**3GPP TSG-RAN WG1 Meeting #118bisR1-2409292**

Hefei, China, October 14th – 18th, 2024

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| *CR-Form-v12.2* |
| **DRAFT CHANGE REQUEST** |
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|  | **2** | **CR** |  | **rev** |  | **Current version:** | **18.4.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Draft CR on PTRS-DMRS Association |
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| ***Source to WG:*** | Ericsson |
| ***Source to TSG:*** |  |
|  |  |
| ***Work item code:*** | NR\_newRAT-Core |  | ***Date:*** | 2024-10-18 |
|  |  |  |  |  |
| ***Category:*** |  |  | ***Release:*** | Rel-18 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)Rel-19 (Release 19)* |
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| ***Reason for change:*** | The maximum number of PUSCH layers can be limited by maxMIMO-Layers for non-codebook based operation. PTRS-DMRS port assocation only reflects layer constraints from maxRank for some cases in the current specification, which means that PTRS-DMRS assocation is incorrect for non-codebook based when maxMIMO-Layers is configured. Similarly, maxMIMO-LayersDCI-0-2 is not taken into account for DCI 0\_2, and so the association procedure is incorrect for both DCI 0\_2 and 0\_1. Finally, the parameters that constrain the maximum number of layers in STxMP operation, maxMIMO-LayersforSFN and maxMIMO-LayersforSDM, (and their counterparts for DCI 0\_2) were not taken into account. |
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| ***Summary of change:*** | Include maxMIMO-Layers, maxMIMO-LayersDCI-0-2, maxMIMO-LayersforSFN, maxMIMO-LayersforSFN- DCI-0-2, and maxMIMO-LayersforSDM, and maxMIMO-LayersforSDM-DCI-0-2 in PTRS-DMRS association determination procedure. |
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| ***Consequences if not approved:*** | PTRS-DMRS association is incorrect for non-codebook based operation when the maximum number of PUSCH layers is constrained by maxMIMO-Layers or maxMIMO-LayersDCI-0-2 or the related parameters for STxMP with non-codebook based operation. |
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| ***Clauses affected:*** | 7.3.1.1.2, 7.3.1.1.3 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **N** |  Other core specifications  |  |
| ***affected:*** |  | **N** |  Test specifications |  |
| ***(show related CRs)*** |  | **N** |  O&M Specifications |  |
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| ***Other comments:*** | Note: This CR is related to the RAN1#118bis CR on “Draft CR on PTRS-DMRS Association” (R1-2408961) implements the corresponding changes for DCI 0\_1 and 0\_2 with respect to maxMIMO-Layers and maxMIMO-LayersDCI-0-2. Additional changes for DCI 0\_2 that align with those agreed for DCI 0\_1 in RAN1#118 CR on “PTRS-DMRS Association for 8 Tx UL MIMO” (R1-2407457) are made with respect to maxMIMO-LayersDCI-0-2.Isolated impact analysis:This CR has isolated impact and would only affect where the UE is configured for non-codebook based PUSCH transmission and maxMIMO-Layers or maxMIMO-LayersDCI-0-2 or the related parameters for STxMP with non-codebook based operation. |
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| ***This CR's revision history:*** |  |

7.3.1.1.2 Format 0\_1

DCI format 0\_1 is used for the scheduling of one or multiple PUSCH in one cell, or indicating CG downlink feedback information (CG-DFI) to a UE.

The following information is transmitted by means of the DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:

- Identifier for DCI formats - 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

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PTRS-DMRS association - number of bits determined as follows

- 0 bit if *PTRS-UplinkConfi*g is not configured in either *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* and transform precoder is disabled, or if transform precoder is enabled, or if *maxRank=1* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or if *maxMIMO-Layers*=1 and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or if *maxRank=1* and *maxRankSfn=1*, or if *maxMIMO-Layers*=1 and *maxMIMO-LayersforSFN*=1, or if *maxRank=1* and *maxRankSdm=1* when two PTRS ports are configured by *maxNrofPortsforSdm,* or if *maxMIMO-Layers*=1 and *maxMIMO-LayersforSDM*=1 when two PTRS ports are configured by *maxNrofPortsforSdm*;

- 2 or 4 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A/7.3.1.1.2-25B/7.3.1.1.2-26/7.3.1.1.2-26A are used to indicate the association between PTRS port(s) and DMRS port(s), and the DMRS ports are indicated by the Antenna ports field.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, SRS resource set indicator field is absent or SRS resource set indicator field is present and equals "00" or "01", and *maxRank*<=4 or *maxMIMO-Layers*<=4, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or "11", *maxRank=*3 or 4 or *maxMIMO-Layers*=3 or 4, and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or "11", *maxRank=*2 or *maxMIMO-Layers*=2, and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, the MSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- 2 bits when two PTRS ports are configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, the MSB of this field indicates the association between PTRS port 0 and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port 1 and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- 2 bits when one PTRS port is configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, this field indicates the association between PTRS port and DMRS ports corresponding to SRS resource indicator field and Second SRS resource indicator field and/or Precoding information and number of layers field and Second Precoding information field according to Table 7.3.1.1.2-25.

- 2 bits when one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig,* SRS resource set indicator field is present and equals "10", *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Tables 7.3.1.1.2-25 and 7.3.1.1.2-26.

- 2 bits when one PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is absent, *maxRank>*4or *maxMIMO-Layers*>4, and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port and DMRS port(s) corresponding to the selected codeword according to Table 7.3.1.1.2-25B, where the selected codeword is the codeword with higher MCS for the initial PUSCH if the MCS indices of the two codewords are different for the initial PUSCH, or codeword 0 otherwise.

- 4 bits when two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is absent, *maxRank>*4or *maxMIMO-Layers*>4, and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-26A.

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the "PTRS-DMRS association" field is present for the indicated bandwidth part but not present for the active bandwidth part, the UE assumes the "PTRS-DMRS association" field is not present for the indicated bandwidth part.

When the Transform precoder indicator field is present, if the bit width of PTRS-DMRS association field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the PTRS-DMRS association field for the case with smaller bit width until the bit width of the PTRS-DMRS association field for the two cases are the same.

- Second PTRS-DMRS association - 2 bits if PTRS-DMRS association field and SRS resource set indicator field are present and *maxRank>2* or *maxMIMO-Layers*>2 and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured; 0 bit otherwise. Tables 7.3.1.1.2-25 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second precoding information field when one PT-RS port and two PT-RS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* respectively, and the DMRS ports are indicated by the Antenna ports field.

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7.3.1.1.3 Format 0\_2

DCI format 0\_2 is used for the scheduling of PUSCH in one cell.

The following information is transmitted by means of the DCI format 0\_2 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:

- Identifier for DCI formats - 1 bit

- The value of this bit field is always set to 0, indicating an UL DCI format

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- PTRS-DMRS association - number of bits determined as follows

- 0 bit if *PTRS-UplinkConfi*g is not configured in either *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* and transform precoder is disabled, or if transform precoder is enabled, or if *maxRankDCI-0-2=1* and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or *maxMIMO-LayersDCI-0-2*=1 neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, or if *maxRankDCI-0-2=1* and *maxRankSfnDCI-0-2=1*, or if *maxMIMO-Layers*=1 and *maxMIMO-LayersforSFN-DCI-0-2*=1, or if *maxRankDCI-0-2=1* and *maxRankSdmDCI-0-2=1* when two PTRS ports are configured by *maxNrofPortsforSdm,* or if *maxMIMO-LayersDCI-0-2*=1 and *maxMIMO-LayersforSDM-DCI-0-2*=1 when two PTRS ports are configured by *maxNrofPortsforSdm*;

- 2 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A/7.3.1.1.2-25B/7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s), and the DMRS ports are indicated by the Antenna ports field.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, SRS resource set indicator field is absent or SRS resource set indicator field is present and equals "00" or “01” and maxRank*DCI-0-2*<=4 or *maxMIMO-LayersDCI-0-2*<=4, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or “11”, *maxRankDCI-0-2=3 or 4* or *maxMIMO-LayersDCI-0-2*=3 or 4 and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is not configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" or "11" and *maxRankDCI-0-2=2* or *maxMIMO-LayersDCI-0-2*=2 and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured, the MSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- When two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, the MSB of this field indicates the association between PTRS port 0 and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field, and the LSB of this field indicates the association between PTRS port 1 and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second Precoding information field, according to Table 7.3.1.1.2-25A.

- When one PTRS port is configured by *maxNrofPortsforSDM* in *PTRS-UplinkConfig*, SRS resource set indicator field is present and equals "10" and *multipanelSchemeSDM* is configured, this field indicates the association between PTRS port and DMRS ports corresponding to SRS resource indicator field and Second SRS resource indicator field and/or Precoding information and number of layers field and Second Precoding information field according to Table 7.3.1.1.2-25.

- When one PTRS port or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig,* SRS resource set indicator field is present and equals "10", *multipanelSchemeSFN* is configured, this field indicates the association between PTRS port(s) and DMRS port(s) corresponding to SRS resource indicator field and/or Precoding information and number of layers field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26.

If "Bandwidth part indicator" field indicates a bandwidth part other than the active bandwidth part and the "PTRS-DMRS association" field is present for the indicated bandwidth part but not present for the active bandwidth part, the UE assumes the "PTRS-DMRS association" field is not present for the indicated bandwidth part.

When the Transform precoder indicator field is present, if the bit width of PTRS-DMRS association field for the case with transform precoder enabled is not equal to that for the case with transform precoder disabled, a number of most significant bits with value set to '0' are inserted to the PTRS-DMRS association field for the case with smaller bit width until the bit width of the PTRS-DMRS association field for the two cases are the same.

- Second PTRS-DMRS association - 2 bits if PTRS-DMRS association field and SRS resource set indicator field are present and *maxRankDCI-0-2>2* or *maxMIMO-LayersDCI-0-2*>2 and neither *multipanelSchemeSDM* nor *multipanelSchemeSFN* is configured; 0 bit otherwise. Table 7.3.1.1.2-25 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) corresponding to Second SRS resource indicator field and/or Second precoding information field when one PT-RS port and two PT-RS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* respectively, and the DMRS ports are indicated by the Antenna ports field.

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