**3GPP TSG RAN WG1 #101-e R1-200xxxx**

**E-Meeting, 25 May – 5 June, 2020**

Agenda: 5

Source: Moderator (Huawei)

Title: Summary of reply LS on Conflicting configurations

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

# **Introduction**

RAN1 received an LS [1] from RAN2 on conflicting configurations related to URLLC, MIMO and NR-U. In the LS, RAN2 asked several questions on the following aspects, and would like to know whether some restrictions should be captured for the configurations of the related higher layer parameters:

1. dmrs-UplinkTransformPrecoding-r16
2. dmrs-Downlink-r16
3. PDSCH time domain resource allocation
4. PUSCH time domain resource allocation
5. DCI format 1\_2 applicability to features introduced in NR\_eMIMO WI

As guided by the Chairman, this summary is to collect companies’ views on the questions in the LS and draft the reply based on the collected input.

[101-e-5LS-01] Email approval for a reply LS to [R1-2004665](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004665.zip) till 5/28, to be handled(Huawei)

# **Summary of the draft reply LSs**

Two contributions providing draft response to the RAN2 LS were submitted to RAN1#101-e meeting, and the views are summarized in the following Table:

Table 1 Summary of the views in the two draft reply LSs

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| Questions listed in the RAN2 LS | | R1-2004428, Ericsson | R1-2004627, Huawei |
| 1. dmrs-UplinkTransformPrecoding-r16 | **Q1-1:** Can dmrs-UplinkTransformPrecoding-r16 be configured for DCI format 0-2? | Yes. | Yes. |
| **Q1-2:** Is it possible to configure dmrs-UplinkTransformPrecoding-r16 independently for each mapping type of DCI formats other than 0-2 and for each mapping type of DCI format 0-2 (if the answer to Q1-2 is "yes") or what are the restrictions? | Yes, with no restriction. | Yes, with no restriction. |
| 1. dmrs-Downlink-r16 | **Q2-1:** Can dmrs-Downlink-r16 be used for DCI format 1-2? | Yes. | Yes. |
| **Q2-2:** Is it possible to configure dmrs-Downlink-r16 independently for each mapping type of DCI formats other than 1-2 and for each mapping type of DCI format 1-2 (if the answer to Q2-1 is "yes") or what are the restrictions? | Yes, with no restriction. | Yes, with no restriction. |
| 1. PDSCH time domain resource allocation | **Q3-1:** Can the PDSCH time domain resource allocation for DCI format 1-2 support the use of repetitionNumber? | Yes. | Yes. |
| **Q3-2:** If the answer to Q3-1 is yes, can repetitionNumber be configured in the PDSCH time domain resource allocation for DCI format 1-2 if it is not configured in the time domain resource allocation for other DCI formats (and vice-versa), or should it be configured in the PDSCH time domain resource allocation for all DCI formats or for none? | Yes, independent configuration for DCI format 1\_1 and DCI format 1\_2 should be allowed. | Yes, independent configuration for DCI format 1\_1 and DCI format 1\_2 should be allowed. |
| 1. PUSCH time domain resource allocation | **Q4-1:** Can the multiplePUSCH-Allocations (introduced for NR-U) and startSymbol, length and numberOfRepetitions (introduced for URLLC) be configured in the same PUSCH time domain resource allocation table, used for one of the following two fields: pusch-TimeDomainAllocationListForDCI-Format0-2-r16 and pusch-TimeDomainAllocationListForDCI-Format0-1-r16? | Yes with some restrictions. | No. |
| **Q4-2:** Can the multiplePUSCH-Allocations (introduced for NR-U) be used for one of the 2 above underlined fields while startSymbol, length and numberOfRepetitions (introduced for URLLC) are used in another of the above underlined fields? | Yes. | No. |
| 1. DCI format 1\_2 applicability to features introduced in NR\_eMIMO WI | **Q5-1:** Can the UE be configured with both DCI format 1\_1 and DCI format 1\_2 with TCI field, either in the same or different CORESETs? And can the value of tci-PresentInDCI-ForDCI-Format1-2 be different in different CORESETs? | Yes to both questions. | Yes to both questions. |
| **Q5-2:** Can the UE be configured with mPDCCH mTRP (have at least on CORESET with CORESETPoolIndex=1) and the parameter tci-PresentInDCI-ForDCI-Format1-2? | Yes. | Yes. |
| **Q5-3:** Does the Enhanced TCI state MAC CE in TS 38.321 6.1.3.24 apply to DCI 1\_2? | Yes. | Yes. |

According to the summary, the answers to the questions under 1), 2), 3) and 5) seems clear. The main controversial ones are related to the questions under 4), and more discussions and input from companies are needed to draft the response.

# **Discussion**

# **On questions under 1)**

As mentioned in [R1-2004428, Ericsson], the approved CR R1-2003164 has already clarified that the *dmrs-UplinkTransformPrecoding-r16* can also be configured for DCI format 0\_2. In addition, since the DMRS is separately configured for different mapping types and for different DCI formats, it is also possible to configure *dmrs-UplinkTransformPrecoding-r16* independently for different mapping types and for different DCI formats, therefore, no restriction is needed for the configuration of the parameter.

Moderator’s proposed response is provided as follows:

**Proposed response:**

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| **1)** **dmrs-UplinkTransformPrecoding-r16**  dmrs-UplinkTransformPrecoding-r16 is in the IE DMRS-UplinkConfig and is optional with the condition that "tp-pi2BPSK is included in PUSCH-Config". DMRS-UplinkConfig is use for several fields:  - in PUSCH-Config: dmrs-UplinkForPUSCH-MappingTypeA/B and dmrs-UplinkForPUSCH-MappingTypeA/B-ForDCI-Format0-2-r16  - in ConfiguredGrantConfig: for cg-DMRS-Configuration  **Q1-1**) Can dmrs-UplinkTransformPrecoding-r16 be configured for DCI format 0-2?  **[Answer]:** Yes.  **Q1-2**) Is it possible to configure dmrs-UplinkTransformPrecoding-r16 independently for each mapping type of DCI formats other than 0-2 and for each mapping type of DCI format 0-2 (if the answer to Q1-2 is "yes") or what are the restrictions?  **[Answer]:** Yes. There is no restriction for the configuration of the parameter from RAN1 perspective. |

**Any comment?**

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| Company | View |
| Apple | Okay with FL proposed answer |
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# **On questions under 2)**

[R1-2004428, Ericsson] identified that in Clause 7.4.1.1.1 in TS 38.211 v16.1.0, the specification text for DMRS sequence generation for PDSCH only requires that “the higher-layer parameter dmrsDownlink-r16 in the DMRS-DownlinkConfig IE is provided”, and there is no distinction between mapping types or DCI formats. This implies that the dmrs-Downlink-r16 can also be used for DCI format 1\_2. In addition, similar to the configuration of *dmrs-UplinkTransformPrecoding-r16*, independent configuration of dmrs-Downlink-r16 for different mapping types and for different DCI formats should also be allowed.

Moderator’s proposed response is provided as follows:

**Proposed response:**

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| **2) dmrs-Downlink-r16**  dmrs-Downlink-r16 is in DMRS-DownlinkConfig which is used for several fields in PDSCH-Config: dmrs-DownlinkForPDSCH-MappingTypeA/B and dmrs-DownlinkForPDSCH-MappingTypeA/BForDCI-Format1-2-r16.  DCI format 1-2 is introduced in URLLC WI but dmrs-Downlink-r16 is introduced in MIMO WI.  **Q2-1**) Can dmrs-Downlink-r16 be used for DCI format 1-2?  **[Answer]:** Yes.  **Q2-2**) Is it possible to configure dmrs-Downlink-r16 independently for each mapping type of DCI formats other than 1-2 and for each mapping type of DCI format 1-2 (if the answer to Q2-1 is "yes") or what are the restrictions?  **[Answer]:** Yes. There is no restriction for the configuration of the parameter from RAN1 perspective. |

**Any comment?**

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| Company | View |
| Apple | Okay with FL proposed answer |
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# **On questions under 3)**

As mentioned by [R1-2004428, Ericsson] and [R1-2004627, Huawei], the repetitionNumber can also be configured in the PDSCH time domain allocation table for DCI format 1\_2, and the configuration of the parameter in pdsch-TimeDomainResourceAllocationList and pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 is independent.

Moderator’s proposed response is provided as follows:

**Proposed response:**

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| **3)** **PDSCH time domain resource allocation**  PDSCH-TimeDomainResourceAllocation can be configured with repetitionNumber. Meanwhile, pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 was introduced in PDSCH-Config.  **Q3-1**) Can the PDSCH time domain resource allocation for DCI format 1-2 support the use of repetitionNumber?  **[Answer]:** Yes.  **Q3-2**) If the answer to Q3-1 is yes, can repetitionNumber be configured in the PDSCH time domain resource allocation for DCI format 1-2 if it is not configured in the time domain resource allocation for other DCI formats (and vice-versa), or should it be configured in the PDSCH time domain resource allocation for all DCI formats or for none?  **[Answer]:** Yes. The configuration of the repetitionNumber in pdsch-TimeDomainResourceAllocationList and in pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 is independent. |

**Any comment?**

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| Company | View |
| Apple | Okay with FL proposed answer |
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# **On questions under 4)**

RAN2 asked the following two questions related to PUSCH time domain resource allocation for URLLC and NR-U:

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| **4)** **PUSCH time domain resource allocation**  For **URLLC,** a new Rel-16 IE, PUSCH-TimeDomainResourceAllocationNew-r16 (name will have to be changed to avoid "New"), was defined which includes the parameters of PUSCH-TimeDomainResourceAllocation plus startSymbol, length and numberOfRepetitions. In addition, mappingType and startSymbolAndLength, which were mandatory in the Rel-15 IE PUSCH-TimeDomainResourceAllocationList, are optional in the Rel-16 IE.  For **NR-U**, a new Rel-16 IE, PUSCH-TimeDomainResourceAllocation (name will have to be changed as well), was defined (in this meeting, so not in 38.331 v 16.0.0) which includes multiplePUSCH-Allocations where each allocation is defined by mappingType and startSymbolAndLength.  The new URLLC Rel-16 IE is used in PUSCH-Config for pusch-TimeDomainAllocationListForDCI-Format0-2-r16 and pusch-TimeDomainAllocationListForDCI-Format0-1-r16.  The Rel-15 version PUSCH-TimeDomainResourceAllocationList is used for pusch-TimeDomainAllocationList in PUSCH-Config and pusch-TimeDomainAllocationList in PUSCH-ConfigCommon.  **Q4-1)** Can the multiplePUSCH-Allocations (introduced for NR-U) and startSymbol, length and numberOfRepetitions (introduced for URLLC) be configured in the same PUSCH time domain resource allocation table, used for one of the 2 above underlined fields?  **Q4-2)** Can the multiplePUSCH-Allocations (introduced for NR-U) be used for one of the 2 above underlined fields while startSymbol, length and numberOfRepetitions (introduced for URLLC) are used in another of the above underlined fields? |

[R1-2004627, Huawei] proposed not to configure the parameters introduced for NR-U together with the parameters introduced for URLLC in the same time domain resource allocation table. In addition, since the two underlined fields are all for URLLC, multiplePUSCH-Allocations (introduced for NR-U) should not be used for any of them.

[R1-2004428, Ericsson] proposed that though RAN1 might not have enough time to implement certain spec changes to enable the simultaneous support for both multi-PUSCH scheduling and PUSCH Repetition Type B, it could be beneficial to have a future-proof signalling structure that can be easily extended in the future to support any combination of the two resource allocation schemes. An example for the future-proof signalling structure (copied below) was also proposed with an additional restriction for Rel-16, i.e., when multi-PUSCH is scheduled, the repetition number should not exceed 1. With the proposed structure, the answer to Q4-2 is “Yes” and the independent configuration is allowed for the two underlined fields.

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| PUSCH-TimeDomainResourceAllocationListNew-r16 ::=  SEQUENCE (SIZE(1..maxNrofUL-Allocations-r16)) OF PUSCH-TimeDomainResourceAllocationNew-r16    PUSCH-TimeDomainResourceAllocationNew-r16 ::=  SEQUENCE {      k2-r16                                         INTEGER (0..32)                          OPTIONAL,   -- Need S      multiplePUSCH-Allocations-r16                 SEQUENCE (SIZE(1..maxNrofMultiplePUSCHs-r16)) OF SinglePUSCH-TimeDomainResourceAllocation-r16      OPTIONAL,  -- Need R      ...  }      SinglePUSCH-TimeDomainResourceAllocation-r16 ::=  SEQUENCE {      mappingType-r16                                ENUMERATED {typeA, typeB}                OPTIONAL,   -- Cond RepTypeA      startSymbolAndLength-r16                       INTEGER (0..127)                         OPTIONAL,   -- Cond RepTypeA      startSymbol-r16                                INTEGER (0..13)                          OPTIONAL,   -- Cond RepTypeB      length-r16                                     INTEGER (1..14)                          OPTIONAL,   -- Cond RepTypeB      numberOfRepetitions-r16                        ENUMERATED {n1, n2, n4, n7, n12, n16},      ...  } |

Since different companies may have different answers based on different understanding on the above two questions, more input from companies are needed to draft the response. So, please provide your views on the following questions:

* **Q4-1:** Can the multiplePUSCH-Allocations (introduced for NR-U) and startSymbol, length and numberOfRepetitions (introduced for URLLC) be configured in the same PUSCH time domain resource allocation table, used for one of the 2 above underlined fields? If the answer is yes, any restriction on the configuration of these parameters?

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* **Q4-2:** Can the multiplePUSCH-Allocations (introduced for NR-U) be used for one of the 2 above underlined fields while startSymbol, length and numberOfRepetitions (introduced for URLLC) are used in another of the above underlined fields?

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# **On questions under 5)**

The questions under 5) are related to TCI state for DCI format 1\_1 and DCI format 1\_2. Based on the input from [R1-2004428, Ericsson] and [R1-2004627, Huawei], the proposed response is made as follows:

**Proposed response:**

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| **5)** **DCI format 1\_2 applicability to features introduced in NR\_eMIMO WI**  The IE ControlResourceSet includes both tci-PresentInDCI and tci-PresentInDCI-ForDCI-Format1-2. Currently both parameters can be configured in all or some CORESETs of the UE and these CORESETs may be configured with CORESETPoolIndex (mPDCCH mTRP). Further, eMIMO WI introduced a new TCI state mapping MAC CE in TS 38.321 6.1.3.24 where two TCI states can be mapped to one DCI codepoint. Currently, there is no limitation which DCI format this new MAC CE in TS 38.321 6.1.3.24 applies to.  **Q5-1)** Can the UE be configured with both DCI format 1\_1 and DCI format 1\_2 with TCI field, either in the same or different CORESETs? And can the value of tci-PresentInDCI-ForDCI-Format1-2 be different in different CORESETs?  **[Answer]:** Yes to both questions.  **Q5-2)** Can the UE be configured with mPDCCH mTRP (have at least on CORESET with CORESETPoolIndex=1) and the parameter tci-PresentInDCI-ForDCI-Format1-2?  **[Answer]:** Yes.  **Q5-3)** Does the Enhanced TCI state MAC CE in TS 38.321 6.1.3.24 apply to DCI1\_2?  **[Answer]:** Yes. |

**Any comment?**

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| Company | View |
| Apple | Okay with FL proposed answer for Q5-2, Q5-3  For Q5-1, we prefer that in each CORESET, gNB cannot configure both DCI format 1\_1 and DCI 1\_2. In other words, we prefer that URLLC and eMBB operation to be independent, i.e. not mixed, in each CORESET. Yes to the second sub-question |
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# **References**

1. R1-2004665, LS on Conflicting configurations, RAN2, RAN1#101-e, May 2020
2. R1-2004428, Response to LS on Conflicting Configurations, Ericsson
3. R1-2004627, [DRAFT] LS reply to RAN2 on Conflicting configurations, Huawei/HiSilicon