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

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

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| *CR-Form-v12.2* | | | | | | | | |
| **DRAFT CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  | **2** | **CR** |  | **rev** |  | **Current version:** | **18.3.0** |  |
|  | | | | | | | | |
| *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 for 8 Tx UL MIMO | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Moderator (NTT DOCOMO), Ericsson | | | | | | | | | |
| ***Source to TSG:*** |  | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | NR\_MIMO\_evo\_DL\_UL-Core | | | | |  | ***Date:*** | | | 2024-08-19 |
|  |  | | | |  | |  | | |  |
| ***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 can be 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)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | * For Rel-18, PTRS-DMRS port association depends on if two codewords are transmitted, but the condition in the current specification for the second codeword being present only partially supports codebook based, and excludes non-codebook based, operation. The second codeword is present when *maxRank* or *maxMIMO-Layers* is larger than 4 for codebook based operation, and when *maxMIMO-Layers* is larger than 4 for non-codebook based operation. Both codebook and non-codebook based operation support PTRS for > 4 layers and with one or two PTRS ports. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | * Add the dependency of *maxMIMO-Layers*>4 to determine the PTRS-DMRS association for 8 Tx operation. * Include maxMIMO-Layers in PTRS-DMRS association determination procedure for 4 and less layer modes of PUSCH operation. | | | | | | | | |
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| ***Consequences if not approved:*** | | * PTRS cannot be configured to the UE for non-codebook based PUSCH with more than 4 layers, nor can it be for codebook based PUSCH when *maxMIMO-Layers* > 4 * PTRS-DMRS association is incorrect when the maximum number of PUSCH layers is constrained by *maxMIMO-Layers*<=4. | | | | | | | | |
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| ***Clauses affected:*** | | 7.3.1.1.2 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **N** | Other core specifications | | | |  | | |
| ***affected:*** | |  | **N** | Test specifications | | | |  | | |
| ***(show related CRs)*** | |  | **N** | O&M Specifications | | | |  | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***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

<Unchanged text omitted>

- 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 *multipanelScheme* is not configured, or if *maxRank=1* and *maxRankSfn=1*, or if *maxRank=1* and *maxRankSdm=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 4or *maxMIMO-Layers*=3 or 4, and *multipanelScheme* 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 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 *multipanelScheme* is not 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 *multipanelScheme* is configured to *sdmScheme*, 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 *multipanelScheme* is configured to *sdmScheme*, 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", *multipanelScheme* is configured to *sfnScheme*, 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 *multipanelScheme* is not 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 *multipanelScheme* 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 7.3.1.1.2-26A.

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.

🡨---------------------------------------------------------Unchanged Text Omitted--------------------------------------------------🡪

**Table 7.3.1.1.2-25: PTRS-DMRS association or Second PTRS-DMRS association for UL PTRS port 0**

|  |  |
| --- | --- |
| **Value** | **DMRS port** |
| 0 | 1st scheduled DMRS port |
| 1 | 2nd scheduled DMRS port |
| 2 | 3rd scheduled DMRS port |
| 3 | 4th scheduled DMRS port |

**Table 7.3.1.1.2-25A: PTRS-DMRS association for UL PTRS port 0 or for the actual UL PT-RS port if *multipanelScheme* is not configured, or PTRS-DMRS association for UL PTRS port 0 and 1 if multipanelScheme is configured to *sdmScheme* and *maxNrofPortsforSDM* is set to 2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Value of MSB** | **DMRS port** |  | **Value of LSB** | **DMRS port** |
| 0 | 1st scheduled DMRS port corresponding to SRS resource indicator field and/or Precoding information and number of layers field |  | 0 | 1st scheduled DMRS port corresponding to Second SRS resource indicator field and/or Second Precoding information field |
| 1 | 2nd scheduled DMRS port corresponding to SRS resource indicator field and/or Precoding information and number of layers field |  | 1 | 2nd scheduled DMRS port corresponding to Second SRS resource indicator field and/or Second Precoding information field |

**Table 7.3.1.1.2-25B: PTRS-DMRS association for UL PTRS port 0, *maxRank>*4or *maxMIMO-Layers>*4**

|  |  |
| --- | --- |
| **Value** | **DMRS port** |
| 0 | 1st scheduled DMRS port corresponding to the selected Codeword |
| 1 | 2nd scheduled DMRS port corresponding to the selected Codeword |
| 2 | 3rd scheduled DMRS port corresponding to the selected Codeword |
| 3 | 4th scheduled DMRS port corresponding to the selected Codeword |

**Table 7.3.1.1.2-26: PTRS-DMRS association or Second PTRS-DMRS association for UL PTRS ports 0 and 1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Value of MSB** | **DMRS port** |  | **Value of LSB** | **DMRS port** |
| 0 | 1st DMRS port which shares PTRS port 0 |  | 0 | 1st DMRS port which shares PTRS port 1 |
| 1 | 2nd DMRS port which shares PTRS port 0 |  | 1 | 2nd DMRS port which shares PTRS port 1 |

**Table 7.3.1.1.2-26A: PTRS-DMRS association for UL PTRS ports 0 and 1, *maxRank>*4or *maxMIMO-Layers>*4**

|  |  |  |  |
| --- | --- | --- | --- |
| **Value of 2 MSBs** | **DMRS port** | **Value of 2 LSBs** | **DMRS port** |
| 0 | 1st DMRS port which shares PTRS port 0 | 0 | 1st DMRS port which shares PTRS port 1 |
| 1 | 2nd DMRS port which shares PTRS port 0 | 1 | 2nd DMRS port which shares PTRS port 1 |
| 2 | 3rd DMRS port which shares PTRS port 0 | 2 | 3rd DMRS port which shares PTRS port 1 |
| 3 | 4th DMRS port which shares PTRS port 0 | 3 | 4th DMRS port which shares PTRS port 1 |

<Unchanged text omitted>