open. While there are other slightly different alternatives, the above represent the ones that are aligned with the previous agreement and specific enough not to leave any open issue.Alt1: ZTE, Qualcomm, Ericsson, Fujitsu, Google, Lenovo/MotM, Tejas, Intel, Nokia/NSB, TCL, [MediaTek] Alt2: Xiaomi, vivo, NTT DOCOMO, Apple, Spreadtrum, OPPO, CMCC* Concern (unnecessary overhead): Nokia/NSB

Alt3: Huawei/HiSi, Samsung, vivo, NEC, Apple, CMCC* Concern (combinatorial memory): Qualcomm, MediaTek, Fraunhofer IIS/HHI, CATT, Spreadtrum, Nokia/NSB,

Alt5: Fraunhofer IIS/HHI, MediaTek,  | **Support/fine**: Huawei/HiSi, vivo, Xiaomi, ZTE, Nokia/NSB, Qualcomm, Samsung, Ericsson, MediaTek, Fujitsu, Google, Lenovo/MotM, Fraunhofer IIS/HHI, Tejas, Apple, NEC, **Not support**: |

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

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| 2.3.2 | **Question 2.C.2**: For the Rel-19 CRI-based CSI refinement for up to 128 CSI-RS ports, regarding UCI omission for the UCI reported *in CSI part-1 ~~(only applicable to PUCCH-based reporting and Rel-15 Type-I codebook)~~*, **please share your preference between Alt1 and Alt2**:Alt2 (following PUSCH-based): CSI part-1 is either reported entirely or dropped entirely, with the following UCI packing order:* CSI part-1 associated with the first configured CMR among the non-reported MR CRIs
* …
* CSI part-1 associated with the last configured CMR among the non-reported MR CRIs
* CSI part-1 of the 1st reported CRI,
* …
* CSI part-1 of the **(M-MR)th**reported CRI,

Summary * Alt2: Nokia/NSB, Lenovo/MotM, NTT DOCOMO, OPPO, Lenovo/MotM, TCL, CMCC, Ericsson, MediaTek, Samsung, Apple, CATT, Qualcomm (ok), ZTE (ok)
* Alt3: XIaomi

**FL assessment**: Although it can be argued that Alt1 is closer to legacy, Alt2 should be the baseline since it is analogous to PUSCH |

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



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| 3.1 | **Question 3.A.1**: For the Rel-19 aperiodic standalone CJT calibration reporting, when ReportQuantity is ‘cjtc-P’ (DL/UL phase offset), regarding the support of sub-band reporting (>1), please share your view on the following FFS points: * Supported sub-band size(s), e.g. following the legacy CSI sub-band definition, vs {1, 2, 4, 8, 16 PRBs}
	+ {1, 4}: ZTE, Ericsson
	+ {1, 2, 4, 8, 16 PRBs} dependence on BWP: CATT
	+ Legacy sub-band: OPPO, Samsung, Xiaomi, Nokia/NSB, TCL, Sony (also 1,2 if beneficial), CMCC
	+ Multiple of legacy sub-band: Lenovo/MotM
* If configured with a subset of reporting sub-bands, Whether the UE performs measurement over the entire configured CSI reporting band WCSI
	+ Yes: ZTE, Samsung, CATT, Nokia/NSB, TCL, Ericsson, Sony, CMCC,
	+ No:
* If needed, mechanism to limit CSI reporting overhead (e.g. maximum NSB-P)
	+ Yes, max (NSB-P): OPPO, Samsung, CATT, Xiaomi, Nokia/NSB, TCL, Ericsson (8, gNB config), Sony,
	+ No: Qualcomm, CMCC,

**Proposal 3.A.2**: For the Rel-19 aperiodic standalone CJT calibration reporting, when ReportQuantity is ‘cjtc-P’ (DL/UL phase offset), regarding the support of sub-band reporting (>1) {(n,, n,, n,NSB-P), n=0, 1, …, NTRP – 1, n≠nref}:* Supported sub-band size(s) {1, 2, 4, 8, 16}
* The NW configures, via higher-layer (RRC) signalling, which NSB-P sub-band(s) the UE reports
* The maximum value of NSB-P can be configured by NW via higher-layer (RRC) signalling.
	+ FFS (RAN1#118bis): candidate values
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# References