**3GPP TSG RAN WG1 #118 R1-240xxxx**

**Maastricht, NL, August 19th – 23rd, 2024**

**Source: Moderator (NTT DOCOMO)**

**Title: FL summary on Rel-18 MIMO DMRS**

**Agenda item: 8.1**

**Document for: Discussion and Decision**

# Introduction

This document contains summary of proposals for DMRS.

* **Critical (C)**: this includes high-priority issue (essential, pending issues, broken spec components) or editorial change that either enhances the clarity of the specs or corrects mistakes in the specs.
* **Non-essential (N)**: this includes all other purposes such as spec optimization and low-priority issues.
* **Editorial (E)**: this includes editorial issues that will be handled as editorial CRs.

# Discussion

The following is the summary of issues. Draft CRs with assessment = C/E will be discussed in online.

If you have any comments, please input in “Companies’ view” for each issue.

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| # | Issue | Assessment | Companies’ view (please provide your view on the assessment of each issue) |
| 1 | The port indexes for PDSCH DMRS type 2 are not correctly captured (R1-2406550).FL: The issue is valid. | E | Editorial (E): NEC, Docomo, Samsung, OPPO, vivo, Lenovo, ZTE, Xiaomi, FujitsuNon-essential (N): |
| 2 | Correct RRC parameters and UE capability name.(R1-2406804). FL: Since the tdoc includes many TPs, TPs related to DMRS are extracted in Section 3. (See Section 3)FL: The issue is valid. | E | Editorial (E): Ericsson, Docomo, Samsung, OPPO, vivo, Lenovo, ZTE,Xiaomi, FujitsuNon-essential (N): |
| 3 | PTRS-DMRS association for 8Tx is specified in 7.3.1.1.2 in TS38.212 using *maxRank*. However, the case using *maxMIMO-Layers* is missing (R1-2407178).FL: The issue is valid. | C | Critical (C): Ericsson, Docomo, Samsung, OPPO, vivo, Lenovo, ZTE (Editorial), Fujitsu (Editorial)Non-essential (N): |
| 4 | In the agreed CR (R1-2405746) in RAN1#117, “and non-codebook based” was inadvertently deleted from Table 6.2.3.1-3A in TS38.214 (R1-2407181).FL: The issue is valid. | C | Critical (C): Ericsson, Docomo, Samsung, OPPO(Editorial), vivo, Lenovo, ZTE (Editorial), Fujitsu (Editorial)Non-essential (N): |

# Text proposals for issue#2 (R1-2406804)

**TPs in R1-2406804 related to DMRS agreements are extracted below.**

**Proposal: Adopt the following TPs for alignment CR of TS 38.214.**

* Reason for change: TS 38.214 introduced brackets around various open parameter and capability names. These parameter names have now been set.
* Summary of change: Removes brackets and corrects parameter and capability names.
* Consequences if not approved: Unclear spec

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| 5.3 UE PDSCH processing procedure timeIf the first uplink symbol of the PUCCH which carries the HARQ-ACK information, as defined by the assigned HARQ-ACK timing *K1* and Koffset, if configured, and the PUCCH resource to be used and including the effect of the timing advance, starts no earlier than at symbol *L1*, where *L1* is defined as the next uplink symbol with its CP starting after $T\_{proc,1}=(N\_{1}+d\_{1,1}+d\_{2}+d\_{3})(2048+144)⋅κ2^{-μ}⋅T\_{C}+T\_{ext}$ after the end of the last symbol of the PDSCH carrying the TB being acknowledged, then the UE shall provide a valid HARQ-ACK message. For a PDSCH with disabled HARQ-ACK feedback,$ T\_{proc,1}=(N\_{1}+d\_{1,1}+d\_{2})(2048+144)⋅κ2^{-μ}⋅T\_{C}+T\_{ext}$.*- N1* is based on *µ* of table 5.3-1 and table 5.3-2 for UE processing capability 1 and 2 respectively, where *µ* corresponds to the one of (*µPDCCH*, *µPDSCH*, *µUL*) resulting with the largest *Tproc,1*, where the *µPDCCH* corresponds to the subcarrier spacing of the PDCCH scheduling the PDSCH, the *µPDSCH* corresponds to the subcarrier spacing of the scheduled PDSCH, and *µUL* corresponds to the subcarrier spacing of the uplink channel with which the HARQ-ACK is assumed to be transmitted for PDSCH with or without disabled HARQ-ACK feedback, and κ is defined in clause 4.1 of [4, TS 38.211]. *-* For UE processing capability 2,*-* if the UE is not indicating *simulDMRS-PDSCH*, the UE is not expected to be simultaneously configured with higher layer parameter *processingType2Enabled* set to 'enable' and higher layer parameter *dmrs-TypeEnh*, and the additional processing delay *d3* is 0.- if the UE is indicating *simulDMRS-PDSCH*, *-* if the UE is configured with higher layer parameter *dmrs-TypeEnh,* the additional processing delay *d3* is indicated by *simulDMRS-PDSCH*, *-* otherwise *d3* =0. |

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| 6.1.3 UE procedure for applying transform precoding on PUSCHFor a PUSCH scheduled by RAR UL grant, or for a PUSCH scheduled by fallbackRAR UL grant, or for a PUSCH scheduled by DCI format 0\_0 with CRC scrambled by TC-RNTI, the UE shall consider the transform precoding either 'enabled' or 'disabled' according to the higher layer configured parameter *msg3-transformPrecoder.*For a MsgA PUSCH, the UE shall consider the transform precoding either 'enabled' or 'disabled' according to the higher layer configured parameter *msgA-TransformPrecoder.* If higher layer parameter *msgA-TransformPrecoder* is not configured, the UE shall consider the transform precoding either 'enabled' or 'disabled' according to the higher layer configured parameter *msg3-transformPrecoder.*For PUSCH transmission scheduled by a PDCCH with CRC scrambled by CS-RNTI with NDI=1, C-RNTI, or MCS-C-RNTI or SP-CSI-RNTI:- If the DCI with the scheduling grant was received with DCI format 0\_0, the UE shall, for this PUSCH transmission, consider the transform precoding either enabled or disabled according to the higher layer configured parameter *msg3-transformPrecoder*. - If the DCI with the scheduling grant was not received with DCI format 0\_0 - If the DCI with the scheduling grant was received with DCI format 0\_1 or 0\_2 with CRC scrambled by C-RNTI, MCS-RNTI, or CS-RNTI with NDI=1 and if the UE is configured with a higher layer parameter *dynamicTransformPrecoderFieldPresenceDCI-0-1* in *pusch-Config* for DCI format 0\_1 or *dynamicTransformPrecoderFieldPresenceDCI-0-2* in *pusch-Config* for DCI format 0\_2 and the higher layer parameter is set to 'enabled', - the UE shall, for this PUSCH transmission, consider the transform precoding either enabled or disabled according to the Transform precoder indicator field in the DCI with the scheduling grant.- For *pusch-TimeDomainAllocationListForMultiPUSCH* in *pusch-Config,* the UE shall, for all PUSCH transmissions, consider the transform precoding either enabled or disabled according to Transform precoder indicator field in the DCI format 0\_1 with the scheduling grant.- If r*esourceAllocation* in *pusch-Config* for DCI format 0\_1 or *resourceAllocationDCI-0-2* in *pusch-Config* for DCI format 0\_2 is set to *resourceAllocationType0*, or if the resource allocation is set to resource allocation type 0 according to the DCI configuration as described in clauses 7.3.1.1.2 and 7.3.1.1.3 of [6, TS 38.212], or if *dmrs-Type* in *DMRS-UplinkConfig* is set to ‘type 2’ for this PUSCH transmission, the UE does not expect that the Transform precoder indicator field in the DCI with the scheduling grant indicates that transform precoding is enabled.- If the UE is configured with the higher layer parameter *dmrs-TypeEnh* in *DMRS-UplinkConfig*, and if the scheduling grant indicates that transform precoding is enabled for the scheduled PUSCH transmission, the UE ignores the higher layer parameters *dmrs-TypeEnh* in *DMRS-UplinkConfig*, if configured, for the DM-RS transmission of the scheduled PUSCH transmission.- Otherwise,- If the UE is configured with the higher layer parameter *transformPrecoder* in *pusch-Config*, the UE shall, for this PUSCH transmission, consider the transform precoding either enabled or disabled according to this parameter.- If the UE is not configured with the higher layer parameter *transformPrecoder* in *pusch-Config*, the UE shall, for this PUSCH transmission, consider the transform precoding either enabled or disabled according to the higher layer configured parameter *msg3-transformPrecoder*.<Unchanged text omitted> |

# Conclusion

# References

Following draft CRs are proposed for DMRS in AI8.1 (NR\_MIMO\_evo\_DL\_UL-Core).

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| [1] | R1-2406550 | Draft CR on DMRS port index in TS38.211 | NEC |
| [2] | R1-2406804 | Draft CR for 38.214 on editorial corrections | Ericsson |
| [3] | R1-2407178 | Draft CR on PTRS-DMRS Association for 8 Tx UL MIMO | Ericsson |
| [4] | R1-2407181 | Draft CR on PT-RS Power for Non-Codebook Based 8 Tx PUSCH | Ericsson |