**3GPP TSG RAN WG1 #103-e R1-200xxxx**

**e-Meeting, October 26th – November 13th, 2020**

**Agenda item:** 7.2.6

**Source:** Moderator (vivo)

**Title:** [103-e-NR-eMIMO-04] Maintenance and TPs for UL Full-Power

**Document for:** Discussion and Decision

Issue1: Draft CR UL.2

|  |
| --- |
| Following TP can be starting point.  **Text proposal for 38.214 v16.3.0**  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, the actual number of UL PT-RS port(s) is determined based on TPMI and/or number of layers which are indicated by *Precoding information and number of layers* field in DCI format 0\_1 and DCI format 0\_2 or configured by higher layer parameter *precodingAndNnumberOfLayers*:  - 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 as:  - PUSCH antenna port 1000 and 1002 in indicated TPMI share PT-RS port 0, and PUSCH antenna port 1001 and 1003 in indicated TPMI share PT-RS port 1 except for the cases that *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated.  - 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, 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, where 'x' and/or 'y' are given by DCI parameter *PTRS-DMRS association* as shown in DCI format 0\_1 and DCI format 0\_2 described in Clause 7.3.1 of [5, TS38.212].  - For the cases that *ul-FullPowerTransmission* is configured to *fullpowerMode1*, and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated, PUSCH antenna port 1000, 1001, 1002 and 1003 in the indicated TPMI share PT-RS port 0.  < Unchanged parts are omitted > |

Draft CR UL.2, option 2 (R1-2007819)

|  |
| --- |
| For partial-coherent and non-coherent codebook-based UL transmission, the actual number of UL PT-RS port(s) is determined based on TPMI and/or number of layers which are indicated by *Precoding information and number of layers* field in DCI format 0\_1 and DCI format 0\_2 or configured by higher layer parameter *precodingAndNnumberOfLayers*:  - 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 as:  - PUSCH antenna port 1000 and 1002 in indicated TPMI share PT-RS port 0, and PUSCH antenna port 1001 and 1003 in indicated TPMI share PT-RS port 1 except for the cases that *ul-FullPowerTransmission-r16* is set to '*fullpowerMode1*', and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated.  - 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, 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, where 'x' and/or 'y' are given by DCI parameter *PTRS-DMRS association* as shown in DCI format 0\_1 and DCI format 0\_2 described in Clause 7.3.1 of [5, TS38.212].  - For the cases that *ul-FullPowerTransmission-r16* is set to '*fullpowerMode1*', and TPMI=2 in Table 6.3.1.5-1, or one of the TPMI 12-15 in Table 6.3.1.5-2 and Table 6.3.1.5-3 in [4, TS 38.211] is indicated, the actual number of UL PT-RS port is 1, where UL PT-RS port 0 is associated with the layer of the UL transmission. |

|  |  |
| --- | --- |
| Company | comments |
| CATT | Support to resolve this issue, with option 2 (c.f. R1-2007819) added above.  In our view there are two issues to be resolved:   1. The number of PTRS ports is 1, when rank-1 full-coherent transmission is scheduled. 2. PTRS port 0 is associated with the scheduled UL layer. Our understanding is that 38.214 intends to specify the “*association between PTRS and transmission layer*”, as the 1st paragraph in the current specification reads. Similarly in the 2nd paragraph (current specification) what is specified is the association between “UL PTRS port 0 to UL layer”. Hence specifying PTRS/layer association is consistent with the current specification. |
| Huawei, HiSilicon | Supportive on the proposal.  The issue of mismatch between full power Mode-1 and 2-Port PTRS need to be addressed. In current spec, the mapping between PTRS ports and DMRS ports are one-to-one in FDM manner, where the RE mapping of PTRS ports is shown in 6.4.1.2.2.1 in TS 38.211. There is no such case that 2-port PTRS mapping to the one DMRS port in current spec. For the full coherent precoding , only 1 port PTRS can be used, shown in 38.214:  *“If a UE has reported the capability of supporting full-coherent UL transmission, the UE shall expect the number of UL PT-RS ports to be configured as one if UL-PTRS is configured.”*  So, it is ambiguity for supporting two-PTRS ports for the new introduced precoding in Mode-1 full power transmission. |

Issue2: Draft LS UL.4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Proposed text for draft LS to RAN2.  In RAN1#102-e, the FG 16-5c-3 was agreed with “Candidate component values: any of {2-port {2-bit bitmap}, one of 4-port non-coherent {G0~G3}, one of 4-port partial-coherent {G0~G6}}” which was included in the UE features list in R1-2007326.  In RAN1#98, following agreement was made  **Agreement**  For mode 2, in case of non-coherent with 2 ports, support following TPMI indication for rank 1 which support UL full power transmission:   * Rank 1: support {TPMI=0} and {TPMI=1} * FFS: Details on UE capability signalling   In RAN1#99, following agreements were made  **Agreement**  For 2 ports, number of bits to indicate TPMI(s) which can deliver UL full power:   * 2 bits (bitmap) * Whether is this capability reporting is optional or not will be discussed as part of UE capability discussions   **Agreement**  For 4 ports, number of bits to indicate TPMI(s) which can deliver UL full power:   * + Non Coherent 2 bits   + Partial coherent 4 bits     - Additional entries on top of existing entries may be added to table 1 and table 2   + Whether is this capability reporting is optional or not will be discussed as part of UE capability discussions   Table 1.   |  |  | | --- | --- | | 4Tx, nonCoherent | 4Tx, partial coherent (4bit) | | G0 | G0 | | G1 | G1 | | G2 | G2 | | G3 | G3 | |  | G4 | |  | G5 | |  | G6 | |  |  |   Definition of G0~G6 can be found in the table below.  Table 2.   |  |  | | --- | --- | |  | TPMI groups | | G0 | , | | G1 | , , , | | G2 | , , , , | | G3 | , ,, | | G4 | , , | | G5 | , ,, ,, | | G6 | , ,,, ,  , , ,, |   RAN1 concluded that the definition of G0~G6 TPMI groups should be captured in 38.306.  Action to RAN2:  RAN1 respectfully ask RAN2 to take above into account. |

|  |  |
| --- | --- |
| Company | comments |
| CATT | OK with the LS |
| Huawei, HiSilicon | OK |

Issue3: Draft CR in R1-2008676

|  |  |
| --- | --- |
| Company | comments |
| CATT | OK |
| Huawei, HiSilicon | OK |

# References

[1] R1-2008140, “Summary for Rel.16 NR eMIMO maintenance”, RAN1#103-e