**3GPP TSG RAN WG1 #100bis R1-20xxxxx**

**e-Meeting, April 20th – 30th, 2020**

Title: Summary of enhanced UL configured grant transmission for URLLC

Source: Moderator (vivo)

Agenda Item: 7.2.5.6

**Document for:** **Discussion and Decision**

# **Introduction**

Based on the phase 1 discussions and suggestions, Chairman allocates following two email discussions for eCG for URLLC. In this document, [100b-e-NR-L1enh\_URLLC-eCG-01] will be the focus. **It is noted that the deadline for agreements/conclusions is 4/24, and the deadline for the corresponding TP is by 4/29**.

* [100b-e-NR-L1enh-URLLC-eCG-01] Email discussion/approval regarding DMRS and PTRS operation for dynamic PUSCH and configured grant PUSCH (section 3.1.1. 3.1.2 and 3.1.3 in [R1-2001796](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_100b%5CDocs%5CR1-2001796.zip)) till 4/24, and potential TPs for approval by 4/29 (vivo, Lihui)
* [100b-e-NR-L1enh-URLLC-eCG-02] Email discussion/approval regarding corrections as in section 3.2.1, 3.2.2 and 4.1 in [R1-2001796](file:///C%3A%5CUsers%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_100b%5CDocs%5CR1-2001796.zip) till 4/24, and potential TPs for approval by 4/29 (vivo, Lihui)

# **DMRS and PTRS operation for DG and CG PUSCH**

# **DMRS operation for Type 2 CG activated by DCI format 0\_2 in case Antenna ports field is not present in DCI format 0\_2**

In the RAN1#100 e-meeting, the third email discussion [R1-2001424, URLLC-eCG-03] was postponed since it depends on the decision made in PDCCH session. It was the common understanding during the mail discussion that the DMRS operation for Type 2 configured grant PUSCH activated by DCI format 0\_2 should be the same as that for dynamic PUSCH scheduled by DCI format 0\_2 in case the antenna ports field is not present in DCI format 0\_2.

For DG PUSCH, it was agreed that antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 of 38.212 when the antenna ports bit field is not present in DCI 0\_2 [TS 38.212]. Therefore, following proposals are made:

**Proposal 1:**

* **If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2*,**
* **the UE shall not use the parameter *cg-DMRS-Configuration* in *configuredGrantConfig* to derive the bit width of the Antenna ports field in DCI format 0\_2 with CRC scrambled by CS-RNTI with NDI= 0; the UE determines that the bit width of the Antenna ports field in the DCI format 0\_2 with CRC scrambled by CS-RNTI with NDI=0 is zero.**
* **for the PUSCH transmission corresponding to a Type 2 configured grant activated by DCI format 0\_2, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 of TS 38.212.**
* **FL suggestion: agree proposal 1.**

Any comments?

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| --- | --- |
| Company | View |
| Nokia, NSB | We are fine with the proposal.  |
| CATT |  We are fine to the proposal |
| Samsung | Fine with the proposal.  |
| Panasonic | We are fine to the proposal. |
| LG | We are fine with the proposal.  |
| QC | Agree with proposal |
| MediaTek | We are fine with the proposal.  |
| ZTE | Fine with the proposal. |
| Sharp | We are OK with the proposal. |
| vivo | Support the proposal.  |
| Huawei, HiSilicon | We support the proposal. |
| Apple | We are fine the proposal |
| OPPO | We are fine the proposal |
| Ericsson | Support the proposal |

If above proposal is agreeable, then we can discuss whether and how to capture above into spec.

* [R1-2001616, ZTE] proposed no text proposal is needed given the current text in TS 38.212 can also cover the case for Type 2 CG PUSCH.
* [R1-2001546, HW] proposed following TP for Clause 7.3.1.1.3 in TS 38.212:

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| Text proposal for Clause 7.3.1.1.3 in TS 38.212 v16.1.0--------------------------------------- Start of Text Proposal ----------------------------------------------7.3.1.1.3 Format 0\_2< Unchanged parts are omitted >If a UE is configured with both *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* and is configured with *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, the bitwidth of this field equals $max\left\{x\_{A},x\_{B}\right\}$, where $x\_{A}$ is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and $x\_{B}$ is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2*. A number of $\left|x\_{A}-x\_{B}\right| $zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of $x\_{A}$ and $x\_{B}$. If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* but configured with one or more of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2,* and DCI format 0\_2 is with CRC scrambled by C-RNTI or SP-CSI-RNTI or MSC-C-RNTI or CS-RNTI with NDI set to ‘1’, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23. If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, and DCI format 0\_2 is with CRC scrambled by CS-RNTI and with NDI set to ‘0’, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23.< Unchanged parts are omitted >--------------------------------------------- End of Text Proposal ----------------------------------------- |

[R1-2001674, vivo] proposed following TP:

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| 7.3.1.1.3 Format 0\_2<Unchanged parts are omitted>If a UE is configured with both *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* and is configured with *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, the bitwidth of this field equals $max\left\{x\_{A},x\_{B}\right\}$, where $x\_{A}$ is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and $x\_{B}$ is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2*. A number of $\left|x\_{A}-x\_{B}\right| $zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of $x\_{A}$ and $x\_{B}$. If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* but configured with one or more of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2,* antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23.If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* but configured with *cg-DMRS-Configuration* in *configuredGrantConfig*, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 for PUSCH transmission scheduled by DCI format 0\_2 with CRC scrambled by CS-RNTI with NDI=0.<Unchanged parts are omitted>A UE does not expect that the bit width of a field in DCI format 0\_2 with CRC scrambled by CS-RNTI is larger than corresponding bit width of same field in DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell. If the bit width of a field in the DCI format 0\_2 with CRC scrambled by CS-RNTI is not equal to that of the corresponding field in the DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell, a number of most significant bits with value set to '0' are inserted to the field in DCI format 0\_2 with CRC scrambled by CS-RNTI until the bit width equals that of the corresponding field in the DCI format 0\_2 with CRC scrambled by C-RNTI for the same serving cell. If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, the UE determines that the bit width of the Antenna ports field in the DCI format 0\_2 with CRC scrambled by CS-RNTI is zero.<Unchanged parts are omitted> |

Any comments or preference for above TPs?

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| Company | View |
| Nokia, NSB | Slight preference for the HW version – as it is more precise in the applicability. comments on the vivo TP: - cg-DM-RS config is a mandatory parameter for CG – so no need to say if configured. So we prefer the HW version in this respect as it is more precise for which NDI we do what- the second addition (at the end) is not needed, as already stated in the field description that the size is 0 if *AntennaPorts-FieldPresence-ForDCIFormat0\_2* is not configured. So no need to repeat this here.  |
| CATT | Above proposed TP is unnecessary because current spec already has corresponding description as below in 7.3.1.1.3 in 38.213 g10.“If a UE is not configured with higher layer parameter AntennaPorts-FieldPresence-ForDCIFormat0\_2 but configured with one or more of dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2 and dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23.” |
| Samsung | We slightly prefer ZTE’s comments. It is not necessary to capture duplicated sentence in 214 since 212 already provided same sentence with following. 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:[omitted part is not changed]If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* but configured with one or more of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2,* antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23. |
| LG | We prefer second TP with some modifications. In 7.3.1.1.3, antenna port field already has the sentence, “0 bit if higher layer parameter AntennaPorts-FieldPresence-ForDCIFormat0\_2 is not configured;”. Therefore, latter part of change is not necessary. And it would be better to specify RNTI and NDI on the first part of second TP, like first TP.  |
| QC  | TP is not needed since current specification already captures the case, as CATT mentioned. |
| MediaTek | It seems the TP is not needed as CATT highlighted.  |
| ZTE | No text proposal is needed given the current text in TS 38.212 can also cover the case for Type 2 CG PUSCH. |
| Sharp | We share the same views with CATT and ZTE. No text proposal is needed. |
| vivo | We are fine not to capture above TP if everyone think it is already clear from current spec.  |
| Huawei, HiSilicon | We think a TP is needed and we support the first TP. To our understanding, Proposal 1 covers following two cases for Type 2 CG:* **Case 1:** UE is not configured with *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, but configured with one or more of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2.*
* **Case 2:** UE is not configured with *AntennaPorts-FieldPresence-ForDCIFormat0\_2*, and also not configured with *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* or *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2.*

However, the following description in current spec only covers Case 1. Therefore, TP is needed to also cover Case 2 for Type 2 CG.

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| If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* but configured with one or more of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2,* antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23. |

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| OPPO | The same opinion as CATT, TP is not needed. |
| Ericsson | To address Huawei’s concern over Case 2, the following TP is simpler:“If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2* ~~but configured with one or more of~~ *~~dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2~~* ~~and~~ *~~dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2~~,* antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23.” |

# **Correction to DMRS transmission procedure for PUSCH scheduled by DCI format 0\_2**

[Nokia, R1-2001698, R1-2001694] proposed to adopt the following text proposal for PUSCH DMRS transmission with DCI format 0\_2 to Sec. 6.1.4.2 and 6.2.2 of TS 38.214, because:

* If *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat1\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat1\_2* are not configured, the DMRS transmission procedure for PUSCH scheduled by DCI format 0\_2 follows the fallback DCI operation (i.e. DCI format 0\_0)
* Otherwise (i.e. if configured), the procedures of PUSCH scheduled by DCI format 0\_1 apply also for PUSCH scheduled by DCI format 0\_2 by using the separately configured DMRS parameters.

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| **TP to TS 38.214, Sec. 6.1.4.2 & 6.2.2: UE DM-RS transmission procedure description for DCI format 0\_2** 6.1.4.2 Transport block size determinationFor a PUSCH scheduled by RAR UL grant or for a PUSCH scheduled by fallbackRAR UL grant orfor a PUSCH scheduled by a DCI format 0\_0 with CRC scrambled by C-RNTI, MCS-C-RNTI, TC-RNTI, CS-RNTI, or for a PUSCH scheduled by a DCI format 0\_1 or DCI format 0\_2 with CRC scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI, SP-CSI-RNTI, or for a PUSCH transmission with configured grant, orfor a MsgA PUSCH transmission,if- and transform precoding is disabled and Table 5.1.3.1-2 is used, or-  and transform precoding is disabled and a table other than Table 5.1.3.1-2 is used, or -  and transform precoding is enabled, the UE shall first determine the TBS as specified below:The UE shall first determine the number of REs (*NRE*) within the slot: - A UE first determines the number of REs allocated for PUSCH within a PRB  by - , where is the number of subcarriers in the frequency domain in a physical resource block,  $N\_{symb}^{slot}$is the number of symbols *L* of the PUSCH allocation according to Clause 6.1.2.1 for scheduled PUSCH of Clause 6.1.2.3 for configured PUSCH,  is the number of REs for DM-RS per PRB in the allocated duration including the overhead of the DM-RS CDM groups without data, as described for PUSCH with a configured grant in Clause 6.1.2.3 or as indicated by DCI format 0\_1 or DCI format 0\_2 or as described for DCI format 0\_0 and DCI format 0\_2 in Clause 6.2.2, and  is the overhead configured by higher layer parameter *xOverhead* in*PUSCH-ServingCellConfig*. If the  is not configured (a value from 6, 12, or 18), the  is assumed to be 0. For Msg3 transmission the  is always set to 0.**<**Unchanged text is omitted>**6.2.2 UE DM-RS transmission procedure**If both higher layer parameter *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and higher layer parameter *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* are notconfigured, the DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_0 described in this clause equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2; Otherwise, the DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this clause equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* instead of *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*.When transmitted PUSCH is neither scheduled by DCI format 0\_1 with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure,~~.~~ the UE shall use single symbol front-loaded DM-RS of configuration type 1 on DM-RS port 0 and the remaining REs not used for DM-RS in the symbols are not used for any PUSCH transmission except for PUSCH with allocation duration of 2 or less OFDM symbols with transform precoding disabled, additional DM-RS can be transmitted according to the scheduling type and the PUSCH duration as specified in Table 6.4.1.1.3-3 of [4, TS38.211] for frequency hopping disabled and as specified in Table 6.4.1.1.3-6 of [4, TS38.211] for frequency hopping enabled, and If frequency hopping is disabled:- The UE shall assume *dmrs-AdditionalPosition* equals to 'pos2' and up to two additional DM-RS can be transmitted according to PUSCH duration, orIf frequency hopping is enabled:- The UE shall assume *dmrs-AdditionalPosition* equals to 'pos1' and up to one additional DM-RS can be transmitted according to PUSCH duration.**<Unchanged text is omitted>** |

[CATT, R1-2002087, R1-2002082] proposed a similar TP for TS 38.214 as shown below:

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| -------------------------------------------------- Start of text proposal ------------------------------------------------------**6.2.2 UE DM-RS transmission procedure**The DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this section equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCI-Format0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCI-Format0\_2* instead of *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*.When transmitted PUSCH is ~~neither~~ scheduled by DCI format 0\_~~1~~ 0 ~~with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure~~or by RAR UL grant~~.~~ , the UE shall use single symbol front-loaded DM-RS of configuration type 1 on DM-RS port 0 and the remaining REs not used for DM-RS in the symbols are not used for any PUSCH transmission except for PUSCH with allocation duration of 2 or less OFDM symbols with transform precoding disabled, additional DM-RS can be transmitted according to the scheduling type and the PUSCH duration as specified in Table 6.4.1.1.3-3 of [4, TS38.211] for frequency hopping disabled and as specified in Table 6.4.1.1.3-6 of [4, TS38.211] for frequency hopping enabled, and < -----------------------text omitted----------------------->< -----------------------to be continued----------------------->* and, the UE shall transmit a number of additional DM-RS as specified in Table 6.4.1.1.3-3 and Table 6.4.1.1.3-4 in -Clause 6.4.1.1.3 of [4, TS 38.211].

A UE may be scheduled with a number of DM-RS ports by the antenna port index in DCI format 0\_1 as described in Clause 7.3.1.1 of [5, TS 38.212].If a UE transmitting PUSCH is configured with the higher layer parameter phaseTrackingRS in DMRS-UplinkConfig, the UE may assume that the following configurations are not occurring simultaneously for the transmitted PUSCH< -----------------------text omitted-----------------------> |

From FL perceptive, the TP proposed by Nokia is more complete by including both cases where dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat1\_2 and dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat1\_2 are configured and mrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat1\_2 and dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat1\_2. The second correction “When transmitted PUSCH is ~~neither~~ scheduled by DCI format 0\_~~1~~ 0 ~~with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure~~or by RAR UL grant~~.~~ ,” proposed by CATT by changing the negative expression to positive description is unnecessary, especially it involves operation for 2-step RACH which is beyond our expertise. Therefore,

* **FL suggestion:** adopt the TP from [Nokia, R1-2001698, R1-2001694] for PUSCH DMRS transmission with DCI format 0\_2 to Sec. 6.1.4.2 and 6.2.2 of TS 38.214.

Any comments?

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| Company | View |
| Nokia, NSB | ~~We are fine with FL proposal.~~ Update based on the inputs by LGE there seems to be no reason to not use the procedure from 0\_1 also for 0\_2, independently if the DM-RS config for DCI format 0\_2 is provided or not. As a consequence, the version by Samsung below seems to be sufficient:The DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this section equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCI-Format0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCI-Format0\_2* instead of *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*.When transmitted PUSCH is neither scheduled by DCI format 0\_1/0\_2 with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure |
| CATT | 1. We would like to suggest two ways for full description as follows:
2. CATT proposed TP + Nokia’s proposal on the case where dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat1\_2 and dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat1\_2 aren’t configured as follows

If both higher layer parameter *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and higher layer parameter *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* are notconfigured, the DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_0 described in this clause equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2;1. Or Nokia’s proposal + CATT proposal on how to determine DMRS-port description as follows:

A UE may be scheduled with a number of DM-RS ports by the antenna port index in DCI format 0\_1 as described in Clause 7.3.1.1 of [5, TS 38.212].1. We support changing the negative expression to positive description on 2nd correction in FL proposal because this will make description on PUSCH transmission condition more clear
 |
| Samsung | We prefer CATT’s first TP proposal since there is no need to add UE behaviour when both configurations are not configured because UE behaviour has not been defined when both “dmrs-UplinkForPUSCH-MappingTypeA” and “dmrs-UplinkForPUSCH-MappingTypeB” are not configured for DCI format0\_1. Following is our suggestion with some modifications. The DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this section equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of dmrs-UplinkForPUSCH-MappingTypeA-ForDCI-Format0\_2 and dmrs-UplinkForPUSCH-MappingTypeB-ForDCI-Format0\_2 instead of dmrs-UplinkForPUSCH-MappingTypeA and dmrs-UplinkForPUSCH-MappingTypeB. When transmitted PUSCH is neither scheduled by DCI format 0\_1/0\_2 with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure, |
| Panasonic | We agree to the FL suggestion. |
| LG | We don’t have strong view, however, we think this change doesn’t make much difference especially for the case that dmrs-UplinkForXXX are not configured. Without this TP, UE shall use default parameter which is specified 38.331. Those are almost same as fallback procedure. For example, UE use maxlength=len1, dmrs-type=type1 and dmrs-AdditionalPosition= pos1 or pos2 according to whether FH is enabled or not. In our view, we think only following part are necessary.The DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this clause equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* instead of *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*. |
| QC | We are fine with Nokia’s proposal but TP for 38.214 Sec. 6.2.2. needs a modification. Specifically, “*If both higher layer parameter* ….” Should be replaced with“*if none of higher layer parameter dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2 and higher layer parameter dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2 is configured,* …”  |
| ZTE | We slightly prefer what Samsung proposed above. |
| Sharp | We support the FL suggestion. |
| vivo | Support FL suggestion.  |
| Apple | Samsung’s proposal is reasonable. |
| OPPO | We are fine with FL suggestion. |
| Ericsson | TP suggested by Samsung is sufficient |
| CATT2 | Regarding the proposed TP on antenna port determination, we clarify only first TP proposal in our contribution isn’t enough because there is no any description on how to determine antenna port in case AP field is absent in the DCI while the [DMRS configuration parameters] are configured in 6.2.2 DMRS transmission procedure section of 38.214. In addition, there is already similar description as blow on how to determine antenna port in 5.1.6.2 of 38.214.“A UE may be scheduled with a number of DM-RS ports by the antenna port index in DCI format 1\_1 as described in Clause 7.3.1.2 of [5, TS 38.212].”So below proposed TP is needed to make the UL procedure of determination antenna port more complete.A UE may be scheduled with a number of DM-RS ports by the antenna port index in DCI format 0\_1 as described in Clause 7.3.1.1 of [5, TS 38.212]. |

# **Missing PTRS transmission procedure for PUSCH scheduled by DCI format 0\_1 & 0\_2 (38.214 - Sec. 6.2.3 & 6.2.3.1, 38.212 – Sec. 7.3.1.1.2 & 7.3.1.1.3)**

RAN1 had agreed to support independent PTRS configuration which is available due to the independent DMRS configurations for DCI format 0\_2 and Rel-15 containing the RRC parameter *phaseTrackingRS* in *DMRS-UplinkConfig*.

*Agreements:*

*Support new RRC configuration for “PTRS-DMRS association” in DCI format 0\_2*

Currently, the effect on PTRS is currently not at all addressed in Sec. 6.2.3 of TS 38.214. [Nokia, R1-2001694] proposes to adopt the following TP for PUSCH PTRS transmission with DCI format 0\_2 to Sec. 6.2.3 & 6.2.3.1 of TS 38.214 with changes marked in red:

|  |
| --- |
| **TP to TS 38.214, 6.2.3 and 6.2.3.1: UE PTRS transmission procedure description for DCI format 0\_2** 6.2.3 UE PT-RS transmission procedureThe procedures on PT-RS transmission described in this clause as well as clauses 6.2.3.1 and 6.2.3.2 apply to a UE PUSCH transmission scheduled by DCI format 0\_2 if the higher layer parameter *phaseTrackingRS* in *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* or *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* is configured, to PUSCH transmissions scheduled by DCI format 0\_0 or format 0\_1 if the higher layer parameter *phaseTrackingRS* in *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* is configured and PUSCH transmissions corresponding to a configured grant if the higher layer parameter *phaseTrackingRS* in *cg-DMRS-Configuration* is configured. If a UE is not configured with the higher layer parameter *phaseTrackingRS* inthe respective *DMRS-UplinkConfig*, the UE shall not transmit PT-RS. ThePTRS is only present on PUSCH scheduled by PDCCH with CRC scrambled by MCS-C-RNTI, C-RNTI, CS-RNTI, SP-CSI-RNTI and on PUSCH corresponding to a configured grant. For PUSCH repetition Type B, the PT-RS transmission procedure is applied for each actual repetition separately based on the allocation duration of the actual repetition.6.2.3.1 UE PT-RS transmission procedure when transform precoding is not enabled**<**Unchanged text is omitted>For codebook or non-codebook based UL transmission, the association between UL PT-RS port(s) and DM-RS port(s) is signalled by *PTRS-DMRS association* field in DCI format 0\_1 and DCI format 0\_2. For a PUSCH corresponding to a configured grant Type 1 transmission, the UE may assume the association between UL PT-RS port(s) and DM-RS port(s) defined by value 0 in Table 7.3.1.1.2-25 or value "00" in Table 7.3.1.1.1.2-26 described in Clause 7.3.1 of [5, TS38.212].For PUSCH scheduled by DCI format 0\_0 or by activation DCI format 0\_0, the UL PT-RS port is associated to DM-RS port 0.For non-codebook based UL transmission, the actual number of UL PT-RS port(s) to transmit is determined based on SRI(s) in DCI format 0\_1 and DCI format 0\_2 or higher layer parameter *sri-ResourceIndicator* in *rrc-ConfiguredUplinkGrant*. A UE is configured with the PT-RS port index for each configured SRS resource by the higher layer parameter *ptrs-PortIndex* configured by *SRS-Config* if the UE is configured with the higher layer parameter *phaseTrackingRS in DMRS-UplinkConfig*. If the PT-RS port index associated with different SRIs are the same, the corresponding UL DM-RS ports are associated to the one UL PT-RS port.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.- 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].**<**Unchanged text is omitted> |

Similarly, [Nokia, R1-2001694] proposes to adopt the following text proposal on the PTRS-DMRS association field for DCI format 0\_1 and 0\_2 to Sec. 7.3.1.1.2 & 7.3.1.1.3 of TS 38.212 with changes marked in red:

|  |
| --- |
| **TP to TS 38.212, 7.3.1.1.2 and 7.3.1.1.3: Correction to DCI field size determination for PTRS-DMRS association**7.3.1.1.2 Format 0\_1**<**Unchanged text is omitted>- PTRS-DMRS association – number of bits determined as follows- 0 bit if *PTRS-UplinkConfi*g in *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* is not configured 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 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) for transmission of one PT-RS port and two PT-RS ports respectively, and the DMRS ports are indicated by the Antenna ports field. 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 is omitted>7.3.1.1.3 Format 0\_2**<**Unchanged text is omitted>- PTRS-DMRS association – number of bits determined as follows- 0 bit if *PTRS-UplinkConfi*g in *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* or *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* is not configured and transform precoder is disabled, or if transform precoder is enabled, or if *maxRank-ForDCIFormat0\_2=1*;- 2 bits otherwise, where 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) for transmission of one PT-RS port and two PT-RS ports respectively, and the DMRS ports are indicated by the Antenna ports field. 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 is omitted> |

* **FL suggestion:** adopt above TPs.

Any comments?

|  |  |
| --- | --- |
| Company | View |
| Nokia, NSB | We are fine to adopt these TPs.  |
| CATT | We are fine to the proposed TP. |
| Samsung | Agree with motivation. It may need to change some words, for example, “a UE PUSCH transmission” seems not generally used in specification.  |
| Panasonic | We agree to the FL suggestion. |
| LG | We are fine with the proposal. For the second TP, it would be better to clarify that UE is not configured with *PTRS-UplinkConfig* in any of respective DMRS-UplinkConfig for transmissions.0 bit if *PTRS-UplinkConfi*g in both *dmrs-UplinkForPUSCH-MappingTypeA* ~~or~~and *dmrs-UplinkForPUSCH-MappingTypeB* |
| QC | We agree with FL proposal, for the second TP, text needs modification:0 bit if *PTRS-UplinkConfi*g in neither *dmrs-UplinkForPUSCH-MappingTypeA n*or *dmrs-UplinkForPUSCH-MappingTypeB* is configured |
| ZTE | We are fine with the TPs above.  |
| Sharp | We are fine to adopt TPs above. |
| vivo | Support the TPs.  |
| Huawei, HiSilicon | We are fine with the TPs above. |
| Apple | Agree with QC’s suggestion, can we also check whether a similar change “neither … nor …” is needed for 0\_1. |
| OPPO | We are fine with TPs above. |
| Ericsson | Support the TPs |

# **Summary and Proposals**

For section 2.1, DMRS operation for Type 2 CG activated by DCI format 0\_2 in case Antenna ports field is not present in DCI format 0\_2, all companies agree proposal 1. 8 companies think no TP is necessary. 1 company think TP is necessary; 3 companies give comments on the proposed TP.

For section 2.2, correction to DMRS transmission procedure for PUSCH scheduled by DCI format 0\_2, all companies are fine to adopt the TP with some wording refinement.

For section 2.3, missing PTRS transmission procedure for PUSCH scheduled by DCI format 0\_1 & 0\_2 (38.214 - Sec. 6.2.3 & 6.2.3.1, 38.212 – Sec. 7.3.1.1.2 & 7.3.1.1.3), all companies are fine to adopt the TP with some wording refinement.

Following proposals are stable:

**Proposal 1:**

* **If a UE is not configured with higher layer parameter *AntennaPorts-FieldPresence-ForDCIFormat0\_2*,**
* **the UE shall not use the parameter *cg-DMRS-Configuration* in *configuredGrantConfig* to derive the bit width of the Antenna ports field in DCI format 0\_2 with CRC scrambled by CS-RNTI with NDI= 0; the UE determines that the bit width of the Antenna ports field in the DCI format 0\_2 with CRC scrambled by CS-RNTI with NDI=0 is zero.**
* **for the PUSCH transmission corresponding to a Type 2 configured grant activated by DCI format 0\_2, antenna port(s) are defined assuming bit field index value 0 in Tables 7.3.1.1.2-6 to 7.3.1.1.2-23 of TS 38.212.**

**Note: for proposal 1, check further whether TP is necessary or not.**

**Proposal 2: adopt following TP to TS 38.214, Section 6.1.4.2 and Section 6.2.2.**

|  |
| --- |
| **TP to TS 38.214, Sec. 6.1.4.2 & 6.2.2: UE DM-RS transmission procedure description for DCI format 0\_2** 6.1.4.2 Transport block size determinationFor a PUSCH scheduled by RAR UL grant or for a PUSCH scheduled by fallbackRAR UL grant orfor a PUSCH scheduled by a DCI format 0\_0 with CRC scrambled by C-RNTI, MCS-C-RNTI, TC-RNTI, CS-RNTI, or for a PUSCH scheduled by a DCI format 0\_1 or DCI format 0\_2 with CRC scrambled by C-RNTI, MCS-C-RNTI, CS-RNTI, SP-CSI-RNTI, or for a PUSCH transmission with configured grant, orfor a MsgA PUSCH transmission,if- and transform precoding is disabled and Table 5.1.3.1-2 is used, or-  and transform precoding is disabled and a table other than Table 5.1.3.1-2 is used, or -  and transform precoding is enabled, the UE shall first determine the TBS as specified below:The UE shall first determine the number of REs (*NRE*) within the slot: - A UE first determines the number of REs allocated for PUSCH within a PRB  by - , where is the number of subcarriers in the frequency domain in a physical resource block,  $N\_{symb}^{slot}$is the number of symbols *L* of the PUSCH allocation according to Clause 6.1.2.1 for scheduled PUSCH of Clause 6.1.2.3 for configured PUSCH,  is the number of REs for DM-RS per PRB in the allocated duration including the overhead of the DM-RS CDM groups without data, as described for PUSCH with a configured grant in Clause 6.1.2.3 or as indicated by DCI format 0\_1 or DCI format 0\_2 or as described for DCI format 0\_0 and DCI format 0\_2 in Clause 6.2.2, and  is the overhead configured by higher layer parameter *xOverhead* in *PUSCH-ServingCellConfig*. If the  is not configured (a value from 6, 12, or 18), the  is assumed to be 0. For Msg3 transmission the  is always set to 0.**<**Unchanged text is omitted>**6.2.2 UE DM-RS transmission procedure**The DM-RS transmission procedures for PUSCH scheduled by PDCCH with DCI format 0\_1 described in this clause equally apply to PUSCH scheduled by PDCCH with DCI format 0\_2, by applying the parameters of *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* instead of *dmrs-UplinkForPUSCH-MappingTypeA* and *dmrs-UplinkForPUSCH-MappingTypeB*.When transmitted PUSCH is neither scheduled by DCI format 0\_1 with CRC scrambled by C-RNTI, CS-RNTI, SP-CSI-RNTI or MCS-C-RNTI, nor corresponding to a configured grant, nor being a PUSCH for Type-2 random access procedure,~~.~~ the UE shall use single symbol front-loaded DM-RS of configuration type 1 on DM-RS port 0 and the remaining REs not used for DM-RS in the symbols are not used for any PUSCH transmission except for PUSCH with allocation duration of 2 or less OFDM symbols with transform precoding disabled, additional DM-RS can be transmitted according to the scheduling type and the PUSCH duration as specified in Table 6.4.1.1.3-3 of [4, TS38.211] for frequency hopping disabled and as specified in Table 6.4.1.1.3-6 of [4, TS38.211] for frequency hopping enabled, and If frequency hopping is disabled:- The UE shall assume *dmrs-AdditionalPosition* equals to 'pos2' and up to two additional DM-RS can be transmitted according to PUSCH duration, orIf frequency hopping is enabled:- The UE shall assume *dmrs-AdditionalPosition* equals to 'pos1' and up to one additional DM-RS can be transmitted according to PUSCH duration.**<Unchanged text is omitted>** |

**Proposal 3: adopt following TP to TS 38.214, section 6.2.3 and section 6.2.3.1.**

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| **TP to TS 38.214, 6.2.3 and 6.2.3.1: UE PTRS transmission procedure description for DCI format 0\_2** 6.2.3 UE PT-RS transmission procedureThe procedures on PT-RS transmission described in this clause as well as clauses 6.2.3.1 and 6.2.3.2 apply to a UE PUSCH transmission scheduled by DCI format 0\_2 if the higher layer parameter *phaseTrackingRS* in *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* or *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* is configured, to PUSCH transmissions scheduled by DCI format 0\_0 or format 0\_1 if the higher layer parameter *phaseTrackingRS* in *dmrs-UplinkForPUSCH-MappingTypeA* or *dmrs-UplinkForPUSCH-MappingTypeB* is configured and PUSCH transmissions corresponding to a configured grant if the higher layer parameter *phaseTrackingRS* in *cg-DMRS-Configuration* is configured. If a UE is not configured with the higher layer parameter *phaseTrackingRS* inthe respective *DMRS-UplinkConfig*, the UE shall not transmit PT-RS. ThePTRS is only present on PUSCH scheduled by PDCCH with CRC scrambled by MCS-C-RNTI, C-RNTI, CS-RNTI, SP-CSI-RNTI and on PUSCH corresponding to a configured grant. For PUSCH repetition Type B, the PT-RS transmission procedure is applied for each actual repetition separately based on the allocation duration of the actual repetition.6.2.3.1 UE PT-RS transmission procedure when transform precoding is not enabled**<**Unchanged text is omitted>For codebook or non-codebook based UL transmission, the association between UL PT-RS port(s) and DM-RS port(s) is signalled by *PTRS-DMRS association* field in DCI format 0\_1 and DCI format 0\_2. For a PUSCH corresponding to a configured grant Type 1 transmission, the UE may assume the association between UL PT-RS port(s) and DM-RS port(s) defined by value 0 in Table 7.3.1.1.2-25 or value "00" in Table 7.3.1.1.1.2-26 described in Clause 7.3.1 of [5, TS38.212].For PUSCH scheduled by DCI format 0\_0 or by activation DCI format 0\_0, the UL PT-RS port is associated to DM-RS port 0.For non-codebook based UL transmission, the actual number of UL PT-RS port(s) to transmit is determined based on SRI(s) in DCI format 0\_1 and DCI format 0\_2 or higher layer parameter *sri-ResourceIndicator* in *rrc-ConfiguredUplinkGrant*. A UE is configured with the PT-RS port index for each configured SRS resource by the higher layer parameter *ptrs-PortIndex* configured by *SRS-Config* if the UE is configured with the higher layer parameter *phaseTrackingRS in DMRS-UplinkConfig*. If the PT-RS port index associated with different SRIs are the same, the corresponding UL DM-RS ports are associated to the one UL PT-RS port.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.- 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].**<**Unchanged text is omitted> |

**Proposal 4: adopt following TP to TS 38.212, section 7.3.1.1.2 and 7.3.1.1.3.**

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| --- |
| **TP to TS 38.212, 7.3.1.1.2 and 7.3.1.1.3: Correction to DCI field size determination for PTRS-DMRS association**7.3.1.1.2 Format 0\_1**<**Unchanged text is omitted>- PTRS-DMRS association – number of bits determined as follows- 0 bit if *PTRS-UplinkConfi*g in neither *dmrs-UplinkForPUSCH-MappingTypeA* nor *dmrs-UplinkForPUSCH-MappingTypeB* is ~~not~~ configured 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 and 7.3.1.1.2-26 are used to indicate the association between PTRS port(s) and DMRS port(s) for transmission of one PT-RS port and two PT-RS ports respectively, and the DMRS ports are indicated by the Antenna ports field. 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 is omitted>7.3.1.1.3 Format 0\_2**<**Unchanged text is omitted>- PTRS-DMRS association – number of bits determined as follows- 0 bit if *PTRS-UplinkConfi*g in neither *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* nor *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2* is ~~not~~ configured and transform precoder is disabled, or if transform precoder is enabled, or if *maxRank-ForDCIFormat0\_2=1*;- 2 bits otherwise, where 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) for transmission of one PT-RS port and two PT-RS ports respectively, and the DMRS ports are indicated by the Antenna ports field. 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 is omitted> |

# **Reference**

|  |  |  |
| --- | --- | --- |
| [**R1-2001546**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001546.zip) | Corrections on configured grant transmission | Huawei, HiSilicon |
| [**R1-2001616**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001616.zip) | Remaining issues on enhancements for UL configured grant transmission | ZTE |
| [**R1-2001674**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001674.zip) | Enhanced UL configured grant transmissions for URLLC | vivo |
| [**R1-2001698**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001698.zip) | Maintenance of Rel-16 URLLC Configured Grant enhancements | Nokia, Nokia Shanghai Bell |
| [**R1-2001778**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001778.zip) | Configured grant enhancements for URLLC | OPPO |
| [**R1-2001789**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001789.zip) | Remaining Issue of Enhancements to UL Configured Grant Transmission for NR URLLC | Ericsson |
| [**R1-2001924**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001924.zip) | Remaining issues of Enhanced UL configured grant transmission for NR URLLC | LG Electronics |
| [**R1-2002087**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002087.zip) | Remaining issues on enhanced UL configured grant transmission | CATT |
| [**R1-2002334**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002334.zip) | Remaining Issues in Enhanced Configured Grant Transmission | Apple |
| [**R1-2002412**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002412.zip) | Maintenance of UL grant Type 2 scheduling activation | ITRI |
| [**R1-2002446**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002446.zip) | Remaining issues for enhanced Configured grant for Rel.16 URLLC | NTT DOCOMO, INC. |