**3GPP TSG-RAN WG2 Meeting #109-e-bis R2-200xxxx**

**Electronic meeting, 20 – 30 Apr 2020**

**Title:** [DRAFT]LS on Conflicting configurations

**Response to:**

**Release:** Rel-16

**Work Item:** NR\_L1enh\_URLLC-Core, NR\_eMIMO-Core, NR\_unlic-Core, others?

**Source:** [Huawei, to be changed to RAN2]

**To:** RAN1

**CC:**

**Contact Person:**

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**Attachments:** None

**1. Overall Description:**

RAN2 has identified that there are additions in Rel-16 for physical layer configuration for different features/WIs that may conflict with each other.

From RAN2 perspective, one common structure is preferred when applicable to incorporate all Rel-16 features and future extensions in later releases, for example, only one IE related with PUSCH TDRA. In addition, RAN2 by-default understands that the RRC ASN.1 can configure all possibilities and restrictions (if any) will be reflected in RAN1 spec and, if needed, has to communicate to RAN2 to be added in RRC.

For ASN.1 structure design, RAN2 needs to understand the inter-dependencies among Rel-16 features. During the ASN.1 review in RAN2#109bis-e, several issues are identified, which includes but is not limited to, support of DCI format 1-2 for NR\_eMIMO WI, support of PUSCH repetition type for multiple-PUSCH scheduling in NR-U WI, support of DMRS configurability for DCI format 0-2/1-2, etc.

Here are the specific questions:

**1) Applicability of dmrs-UplinkTransformPrecoding-r16 for configured grant and PUSCH scheduled by DCI format 0-2.**

The field dmrs-UplinkTransformPrecoding is in IE DMRS-UplinkConfig and is optional with the condition that "tp-pi2BPSK is included in *PUSCH-Config*". DMRS-UplinkConfig is used in several fields:

- in PUSCH-Config: dmrs-UplinkForPUSCH-MappingTypeA/B and dmrs-UplinkForPUSCH-MappingTypeA/B-ForDCI-Format0-2-r16

- in ConfiguredGrantConfig: for cg-DMRS-Configuration

The conditional presence is “if *tp-pi2BPSK* is included in PUSCH-Config”, but configured grant related DMRS configuration is not in PUSCH-Config rather BWP-UplinkDedicated.

**Q1-1) Can dmrs-UplinkTransformPrecoding-r16 be configured for configured grant ?**

DCI format 0-2 is introduced in URLLC WI but dmrs-UplinkTransformPrecoding-r16 is introduced in MIMO WI.

**Q1-2) Can dmrs-UplinkTransformPrecoding-r16 be configured for dmrs-UplinkForPUSCH-MappingTypeA/B-ForDCI-Format0-2-r16 ?**

configured in the 5 above listed fields and, for each field, in **which instance of PUSCH-Config** does tp-pi2BSK need to be included for pi2BPSK-ScramblingID0/pi2BPSK-ScramblingID1to be possible? (note that in ConfiguredGrantConfig is not included in PUSCH-Config but in BWP-UplinkDedicated, where PUSCH-Config is also included).

In total up-to 5 fields (depending on the answers to Q1-1 and Q1-2) might use dmrs-UplinkTransformPrecoding-r16.

**Q1-3) which one is the correct understanding?**

1. **Each dmrs-UplinkTransformPrecoding-r16 is configured independently;**
2. **Only one dmrs-UplinkTrasnforPrecoding-r16 is configured and apply for all PUSCH transmissions (except those excluded in 38.214);**

**Q1-4) If the answer to Q1-3 is “a”, are there any constraints?**

Is the usage of pi2BPSK-ScramblingID0/pi2BPSK-ScramblingID1 in each of the 5 above listed fields (or in the ones among them in which it can be used according to the answer to Q1-1) in **PUSCH-Config** independent of its usage in the other fields or is there any constraint (e.g. can it be used in mappingTypeA and not in mappingTypeB, etc)?

**2) Applicability of dmrs-Downlink-r16 for PDSCH scheduled by DCI format 1-2.**

DMRS-DownlinkConfig can be extended with dmrs-Downlink-r16. DMRS-DownlinkConfig 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 in the 4 above listed fields?**

In total up-to 4 fields (depending on the answers to Q2-1) might use dmrs-Downlink-r16.

**Q2-2) which one is the correct understanding?**

1. **Each dmrs-Downlink-r16 is configured independently;**
2. **Only one dmrs-Downlink-r16 is configured and apply for all PDSCH transmissions (except those excluded in 38.214);**

**Q2-3) If the answer is a, are there any constraints?**

**Q2-2)** Is the usage of dmrs-Downlink-r16 in the 4 above fields (or in in the ones among them in which it can be used according to the answer to Q2-1) in **PUSCH-Config** fully independent of its usage in the other fields or is there any constraint (e.g. can it be used in mappingTypeA and not in mappingTypeB, etc)?

**3) PDSCH TDRA**

**PDSCH-TimeDomainResourceAllocation** can be extended with repetitionNumber. Meanwhile, pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 was introduced in PDSCH-Config.

**Q3-1)** Should pdsch-TimeDomainAllocationListForDCI-Format1-2-r16 support the use of repetitionNumber?

**Q3-2)** If the answer to Q3-1 is yes, regarding the usage of repetitionNumber in pdsch-TimeDomainResourceAllocationList and pdsch-TimeDomainAllocationListForDCI-Format1-2-r16, are they fully independent or dependent (i.e., used only in both or in neither)?

**4) PUSCH TDRA**

*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 are optional. **PUSCH-TimeDomainResourceAllocationListNew-r16**

is used in **PUSCH-Config** for the following fields:

* pusch-TimeDomainAllocationListForDCI-Format0-2-r16
* pusch-TimeDomainAllocationListForDCI-Format0-1-r16

The Rel-15 version, **PUSCH-TimeDomainResourceAllocationList,** is used in **PUSCH-Config** and in **PUSCH-ConfigCommon** for the field

* pusch-TimeDomainAllocationList

**Q4-1)** Can startSymbol, length and numberOfRepetitions be used in pusch-TimeDomainAllocationList in **PUSCH-Config?** Same question for pusch-TimeDomainAllocationList in **PUSCH-ConfigCommon**?

**Q4-2)** If the answer to Q4-1 is "yes", is the usage of these 3 parameters in each of the 4 above listed fields (or in the ones among them in which it can be used according to the answer to Q4-1) fully independent of their usage in the other fields?

 **URLLC** has introduced support to schedule PUSCH repetitions with different mapping types.

**New information elements for URLLC:**

* PUSCH-TimeDomainResourceAllocationListNew-r16 defines a TDRA table with multiple PUSCHs per entry, where the PUSCHs are repeated
* PUSCH-TimeDomainResourceAllocationNew-r16 defines the number of repetitions, the mapping type as well as start symbol and lengths of each repetition

**NR-U** hasintroduced multi-PUSCH scheduling.

**New information elements for NR-U:**

* PUSCH-TimeDomainResourceAllocationList-r16 defines a TDRA table with multiple PUSCHs per entry
* PUSCH-TimeDomainResourceAllocation-r16 defines multiple PUSCHs
* SinglePUSCH-TimeDomainResourceAllocation-r16 defines mappingType and startSymbolAndLength for each PUSCH in the Multi-PUSCH allocation

**Q4-3)** Can URLLC and NR-U parameters be configured simultaneously? Are there any conflicting parameters?

**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?

**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?

**Q5-3)** Does the Enhanced TCI state MAC CE in TS 38.321 6.1.3.24 apply to DCI1\_2?

[Add more here if needed]

**2. Actions:**

**To RAN1:**

**ACTION:** RAN2 respectfully asks RAN1 to answer the above questions, which are necessary for RAN2 to complete the ASN.1 review of TS 38.331.

**3. Date of Next TSG-RAN WG2 Meetings:**

RAN2#110-e 01-12, June, 2020 Online

RAN2#111 24-28, August, 2020 Toulouse, France