**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:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_100b\Docs\R1-2001796.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:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_100b\Docs\R1-2001796.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 , where is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2*. A number of zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of and .  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 , where is the "Antenna ports" bitwidth derived according to *dmrs-UplinkForPUSCH-MappingTypeA-ForDCIFormat0\_2* and is the "Antenna ports" bitwidthderived according to *dmrs-UplinkForPUSCH-MappingTypeB-ForDCIFormat0\_2*. A number of zeros are padded in the MSB of this field, if the mapping type of the PUSCH corresponds to the smaller value of and .  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.   |  | | --- | | 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. | |
| 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 determination  For a PUSCH scheduled by RAR UL grant or  for a PUSCH scheduled by fallbackRAR UL grant or  for 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, or  for 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,  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, or  If 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 |

# **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:

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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 procedure The 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:

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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 *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?

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| 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 |

# **Reference**

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| [**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. |