**3GPP TSG RAN WG1 #117 R1-240xxxx**

**Fukuoka, Japan, May 20th – 24th, 2024**

**Agenda item:** 7

**Source:** Moderator (Samsung)

**Title:** Summary on PTRS-DMRS association field for Rel-17 UL multi-TRP PUSCH repetition (Round 2)

**Document for:** Discussion and Decision

# Introduction

This contribution summarizes companies’ view about draft CR on PTRS-DMRS association field for Rel-17 UL multi-TRP PUSCH repetition.

## Relevant contributions

R1-2404078 Discussion on PTRS-DMRS association field for Rel-17 UL multi-TRP PUSCH repetition Samsung

R1-2404079 Draft CR on PTRS-DMRS association field for Rel-17 UL multi-TRP PUSCH repetition (Rel-17 spec) Samsung

R1-2404080 Draft CR on PTRS-DMRS association field for Rel-17 UL multi-TRP PUSCH repetition (Rel-18 spec) Samsung

# Discussion

## TP in R1-2404079

In R1-2404079, the following TP is proposed with the following reason.

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| ***Reason for change:*** | There are descriptions for PTRS-DMRS association for a case which maxRank or maxRankDCI-0-2 = 2 for DCI format 0\_1 or 0\_2, in Clause 7.3.1.1.2 and 7.3.1.1.3 in TS38.212, when multi-TRP PUSCH repetition is scheduled. The condition of an SRS resource set indicator is described as “10” and “11”, but either only “10” or “11” can be indicated, hence “10” or “11” is correct expression which also has been used in other specification (e.g., TS38.214). |
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| ***Summary of change:*** | Change “10” and “11” into “10” or “11” to clarify either of two codepoints is indicated by SRS resource set indicator. |
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| ***Consequences if not approved:*** | There is no case when SRS resource set indicator equals both “10” and “11”. |

**TP in Clause 7.3.1.1.2 and 7.3.1.1.3 in TS38.212-h80 as alignment CR**

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| 7.3.1.1.2 Format 0\_1  <omit unrelated parts>  - 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*;  - 2 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) 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. When the SRS resource set indicator field is present and *maxRank>2*, 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 the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRank=2*, 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.  <omit unrelated parts>  7.3.1.1.3 Format 0\_2  <omit unrelated parts>  - 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*;  - 2 bits otherwise, where Table 7.3.1.1.2-25/7.3.1.1.2-25A and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) 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. When the SRS resource set indicator field is present and *maxRankDCI-0-2>2*, 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 field according to Table 7.3.1.1.2-25 and 7.3.1.1.2-26. When the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=2*, 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. |

Please provide your view whether you agree on above TP or not.

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| --- | --- |
| QC | OK. |
| ZTE | Support. |
| Ericsson | Support. |
| Apple | We are okay |
| Samsung | Support |
| Moderator | All companies support the TP as alignment CR. |
| Nokia | OK |
|  |  |

## TP in R1-2404080

In TS38.212-i20 [3], the relevant part in the above TP which is in TS38.212-h80 [1] has been updated as cyan highlighted part as below, for both DCI format 0\_1 and 0\_2, by using the condition of an RRC parameter *multipanelScheme* adopted in Rel-18.

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| 7.3.1.1.2 Format 0\_1  <omit unrelated parts>  - 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, 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* 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 is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and "11", *maxRank=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.  <omit unrelated parts>  7.3.1.1.3 Format 0\_2  <omit unrelated parts>  - 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 *multipanelScheme* is not configured, or if *maxRankDCI-0-2=1* and *maxRankSfnDCI-0-2=1*, or if *maxRankDCI-0-2=1* and *maxRankSdmDCI-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, 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* 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 7.3.1.1.2-25 and 7.3.1.1.2-26.  - When one PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" and "11" and *maxRankDCI-0-2=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 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. |

However, as we can observe in the cyan highlighted part above, **it is limited with the case of one PTRS port**, which is not an intention of the legacy specification, but includes both cases of one or two PTRS ports. Considering this error and the TP above in Section 2.1 as well, in R1-2404080, the following TP is proposed with the following reason.

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| ***Reason for change:*** | There are descriptions for PTRS-DMRS association for a case which maxRank or maxRankDCI-0-2 = 2 for DCI format 0\_1 or 0\_2, in Clause 7.3.1.1.2 and 7.3.1.1.3 in TS38.212, when multi-TRP PUSCH repetition is scheduled. There are two errors in these paragraphs:  1) The condition of an SRS resource set indicator is described as “10” and “11”, but either only “10” or “11” can be indicated, hence “10” or “11” is correct expression which also has been used in other specification (e.g., TS38.214).  2) The case when one PTRS port is configured is only considered, i.e., not considered with case of two PTRS ports. |
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| ***Summary of change:*** | 1) Change “10” and “11” into “10” or “11” to clarify either of two codepoints is indicated by SRS resource set indicator.  2) Add the case with two PTRS ports. |
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| ***Consequences if not approved:*** | 1) There is no case when SRS resource set indicator equals both “10” and “11”.  2) There is no UE behavior with two PTRS ports for PTRS-DMRS association when multi-TRP PUSCH repetition is scheduled and maxRank or maxRankDCI-0-2 = 2. |

**TP in Clause 7.3.1.1.2 and 7.3.1.1.3 in TS38.212-i20**

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| 7.3.1.1.2 Format 0\_1  <omit unrelated parts>  - 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, 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* 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 or two PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11", *maxRank=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.  <omit unrelated parts>  7.3.1.1.3 Format 0\_2  <omit unrelated parts>  - 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 *multipanelScheme* is not configured, or if *maxRankDCI-0-2=1* and *maxRankSfnDCI-0-2=1*, or if *maxRankDCI-0-2=1* and *maxRankSdmDCI-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, 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* 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 7.3.1.1.2-25 and 7.3.1.1.2-26.  - When one or two PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=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 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. |

Please provide your view whether you agree on above TP or not. If not agree, please feel free to comment why.

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| QC | The 1st change from “and” to “or” is fine. For the second change, as we commented during online, when two PTRS ports are configured, the 2 bits are only applied when one actual PTRS port is determined. Therefore, to capture this more accurately, we suggest the following change:   * When one ~~or two~~ PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig* or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* and one actual PTRS port is determined, the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=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 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.   In addition, if any changes are made, they should be applied to both Rel.17 and Rel.18 spec. |
| ZTE | Support.  Regarding QC’s version, we think the case of “*when two PTRS ports are configured, the 2 bits are only applied when one actual PTRS port is determined*” has already been captured by the title of Table 7.3.1.1.2-25A as follows, which is literally the same to that in Rel-17 specs. Hence, we think it is not needed.   * TS 38.212-i20   **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**   * TS 38.212-h80   **Table 7.3.1.1.2-25A: PTRS-DMRS association for UL PTRS port 0 or for the actual UL PT-RS port** |
| Ericsson | We are fine with the ‘and to or’ change. Regarding the other change, the version from Qualcomm is much clearer to us, so we can be fine with the change suggested by Qualcomm. |
| Apple | Either the TP from QC or the original TP works in our view. |
| Samsung | Support the original TP having same view with ZTE. |
| Moderator | Thanks for the discussion. Views are divided as follows:   * Support original TP: ZTE, Samsung, Apple * Support updated TP (from QC): Ericsson, QC, Apple   QC’s version further clarifies the case of actual PT-RS port, but ZTE made a point that it is already clarified in the current specification. With that, it is enough to have the original TP provided by Samsung. |
| Nokia | Ok to clarify this with the original TP. We do not think further clarification text as in QC suggestion is needed. |
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## (ROUND 2) After online session in 5/21

In online session, all companies have same page that including the case of two PTRS ports is needed, but some companies still want to further include detailed TP with the condition of actual PTRS port. Hence, some clarification questions are prepared as below.

### Q1

**Q1. Do you agree that the following TP (proposed by QC in Section 2.2) is needed (except the part changing “and” to “or”)?**

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| * When one ~~or two~~ PTRS port is configured by *maxNrofPorts* in *PTRS-UplinkConfig* or two PTRS ports are configured by *maxNrofPorts* in *PTRS-UplinkConfig* and one actual PTRS port is determined, the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=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 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. |

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| **Company** | **Comments** |
| vivo | Not support.  We’d like to further clarify that the number of actual PTRS ports is determined by two TPMI/SRI respectively. So, it is possible that one actual PTRS port is determined for the first repetition while two actual PTRS ports are determined for the second repetition. This version is unclear for the case. |
| ZTE | Not support.  As far as I can recall, the very similar change was indeed proposed in Rel-17 maintenance phase of TS 38.212. As a result, it was common understanding that the case emphasized above is already captured by the title of Table 7.3.1.1.2-25A (see the highlighted part in Q2), hence the wording text “one or two PTRS ports” was kept instead. Besides, if go with this change, we have to extend this to each of multiple cases among different scenarios (e.g., sTRP or mTRP) and different releases (e.g., R17, R18 and R19) for context alignment, it was strongly complained and rejected by companies in Rel-17 maintenance phase. |
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### Q2

**Q2. If the answer of Q1 is “Yes”, then please share your view/interpretation on the highlighted part in the following current specification text (title of Tables) which already seems to capture the intention of the TP in Q1.**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| * TS 38.212-i20   **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 |  * TS 38.212-h80   **Table 7.3.1.1.2-25A: PTRS-DMRS association for UL PTRS port 0 or for the actual UL PT-RS port**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **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 | |

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| **Company** | **Comments** |
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### Q3

**Q3. If the answer of Q1 is “No”, do you agree on the following TP (updated by Huawei to align with current specification text)?**

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| 7.3.1.1.2 Format 0\_1  <omit unrelated parts>  - 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, 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* 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 is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11", *maxRank=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.  <omit unrelated parts>  7.3.1.1.3 Format 0\_2  <omit unrelated parts>  - 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 *multipanelScheme* is not configured, or if *maxRankDCI-0-2=1* and *maxRankSfnDCI-0-2=1*, or if *maxRankDCI-0-2=1* and *maxRankSdmDCI-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, 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* 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 7.3.1.1.2-25 and 7.3.1.1.2-26.  - When one PTRS port or two PTRS ports are is configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=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 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. |

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| **Company** | **Comments** |
| vivo | Support this version. |
| ZTE | Support this version.  One editorial change should be captured as follows:  - 2 bits when one PTRS port or two PTRS ports are ~~is~~ configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11", *maxRank=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.  …  - When one PTRS port or two PTRS ports are ~~is~~ configured by *maxNrofPorts* in *PTRS-UplinkConfig*, the SRS resource set indicator field is present and equals "10" ~~and~~or "11" and *maxRankDCI-0-2=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 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. |
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# Conclusion

TBD

# References

1. 3GPP TS 38.212 V17.8.0 (h80): "NR; Multiplexing and channel coding (Release 17)"
2. 3GPP TS 38.212 V18.2.0 (i20): "NR; Multiplexing and channel coding (Release 18)"