**3GPP TSG RAN WG1 #107-e R1-2112763**

**e-Meeting, November 11th – 19th, 2021**

**Agenda item:** 8.1.1

**Source:** Moderator (Samsung)

**Title:** Moderator summary#4 for multi-beam enhancement: ROUND 3

**Document for:** Discussion and Decision

## CORESET framework

Summary:

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| **Proposal 1.I:** For Rel-17 unified TCI framework, on applying the indicated Rel-17 TCI state to PDCCH reception and the respective PDSCH reception, for intra-cell and inter-cell BM, support per CORESET determination as follows:   * For any PDCCH reception on a CORESET [other than CORESET#0] that is associated with ~~[~~at least ~~or] [~~USS ~~and/or CSS type 3]~~ set(s) and the respective PDSCH reception, UE always applies the indicated Rel-17 TCI state. * For any PDCCH reception on [CORESET#0 or] a CORESET [(other than CORESET#0)] that is not associated with any ~~[~~USS ~~and/or CSS type 3]~~ set and the respective PDSCH reception, whether or not UE to apply the indicated Rel-17 TCI state is determined per CORESET by RRC   + Note: It was agreed that a UE can receive non-UE dedicated signal/channel only from the serving cell   + ~~Above applies only for intra-cell beam indication~~ * ~~[~~For inter-cell beam management (i.e. when at least one of the RRC-configured TCI states is associated with a PCI different from that of the serving cell) ~~indication~~, a UE may expect that a CSS and a USS are not associated with a same CORESET~~]~~   The bracketed texts will be discussed and concluded during maintenance  **FL Note**: 3 open issues to finalize, companies’ views  **Working Assumption**  For Rel-17 unified TCI framework, on applying the indicated Rel-17 TCI state to PDCCH reception and the respective PDSCH reception, for intra-cell and inter-cell BM, support per CORESET determination as follows:   * For any PDCCH reception on a CORESET [other than CORESET#0] that is associated with [at least or only] [USS and/or CSS type 3] set(s) and the respective PDSCH reception, UE always applies the indicated Rel-17 TCI state. * For any PDCCH reception on [CORESET#0 or] a CORESET [(other than CORESET#0)] that is not associated with any [USS and/or CSS type 3] set and the respective PDSCH reception, whether or not UE to apply the indicated Rel-17 TCI state is determined per CORESET by RRC   + Note: It was agreed that a UE can receive non-UE dedicated signal/channel only from the serving cell   + Above applies only for intra-cell beam indication * [For inter-cell beam indication, a UE may expect that a CSS and a USS are not associated with a same CORESET]   **CORESET#0:**   * **Remove brackets (include):** ZTE, Ericsson, NTT Docomo, Intel, vivo, Nokia/NSB * **Remove text or keep brackets (FFS and address in maintenance):** QC, Apple, MTK, Samsung, CMCC, Xiaomi, LG, OPPO, CATT   FL assessment: No consensus on removing the brackets for now, continue discussion during maintenance  **USS and/or CSS Type 3:**   * **Only USS:** QC, Ericsson, CMCC, Samsung, Xiaomi, LG, CATT * **USS and CSS Type 3:** Apple, ZTE, NTT Docomo, Intel, vivo, OPPO, Nokia/NSB   FL assessment: ‘USS only’ is default, no consensus on treating CSS Type 3 (non UE dedicated) similarly to USS.  **Support CORESET association with both CSS and USS:**   * **For both intra- and inter-cell:** Ericsson, NTT Docomo, Intel, Samsung (1st pref, NW implementation), ZTE, Nokia/NSB, CATT * **Only for intra-cell:** Samsung (2nd pref), CMCC, NTT Docomo (2nd pref), LG, OPPO * **Not supported:** QC, ZTE (except for CORESET#0), MTK, Lenovo/MotM, Apple, Xiaomi, vivo   FL assessment: Almost equal support for intra+inter vs none. ‘Only intra’ is a good compromise |

**Table 1 Restructured CORESET-based framework proposal**

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| **Proposal 1.I’:** For Rel-17 unified TCI framework, on applying the indicated Rel-17 TCI state to PDCCH reception and the respective PDSCH reception:    For discussion purposes, define ‘CORESET A’ and ‘CORESET B’ as follows:   * ‘CORESET A’: CORESETs associated with UE-dedicated reception on PDCCH in a CC, comprising CORESETs in association with:   + USS   + [CSS Type 3] * ‘CORESET B’: CORESETs associated with non-UE-dedicated (not associated with UE-dedicated) reception on PDCCH in a CC, comprising CORESETs in association with:   + CSS [other than Type 3]   + [CORESET#0]   For intra-cell BM (when all of the RRC-configured TCI states are associated with the serving cell), support per CORESET determination as follows:   * For any PDCCH reception on at least a ‘CORESET A’ and the respective PDSCH reception, UE always applies the indicated Rel-17 TCI state. * For any PDCCH reception on only a ‘CORESET B’ and the respective PDSCH reception, whether or not UE to apply the indicated Rel-17 TCI state is determined per CORESET by RRC * For intra-cell BM, a supported CORESET can be either ‘CORESET A’, ‘CORESET B’, or both   For inter-cell BM (when at least one of the RRC-configured TCI states is associated with a PCI different from that of the serving cell), support per CORESET determination as follows:   * For any PDCCH reception on only a CORESET A and the respective PDSCH reception, UE always applies the indicated Rel-17 TCI state. * For inter-cell BM, a supported CORESET can be either CORESET A or CORESET B (but not both) |

Table 2 Additional inputs: proposal 1.I’

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| **Company** | **Input** |
| Mod V0 | 1. **Share your inputs on proposal 1.I’** |
| Qualcomm | Do not support Proposal 1.1’. The fundamental issue is still there: for intra-cell BM, if a CORESET is both CORESET A (USS) and CORESET B (CSS), it should always apply the indicated TCI. AGAIN, this is against the previous agreement. As a compromise, we can only accept a CORESET to be either USS or CSS. Otherwise, we prefer per SS based classification, which has no such “CORESET for both USS and CSS” issue.  For intra-cell and inter-cell BM (when all of the RRC-configured TCI states are associated with the serving cell), support per CORESET determination as follows:   * For any PDCCH reception on ~~at least~~ a ‘CORESET A’ and the respective PDSCH reception, UE always applies the indicated Rel-17 TCI state. * For any PDCCH reception on ~~only~~ a ‘CORESET B’ and the respective PDSCH reception, whether or not UE to apply the indicated Rel-17 TCI state is determined per CORESET by RRC * For intra-cell and inter-cell BM, a supported CORESET can be either ‘CORESET A’, ‘CORESET B’~~, or both~~ |
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## Other issues

### Issue 1 (Rel.17 unified TCI framework – note: for intra-cell beam management unless otherwise noted)

Table 3 Summary: issue 1

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| **#** | **Issue** | **Companies’ views** |
| 1.1 | **Proposal 1.A.2**: On Rel-17 unified TCI framework, for any SRS resource or resource set that does not share the same indicated Rel-17 TCI state(s) as dynamic-grant/configured-grant based PUSCH and all of dedicated PUCCH resources, but can be configured as a target signal of a Rel-17 UL or, if applicable, joint TCI (hence the Rel-17 UL or, if applicable, joint TCI state pool), Rel-17 mechanism(s) which reuse mechanisms similar to the Rel-15/16 spatial relation info update signaling/configuration design(s) are used to update/configure such SRS (s) with Rel-17 UL or, if applicable, joint TCI state(s).   * Applies for both intra-cell and inter-cell beam indication * [In such a case, UE ignores the UL PC parameters associated with the UL or, if applicable, joint TCI state for SRS, and legacy Rel-15/16 UL PC parameter configuration/activation signaling is reused; otherwise, if SRS resource or resource set shares the same indicated Rel-17 TCI state(s) as dynamic-grant/configured-grant based PUSCH and all of dedicated PUCCH resources, UE does not expect legacy Rel-15/16 UL PC parameter configuration for SRS.] * The MAC-CE signaling for the Rel-17 mechanism(s) shall fully reuse, to the fullest possible extent, the MAC-CE for the Rel-15/16 spatial relation info update   + Note: Strive, to the fullest possible extent, not to introduce any No new MAC-CE is introduced. The exact details are up to RAN2. * Note: A Rel-17 UE is not required to support both this feature and Rel-16 AP SRS SpatialRelationInfo update within the same band.   **FL Note**: Discussed offline [1] | **Support/fine (27)**: Sony, Nokia/NSB, Ericsson, Samsung, MTK, Fraunhofer IIS/HHI, CMCC, Futurewei, Intel, vivo, NEC, AT&T, NTT Docomo, QC, CATT, Xiaomi, TCL, Lenovo/MotM, Convida, Huawei, HiSi, ZTE, Apple, OPPO  **Concern**: LG, [Qualcomm] |
| 1.2 | **Proposal 1.E:** On Rel.17 unified TCI framework, for Rel-17 unified TCI, for DL channels/signals that share the same indicated Rel-17 TCI state as UE-dedicated reception on PDSCH/PDCCH (via Rel-17 MAC-CE/DCI TCI state update), the following option on source RSs and QCL-Types is also supported:   * Option 3: CSI-RS for CSI is configured for QCL-TypeA and QCL-TypeD source RS   **FL Note**: It was explained that the so-called “circular” issue is avoided in practice via NW implementation, i.e. NW will not configure the same CSI-RS for CSI both as source and target RSs. | **Support/fine (22)**: Huawei/HiSi, Ericsson, CMCC, Samsung, Sony, Qualcomm, Fraunhofer IIS/HHI, Futurewei, MTK, NTT Docomo, AT&T, Lenovo/MotM, Intel, Xiaomi, CATT, TCL, ZTE, Nokia/NSB  **Concern**: Apple (object), OPPO |

Table 4 Additional inputs: issue 1

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| **Company** | **Input** |
| Mod V0 | 1. **Check and update your view in Table 3** 2. **Share more inputs here if needed** |
| Qualcomm | For 1.A.2,   * Do not support the red text, which unnecessarily require both legacy and R17 PC configurations. R17 config is sufficient. We are fine for restriction rule on top of R17 config. * Also suggest wording update for the note below   + Note: Strive, to the fullest possible extent, not to introduce any ~~No~~new MAC-CE ~~is introduced~~. The exact details are up to RAN2. |
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### Issue 4 (MP-UE)

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# References

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| 1 | R1-2111716 | Summary of offline discussion on unified TCI, inter-cell beam management, and MPUE | Moderator (Samsung) |