**3GPP TSG RAN WG1 #122 R1-250XXXX**

**Bengaluru, India, Aug 25th – 29th, 2025**

Agenda Item: 8.2

Source: Ad-Hoc Chair (Ericsson)

Title: Session notes for 8.2 Maintenance on NR MIMO Phase 5

Document for: Discussion, Decision

## Maintenance on NR MIMO Phase 5

[122-R19-MIMO] Email discussion on MIMO – Eko (Samsung)

* To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, tdoc number of the moderator summary for online session, etc

### Enhancements for UE-initiated/event-driven beam management

R1-2505158 Remaining issues on UE-initiated/event-driven beam management Spreadtrum, UNISOC

R1-2505205 Maintenance of UE-initiated/event-driven beam management Huawei, HiSilicon

R1-2505236 Maintenance of UE/Event-Driven Beam Management InterDigital, Inc.

R1-2505267 Maintenance on enhancements for UE-initiated/event-driven beam management ZTE Corporation, Sanechips

R1-2505320 Maintenance on UE-initiated/event-driven beam report CATT

R1-2505370 Maintenance on UE-initiated/event-driven beam management vivo

R1-2505427 Maintenance on UE-initiated/event-driven beam management Xiaomi

R1-2505476 Remaining issue on UE-initiated/event-driven beam management MediaTek Inc.

R1-2505533 Remaining issues on Rel-19 UE-initiated/event-driven beam management Samsung

R1-2505609 Maintenance for UE-initiated beam management Ericsson

R1-2505658 Discussion on UE-initiated/event-driven beam management Ofinno

R1-2505735 Remaining Issues of UE-initiated/event-driven beam management OPPO

R1-2505808 Maintenance on UE-initiated/event-driven beam management Lenovo

R1-2505816 Remaining issues on UE-initiated beam management LG Electronics

R1-2505875 Remaining issues for UE-initiated/event-driven beam management Apple

R1-2505929 Remaining issues on UE-initiated event-driven beam management NEC

R1-2505943 Maintenance on UE-initiated/event-driven beam management Transsion Holdings

R1-2505959 Remaining issues on enhancements for UE-initiated/event-driven beam management Fujitsu

R1-2506051 Enhancements for UE-initiated/event-driven beam management ETRI

R1-2506138 Maintenance topics on UE-initiated/event-driven beam management Panasonic

R1-2506160 Maintenance of enhancements to facilitate UE-initiated/event-driven beam management Nokia

R1-2506175 UE-initated/event-driven beam management Qualcomm Incorporated

R1-2506253 Moderator Summary #1 on UE-initiated/event-driven beam management Moderator (ZTE)

R1-2506254 Moderator Summary #2 on UE-initiated/event-driven beam management Moderator (ZTE)

R1-2506255 Moderator Summary #3 on UE-initiated/event-driven beam management Moderator (ZTE)

R1-2506265 Enhancements for UE-initiated/event-driven beam management Sharp

R1-2506272 Maintenance on Enhancements for UE-initiated/event-driven beam management NTT DOCOMO, INC.

R1-2506316 Correction of UEIRI reporting in PUCCH ITRI, Acer Incorporated

R1-2506348 Maintenance on enhancements for UE-initiated or event-driven beam management Google

**R1-2506253**

**Agreement:**

Adopt the following changes in TS38.213 Section 9.2.5.1:

* **Reason for change:** In the last meeting, when the PUCCH resource for UE-initiated/event-driven beam reporting is collided/overlapped with a PUCCH format 2/3/4 carrying CSI/SR, the multiplexing rule that was agreed in RAN1#121. However, in the current specification, only the priority rule of LRR, UEIRI and normal SR is captured when the PUCCH resource for UE-initiated/event-driven beam reporting is collided/overlapped with a PUCCH format 2/3/4 carrying CSI/SR.
* **Summary of change:** In TS38.213 section 9.2.5.1, add the case of no positive LRR and at least one positive UEIBRs to the multiplexing rule of PUCCH with UEIBR.
* **Consequences if not approved:** UE behavior is unclear for the case of no positive LRR and at least one positive UEIBRs, when the PUCCH resource for UE-initiated/event-driven beam reporting is collided/overlapped with a PUCCH format 2/3/4 carrying CSI/SR.

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| **9.2.5.1 UE procedure for multiplexing HARQ-ACK or CSI and SR in a PUCCH**  < Unchanged parts are omitted >  If a UE would transmit a PUCCH with HARQ-ACK information bits in a resource using PUCCH format 2 or PUCCH format 3 or PUCCH format 4 in a slot, as described in clauses 9.2.1 and 9.2.3, bits representing a negative or positive SR/UEIRI, in ascending order of the values of *schedulingRequestResourceId*,a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR-SCell*, a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR,* a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR2* if the UEprovides *twoLRRcapability*, and a *schedulingRequestResourceId* associated with *schedulingRequestID-LBT-SCell* for SR, and then in ascending order of the values of *pucch-ResourceId* for UEIRI, are appended to the HARQ-ACK information bits and the UE transmits the combined UCI bits in a PUCCH using a resource with PUCCH format 2 or PUCCH format 3 or PUCCH format 4 that the UE determines as described in clauses 9.2.1 and 9.2.3. If one of the SRs is a positive LRR, the value of the bits indicates the positive LRR; else, if one of the UEIRIs is a positive UEIRI, the value of the bits indicates the positive UEIRI. An all-zero value for the bits represents a negative SR/UEIRI value across all SRs and UEIRIs.  If a UE would transmit a PUCCH with CSI report bits in a resource using PUCCH format 2 or PUCCH format 3 or PUCCH format 4 in a slot, bits representing corresponding negative or positive SR/UEIRI, in ascending order of the values of *schedulingRequestResourceId*, a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR-SCell*, a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR,* a *schedulingRequestResourceId* associated with *schedulingRequestID-BFR2* if the UEprovides *twoLRRcapability*, and a *schedulingRequestResourceId* associated with *schedulingRequestID-LBT-SCell* for SR, and then in ascending order of the values of *pucch-ResourceId* for UEIRI, are prepended to the CSI information bits as described in clause 9.2.5.2 and the UE transmits a PUCCH with the combined UCI bits in a resource using the PUCCH format 2 or PUCCH format 3 or PUCCH format 4 for CSI reporting. If one of the SRs is a positive LRR, the value of the bits indicates the positive LRR; else, if one of the UEIRIs is a positive UEIRI, the value of the bits indicates the positive UEIRI. An all-zero value for the bits represents a negative SR/UEIRI value across all SRs and UEIRIs. |

**Agreement:**

Adopt the following changes in TS38.213 Section 7.5:

* **Reason for change:** When the transmission powers of multiple uplink transmissions exceed the UE’s maximum transmit power, TS 38.213 specifies a prioritization mechanism to determine which transmissions should be reduced or dropped. This prioritization covers all conventional UCI types, such as SR, CSI reports, and HARQ-ACK, ensuring consistent behavior across implementations when power reduction is needed. However, the UE-initiated CSI reporting indicator (UEIRI), introduced as a new UCI type to support UE-initiated CSI reporting, is not currently included in the priority order defined in TS 38.213.
* **Summary of change:** Capture the priority rule for UEIRI, i.e., the same priority as LRR/SR.
* **Consequences if not approved:** Without explicit prioritization, UE behavior may vary between implementations, potentially causing inconsistent reporting of UE-initiated CSI under power-limited conditions. This could result in the unintended suppression of UEIRI or, conversely, excessive reduction of other UCI types, impacting system performance and interoperability

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| 7.5 Prioritizations for transmission power reductions For single cell operation with two uplink carriers or for operation with carrier aggregation or for operation with a candidate cell configured by *LTM-Config* or for operation with a single cell configured with *sTx-2Panel*, if a total UE transmit power for PUSCH or PUCCH or PRACH or SRS transmissions on serving cell(s) or on a candidate cell, if any, in a frequency range in a respective transmission occasion would exceed , where is the linear value of in transmission occasion as defined in [8-1, TS 38.101-1] for FR1 and [8-2, TS 38.101-2] for FR2, the UE allocates power to PUSCH/PUCCH/PRACH/SRS transmissions according to the following priority order (in descending order) so that the total UE transmit power for transmissions on serving cell(s) or on a candidate cell, if any, in the frequency range is smaller than or equal to for that frequency range in every symbol of transmission occasion . If the UE transmits SRS on multiple SRS resources according to Clause 6.2.1.4 of [6, TS 38.214], the UE allocates power so that all REs of the SRS transmission have same power.  For the purpose of power allocation in this clause, if a UE is provided *uci-MuxWithDiffPrio* and the UE multiplexes HARQ-ACK information in a PUSCH, a priority index of the PUSCH is the larger of (a) the priority index of the PUSCH according to clause 9 and (b) the larger priority index of the HARQ-ACK information. When determining a total transmit power for serving cells or a candidate cell, if any, as described in Clause 21 in a frequency range in a symbol of transmission occasion , the UE does not include power for transmissions starting after the symbol of transmission occasion . The total UE transmit power in a symbol of a slot is defined as the sum of the linear values of UE transmit powers for PUSCH, PUCCH, PRACH, and SRS in the symbol of the slot.  - PRACH transmission on a candidate cell, if any, as described in Clause 21  - PRACH transmission on the PCell  - PUCCH or PUSCH transmissions with larger priority index  - For PUCCH or PUSCH transmissions with same priority index  - PUCCH transmission with HARQ-ACK information, and/or SR, and/or LRR, and/or UEIRI, or PUSCH transmission with HARQ-ACK information of the priority index  - PUCCH transmission with CSI or PUSCH transmission with CSI  - PUSCH transmission without HARQ-ACK information of the priority index or CSI and, for Type-2 random access procedure, PUSCH transmission on the PCell  - If the UE is configured with prioSCellPRACH-OverSP-PeriodicSRS-r17  - Aperiodic SRS transmission or PRACH transmission on a serving cell other than the PCell  - Semi-persistent and/or periodic SRS transmission  - otherwise,  - SRS transmission, with aperiodic SRS having higher priority than semi-persistent and/or periodic SRS, or PRACH transmission on a serving cell other than the PCell  =========unchanged omitted=========== |

**Agreement:**

Adopt the following changes in Clause 5.2.5 in TS38.214.

* **Reason for change:** Reusing the intra-UE multiplexing/prioritization rules of PUSCH with SP-CSI for PUSCH for UEI-BR for Mode B was agreed. However, it is not captured in the current specification on the priority rules of CSI reports.
* **Summary of change:** In TS38.214 section 5.2.5, clarify the intra-UE multiplexing/prioritization rules of PUSCH with SP-CSI for PUSCH is reused for UEI-BR for Mode B.
* **Consequences if not approved:** UE behavior is not clear when PUSCH carrying UEI-BR for Mode B overlaps with other PUSCHs.

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| 5.2.5 Priority rules for CSI reports  <Unchanged parts are omitted>  If a UE would transmit a first PUSCH that includes semi-persistent CSI reports or UE initiated CSI report for mode B and a second PUSCH that includes an UL-SCH on the same carrier, and the first PUSCH transmission would overlap in time with the second PUSCH transmission, the UE does not transmit the first PUSCH and transmits the second PUSCH. The UE expects that the first and second PUSCH transmissions satisfy the above timing conditions for PUSCH transmissions that overlap in time when at least one of the first or second PUSCH transmissions is in response to a DCI format detection by the UE. |

**Agreement:**

Adopt the following changes in TS38.214 Section 5.2.1.5.4.1d:

* **Reason for change:** In TS38.214 [3], the CSI report identifier in the beam report format is captured as *CSI-ReportConfigID*. However, according to the related agreement, the CSI report identifier is determined based on the order of the triggered CSI report in the CSI report configurations associated with the same PUCCH resource. Thus, the specification description is aligned with the agreement only when all CSI report configurations in a CC are associated with the same PUCCH resource.
* **Summary of change:** In TS38.214 section 5.2.1.5.4.1d, clarify the determination of a CSI report identifier in the report format when multiple CSI report configurations are associated with one PUCCH resource.
* **Consequences if not approved:** The spec is not aligned with the agreement.

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| 5.2.1.5.4.1d UE Initiated CSI reporting for multiple CSI configurations  For a UE configured with multiple *CSI-ReportConfig* with same higher layer parameters *eventType* and *PUCCHResource*, the UE expects  - the multiple *CSI-ReportConfig* to be configured in the same CC,  - the multiple *CSI-ReportConfig* to be associated with a same CSI trigger state if *reportTransmissionMode* is configured as ‘ModeA’, else  - the same *configuredPUSCHResourceOfModeB* if *reportTransmissionMode* is configured as ‘ModeB’.  The UE reports in a single reporting instance *nrofReportedRS-UEIBR* CRIs or SSBRIs corresponding to reference signals provided by the *newBeamResourceSet* in a *CSI-ReportConfig* that satisfies the event. The CSI report includes the ~~corresponding~~ *~~CSI-ReportConfigId~~* CSI report configuration indicator as defined in Table 6.3.2.1.2-3I in [5, TS38.212] corresponding to the *CSI-ReportConfig* ~~the~~ and is zero padded to a fixed payload size (when needed), with the fixed payload size given by the maximum payload size among all the multiple *CSI-ReportConfig*. |

**Agreement:**

Adopt the following changes in Section 5.4 in TS 38.214.

* **Reason for change:** Legacy CSI reference definition of aperiodic CSI reporting is reused for mode-A and definition of Z' for mode-B follows the legacy definition, hence we should capture the agreement by declaring that and defined for legacy beam report are used for UEI-CSI report as well.



* **Summary of change:** Clarifying that and defined for legacy beam report are used for UEI-CSI report as well.



* **Consequences if not approved:** Z/Z' definition for UEI-CSI report is unclear.

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| 5.4 UE CSI computation time <Irrelevant part is omitted>  - of the table 5.4-2 if *reportQuantity* is set to 'cri-RSRP', 'ssb-Index-RSRP', 'cri-RSRP- Index' or 'ssb-Index-RSRP- Index ', is according to UE reported capability *beamReportTiming* and *KBl* is according to UE reported capability *beamSwitchTiming* as defined in [13, TS 38.306], or if the CSI report is configured with *ltm-CSI-ReportConfig* for L1-RSRP measurement, or if the CSI report is configured with *eventType*, or |

**Agreement:**

Adopt the following changes in TS38.214 Section 5.2.1.5.4.1:

* **Reason for change:** Besides for correcting typos, when “current” beam RS for event evaluation is SSB QCLed with RS in an activated TCI state, the SSB having the Q-th best quality among all SSBs QCLed with the RSs in all the activated TCI states should be clarified:
* **Summary of change:** 
  + In TS38.214 section 5.2.1.5.4.1, add “state” after “indicated TCI”.
  + In TS38.214 section 5.2.1.5.4.1c, clarify the current beam RS determination when *enabledCurrentBeamReport* is configured for event-7.
* **Consequences if not approved:** It can cause inconsistency in the specification description.

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| 5.2.1.5.4.1 UE Initiated CSI reporting  For a UE configured with a *CSI-ReportConfig* with *eventType* for periodic reference signals with the same periodicity configured by the *newBeamResourceSet*, without *eventDetectionTimeWindowLength,* and with *dl-OrJointTCI-StateList*, when an event instance is determined (as described in the following clauses),  - for a reference signal configured by the *newBeamResourceSet*, if *eventType* is set to ‘event2’ or ‘event7’, or  - for the reference signal in the indicated TCI state or the SS/PBCH block which is QCLed with the reference signal in the indicated TCI state, if *eventType* is set to ‘event1’,  the UE transmits UEIRI on a PUCCH format 0 or format 1 in the PUCCH resource (in the CC provided by *pucchCell,* if configured, in the *CSI-ReportConfig*) configured by *PUCCHResource* in the *CSI-ReportConfig*.  For a UE configured with a *CSI-ReportConfig* with *eventType* for periodic reference signals with the same periodicity configured by the *newBeamResourceSet*, with *eventDetectionTimeWindowLength*, and with *dl-OrJointTCI-StateList,* when an event instance is determined (as described in the following clauses),  - for a reference signal configured by the *newBeamResourceSet*, if *eventType* is set to ‘event2’ or ‘event7’, or  - for the reference signal in the indicated TCI state or the SS/PBCH block which is QCLed with the reference signal in the indicated TCI state, if *eventType* is set to ‘event1’,  the UE  - starts a timer for such reference signal from the initial value equal to the time window length provided by *eventDetectionTimeWindowLength* and sets the counter to 1,if the timer for such reference signal is not running; or  - increments the counter for such reference signal by 1, if the timer for such reference signal is running.  < Unchanged parts are omitted >  5.2.1.5.4.1c UE Initiated CSI reporting for event 7  < Unchanged parts are omitted >  After transmitting UEIRI, the UE reports, as defined in Clause 6.3.2.1.2 of [5, TS 38.212] in a single reporting instance *nrofReportedRS-UEIBR* CRIs or SSBRIs corresponding to reference signals provided by the *newBeamResourceSet* that comprise at least one reference signal that triggers the UEIRI transmission. For each CRI or SSBRI, the CSI report includes the absolute L1-RSRP or differential L1-RSRP and, when *PresenceOfConditionMetIndicator* is configured a condition met indicator indicating whether the reference signal indicated by reported CRI or SSBRI triggers the UEIRI transmission and, when *enabledCurrentBeamReport* is configured, the differential L1-RSRP corresponding to the reference signal with the *valueOfQ*-th highest L1-RSRP out of the activated TCI state reference signals, or to the SS/PBCH block with the *valueOfQ*-th highest L1-RSRP out of the SS/PBCH blocks QCLed with the activated TCI state reference signals ~~which is QCLed with the reference signal with the~~ *~~valueOfQ~~* ~~highest L1-RSRP out of the activated TCI state reference signals~~. The UE sends the CSI report  - on a PUSCH indicated by the DCI format 0\_1/0\_2 in a PDCCH reception if *reportTransmissionMode* is configured as ‘ModeA’ and the CSI trigger state associated with the *CSI-ReportConfig* is indicated in the CSI request field in the DCI format 0\_1/0\_2, or  - on a type 1 CG-PUSCH configured by *configuredPUSCHResourceOfModeB* in the same CC as the corresponding *CSI-ReportConfig*, on the first available transmission occasion *numOfSymbols-ModeB* symbols after the end of the transmitted PUCCH if *reportTransmissionMode* is configured as ‘ModeB’, where the periodicity of the PUCCH resource and type 1 CG-PUSCH resource is the same, *numOfSymbols-ModeB* is based on the numerology of the PUCCH resource with UEIRI transmitted, and the CG-PUSCH does not carry UL-SCH.  < Unchanged parts are omitted > |

**Agreement**

Update the RRC candidate values for a threshold value eventThreshold-Event1-r19 for trigger event detection regarding Event-1.

* only values **16**, …,113 in RSRP-Range are valid.

**Proposal 3.5 (Offline consensus):**

On beam report transmission procedure for UE-initiated/event-driven beam reporting, occupation time of occupied CPU(s) starts when CSI report configuration for the UEI beam report is configured, and ends when it is released.

**Proposal 1.1 (Updated after offline):**

Regarding triggering event determination, besides for Candidate#2, at least Candidate #1, ~~Candidate#3, Candidate#5~~ and Candidate#7 are additionally supported for resetting the counting ~~and stopping the timer~~.

* Candidate#1: Regarding Event-2 and 7, RS reconfiguration for new beam is received;
  + In such case, the UE only needs to reset the counting of the removed new beams by RS reconfiguration, and stops the timers for those new beams.
    - FFS: Whether/how to have any spec impact on the resetting the counting of the removed new beams by RS reconfiguration and stopping the timers for those new beams.
* ~~Candidate#3: UEI beam report is transmitted.~~
  + ~~In such case, the UE only resets the counting of [new beams fulfilling triggering condition and reported by the UEI beam report/all new beams], and stops the timers for those new beams.~~
* ~~Candidate#5: The timer expires.~~
  + ~~In such case, the UE only needs to reset the counting for the new beam corresponding to the timer.~~
* Candidate#7: The RRC parameter(s) of the threshold for event evaluation in Event-1/2 value of Q in Event-7, *eventInstanceCount* and *eventDetectionTimeWindowLength* are reconfigured for the CSI report configuration for UEI beam report.
  + In such case, the UE need to reset the counting and stop the timers for all new beams.

When Candidate#2 is satisfied, the timers for all new beams should be stopped, besides for resetting counting.

Note: Candidate#2: The measured current beam RS is updated based on indicated TCI state

**R1-2506255**

**Agreement:**

On beam report transmission procedure for UE-initiated/event-driven beam reporting, occupation time of occupied CPU(s) starts when CSI report configuration for the UEI beam report is configured, and ends when it is released.

**Proposal:**

On beam report transmission procedure for UE-initiated/event-driven beam reporting, regarding the multiplexing a number of L (L>=1) first PUCCH(s) with UEIRIs collided/overlapped with a PUSCH~~:~~

* A field of bit sequence with a length of L bit is piggyback into the PUSCH.
  + Each of bits in the bit sequence corresponds to respective first PUCCH(s) by an ascending order of the values of PUCCH resource ID associated with the first PUCCHs.

### CSI enhancements

R1-2505206 Maintenance of 128 CSI-RS ports and UE reporting enhancement Huawei, HiSilicon

R1-2505255 CSI Enhancement for NR MIMO Google

R1-2505268 Maintenance on CSI enhancements ZTE Corporation, Sanechips

R1-2505321 Maintenance on Rel-19 CSI enhancements CATT

R1-2505371 Maintenance on Rel-19 CSI enhancements vivo

R1-2505428 Maintenance on Rel-19 CSI enhancement Xiaomi

R1-2505534 Remaining issues on Rel-19 CSI enhancements Samsung

R1-2505535 Moderator summary#1 on Rel-19 CSI enhancements: Round 1 Moderator (Samsung)

R1-2505736 CSI enhancements for Rel-19 MIMO OPPO

R1-2505809 Maintenance on CSI enhancements Lenovo

R1-2505817 Maintenance on CSI enhancements LG Electronics

R1-2506042 Maintenance on Rel. 19 MIMO CSI enhancements Fraunhofer IIS, Fraunhofer HHI

R1-2506161 Maintenance of CSI enhancement for NR MIMO Phase 5 Nokia

R1-2506167 Maintenance on CSI enhancements for large antenna arrays and CJT Ericsson

R1-2506176 Maintenance on Rel-19 CSI for >32 ports and UE-assisted CJT Qualcomm Incorporated

R1-2506273 Maintainance on CSI enhancements NTT DOCOMO, INC.

**R1-2505535**

**Agreement**:

Adopt the following changes to TS38.214 V19.0.0 Clause 6.2.1.3 on priority rules for UE sounding procedure as follows:

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| **Reason for change**: The newly agreed CSI reporting quantities in Rel-19 MIMO CSI has not been reflected in the current description of priority rules in TS38.214 |
| **Summary of the change**: Added the new CSI reporting quantities for CJT calibration reporting |
| **Consequences if not approved**: Incomplete description in TS38.214 |
| **6.2.1.3 UE sounding procedure between component carriers**  < Unchanged part omitted >  - the UE shall drop PUSCH transmission carrying aperiodic CSI comprising only CQI/PMI/L1-RSRP/L1-SINR/TDCP/cjtc-Dd/cjtc-F/cjtc-Dd-F/cjtc-P on a carrier of a serving cell in set whenever the transmission and aperiodic SRS transmission (including any interruption due to uplink or downlink RF retuning time [11, TS 38.133]) as defined by higher layer parameters *switchingTimeUL* and *switchingTimeDL* of *SRS-SwitchingTimeNR)* on the carrier of the serving cell happen to overlap in the same symbol.  < Unchanged part omitted > |

**Agreement**:

For the Rel-19 Type-I SP and Type-II codebook refinement, refine the following agreement in RAN1#121 as follows:

**Agreements**

For the Rel-19 Type-I SP and Type-II codebook refinement for *P*=48, 64, and 128 CSI-RS ports with K>1 aggregated NZP ~~aperiodic~~ CSI-RS resources for CMR, to implement the previous agreements on the mapping from CSI-RS resource index/port index per resource and port index to CSI/PMI calculation

* In TS38.211, extend the enumeration of antenna port *p=*3000+*p*’ with *p*’=0 …*P–*1
* In TS38.214, remove the term ‘port index for CSI/PMI calculation’

Consequently, based on the endorsed version of TS38.214 V19.0.0, the current description for aperiodic CSI-RS resources should also be applied to periodic and semi-persistent CSI-RS resources.

TPs in Section 3.1 and 3.2 of R1-2505335 for TS 38.214 are endorsed.

R1-2506513

**Conclusion**:

For the Rel-19 Type-I SP codebook refinement for 48, 64, and 128 CSI-RS ports, joint configuration of the Rel-18 SD NES Type-I, the Rel-19 Type-I SP codebook, and the Rel-19 soft scaling for the Rel-19 Type-I SP codebook is not supported.

**Conclusion**:

For Rel-19 Type-II codebook refinement for 48, 64, and 128 CSI-RS ports based on the Rel-18 Type-II Doppler codebook, following the legacy (Rel-18) principle, a UE shall assume that CSI-RS ports mapped to the same port index across the K aperiodic CSI-RS resources, , as described in Clause 7.4.1.5.3 of [4, TS 38.211], share the same antenna port.



**Conclusion**:

For the Rel-19 Type-II codebook refinement for 48, 64, and 128 CSI-RS ports, on CBSR, the -bit group-based bitmap is identical for all the groups



Conclusion:

For the Rel-19 CRI-based CSI refinement for up to 128 CSI-RS ports, when one NZP CSI-RS resource for interference measurement is configured, it is associated with all the KS NZP CSI-RS resources for channel measurement

**Conclusion**:

For Rel-19 SRS port grouping, whether resources across multiple resource sets can be used follows the legacy principle, i.e. for periodic and semi-persistent SRS resource sets, it is not possible to have the grouped SRS ports resources across multiple SRS resource sets; but for aperiodic SRS resource sets, the grouped SRS ports can come from multiple SRS resource sets.

### Support for 3-antenna-port codebook-based transmissions

R1-2505207 Maintenance of 3-antenna-port UL transmission Huawei, HiSilicon

R1-2505237 FL Summary Support for 3TX CB-based Uplink; First Round Moderator (InterDigital, Inc.)

R1-2505256 Uplink 3 Port Codebook based Transmission Google

R1-2505269 Maintenance on 3-antenna-port codebook-based transmissions ZTE Corporation, Sanechips

R1-2505322 Maintenance on 3-antenna-port uplink transmission CATT

R1-2505372 Maintenance on 3-antenna-port codebook-based uplink transmissions vivo

R1-2505422 Maintenance for 3 Tx UL transmissions Ericsson Japan K.K.

R1-2505429 Maintenance on the support of 3-antenna-port CB based transmissions Xiaomi

R1-2505536 Remaining issues on Rel-19 3-antenna-port codebook-based transmissions Samsung

R1-2505737 Discussion on 3-antenna-port uplink transmissions OPPO

R1-2505938 Remaining issues of CSI enhancements NEC

**R1-2505237**

**Agreement:**

The TPs in Proposal 1 in Section 4.1 of R1-2505237 for TS38.214 are endorsed.

**Agreement:**

The TP in Proposal 2 in Section 4.1 of R1-2505237 for TS38.214 is endorsed.

**Agreement:**

The TP in Proposal 4 in Section 4.1 of R1-2505237 for TS38.214 is endorsed.

**Agreement:**

Adopt the following TP for TS 38.214 section 6.2.1.2.

**Reason for change:** Reflect the agreement in UE feature.

**Summary of change:** Include the cases of 3T3R and 3T6R antenna switching.

**Consequence if not changed:** The ~~AS feature~~ 3T3R and 3T6R antenna switching feature will not be supported.

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| 6.2.1.2 UE sounding procedure for DL CSI acquisition **-------------------------------------------Unchanged parts are omitted------------------------------------------**  When the UE is configured with the higher layer parameter *usage* in *SRS-ResourceSet* set as 'antennaSwitching', the UE may be configured with only one of the following configurations depending on the indicated UE capability *supportedSRS-TxPortSwitch* ('t1r2' for 1T2R, 't1r1-t1r2' for 1T=1R/1T2R, 't2r4' for 2T4R, 't1r4' for 1T4R, 't1r1-t1r2-t1r4' for 1T=1R/1T2R/1T4R, 't1r4-t2r4' for 1T4R/2T4R, 't1r1-t1r2-t2r2-t2r4' for 1T=1R/1T2R/2T=2R/2T4R, 't1r1-t1r2-t2r2-t1r4-t2r4' for 1T=1R/1T2R/2T=2R/1T4R/2T4R, 't1r1' for 1T=1R, 't2r2' for 2T=2R, 't1r1-t2r2' for 1T=1R/2T=2R, 't4r4' for 4T=4R, or 't1r1-t2r2-t4r4' for 1T=1R/2T=2R/4T=4R or the UE may be configured with only one of the following configurations depending on the indicated UE capability *supportedSRS-TxPortSwitchBeyond4Rx* ('t1r1' for 1T=1R, 't2r2' for 2T=2R, 't1r2' for 1T2R, 't4r4' for 4T=4R, 't2r4' for 2T4R, 't1r4' for 1T4R, 't2r6' for 2T6R, 't1r6' for 1T6R, 't4r8' for 4T8R, 't2r8' for 2T8R, 't1r8' for 1T8R, or the UE may be configured with the following configurations depending on the indicated UE capability *srs-AntennaSwitching8T8R* ('t1r1' for 1T=1R, 't2r2' for 2T=2R, 't1r2' for 1T2R, 't4r4' for 4T=4R, 't2r4' for 2T4R, 't1r4' for 1T4R, 't2r6' for 2T6R, 't1r6' for 1T6R, 't4r8' for 4T8R, 't2r8' for 2T8R, 't1r8' for 1T8R, 'noTdm' or 'tdmAndNoTdm' for 8T8R) or the UE may be configured with ‘t3r3’ for 3T=3R depending on the indicated UE capability [FG 59-3-3a: *srs-AntennaSwitching3T3R]* orthe UE may be configured with ‘t3r6’ for 3T6R depending on the indicated UE capability [FG 59-3-3: *srs-AntennaSwitching3T6R]*:  **-------------------------------------------Unchanged parts are omitted------------------------------------------** |

R1-2506516

***Agreement:***

*Adopt the following TP for TS 38.214 section 6.2.3.1.*

***Reason for change:*** *Correct the PTRS-DMRS association as DCI format 0\_3 is not supported for a 3TX UE*

***Summary of change:*** *Include a new text without referencing PUSCH port 1003 that is not supported.*

***Consequence if not changed:*** *Incomplete/incorrect specification of PTRS-DMRS association.*

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| 6.2.3.1 UE PT-RS transmission procedure when transform precoding is not enabled **--------------------------------------Unchanged parts are omitted--------------------------------------**  For partial-coherent and non-coherent codebook-based UL transmission with 2 or 4 antenna ports, or non-coherent codebook-based UL Transmission with 3 antenna ports, or when the higher layer parameter *CodebookTypeUL* is set to ‘codebook2’, ‘codebook3’, or ‘codebook4’ with 8 antenna ports, the actual number of UL PT-RS port(s) is determined based on TPMI(s) and/or number of layers which are indicated by '*Precoding information and number of layers'* field(s) in DCI format 0\_1, 0\_2 or 0\_3 or configured by higher layer parameter *precodingAndNumberOfLayers*:   * if the UE is configured with the higher layer parameter maxNrofPorts in PTRS-UplinkConfig set to 'n2', the actual UL PT-RS port(s) and the associated transmission layer(s) are derived from indicated TPMI(s) as: * for PUSCH transmission with 2, 3 or 4 ports, PUSCH antenna port 1000 and 1002 in indicated TPMI(s) share PT-RS port 0, and PUSCH antenna port 1001 and 1003 in indicated TPMI(s) share PT-RS port 1.   + UL PT-RS port 0 is associated with the UL layer 'x' of layers which are transmitted with PUSCH antenna port 1000 and PUSCH antenna port 1002 in indicated TPMI(s), and UL PT-RS port 1 is associated with the UL layer 'y' of layers which are transmitted with PUSCH antenna port 1001 and PUSCH antenna port 1003 in indicated TPMI(s), where 'x' and/or 'y' are given by DCI parameter 'PTRS-DMRS association' as shown in DCI format 0\_1, 0\_2 or 0\_3 described in Clause 7.3.1 of [5, TS 38.212].   **--------------------------------------Unchanged parts are omitted--------------------------------------** |

### Enhancement for asymmetric DL sTRP/UL mTRP scenarios

R1-2505208 Maintenance of asymmetric DL sTRP/UL mTRP scenarios Huawei, HiSilicon

R1-2505270 Maintenance on enhancements for asymmetric DL sTRP/UL mTRP scenarios ZTE Corporation, Sanechips, China Telecom

R1-2505323 Maintenance on asymmetric DL sTRP and UL mTRP scenarios CATT

Withdrawn

R1-2505373 Maintenance on asymmetric DL sTRP/UL mTRP scenarios vivo

R1-2505430 Maintenance on enhancement for asymmetric DL sTRP/UL mTRP scenarios Xiaomi

R1-2505537 Remaining issues on Rel-19 asymmetric DL sTRP/UL mTRP scenarios Samsung

R1-2505659 Maintenance of MIMO asymmetric DL sTRP/UL mTRP scenario Ofinno

R1-2505738 Enhancements on asymmetric DL sTRP/UL mTRP scenarios OPPO

R1-2505810 Maintenance on the enhancement for asymmetric DL sTRP/UL mTRP scenarios Lenovo

R1-2505824 Remaining issues on asymmetric DL sTRP UL mTRP scenarios Ericsson

R1-2505939 Remaining issues on enhancement for asymmetric DL sTRP and UL mTRP scenarios NEC

R1-2506162 Maintenance of Enhancement for asymmetric DL sTRP/UL mTRP scenarios Nokia

R1-2506177 Maintenance for asymmetric DL sTRP and UL mTRP deployment scenarios Qualcomm Incorporated

R1-2506349 Maintenance on enhancement for asymmetric DL sTRP and UL mTRP scenarios Google

**R1-2506397**

Agreement:

The TP in Proposal 1.6 in Section 3 of R1-2506397 for TS 38.213 is endorsed.

Agreement:

The TP in Proposal 2.3 in Section 3 of R1-2506397 for TS 38.212 is endorsed.

Agreement:

The TP in Proposal 2.1 in Section 3 of R1-2506397 for TS 38.213 is endorsed.

Agreement:

The TP in Proposal 4 in Section 3 of R1-2506397 for TS 38.213 is endorsed.