3GPP TSG-RAN WG1 Meeting #116 R1-24xxxxx

**Athens, Greece, February 26th – March 1st, 2024**

Agenda Item: 8.11

WI: NR\_XR\_enh-Core

Source: Moderator (Ericsson)

Title: Moderator Summary#1 – Maintenance of XR Enhancements

Document for: Discussion, Decision

# 1 Introduction

This document provides a summary of the contributions submitted to RAN1#116 under Agenda item 8.11 for maintenance issues for Rel-18 XR WI. It is also intended to facilitate the discussions regarding the topics with respect to the following assignment by the RAN1 Chair:

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| [116-R18-Other\_WIs] Email discussion on other Rel-18 WIs – Xiaodong (Vice Chair)   * To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, tdoc number of the moderator summary for online session, etc   **XR**  R1-2400594 DraftCR on CG-PUSCH grant validation OPPO  R1-2400595 Draft CR on time-domain resource allocation for multi-PUSCH CG configuration OPPO  R1-2401098 Remaining issues on UTO-UCI indication for XR NTT DOCOMO, INC.  R1-2401099 Draft CR on UTO-UCI indication for same CG configuration NTT DOCOMO, INC.  R1-2401343 Correction of RRC parameter names for XR in TS 38.212 Nokia, Nokia Shanghai Bell  R1-2401344 Correction of RRC parameter names for XR in TS 38.213 Nokia, Nokia Shanghai Bell  R1-2401345 Correction of RRC parameter names for XR in TS 38.214 Nokia, Nokia Shanghai Bell  To be moderated by Sorour (Ericsson) |

# 2 Maintenance issues

The following maintenance issues are raised by companies in the submissions at this meeting.

## 2.1 Issue#1: On CG-PUSCH grant validation (OPPO)

OPPO has raised the following issue in [1]

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| ***Reason for change:*** | | RAN1 #115 agreed that “*a valid configured PUSCH grant is the configured PUSCH grant that is not collided with the DL symbol(s) ....., and is not collided with a symbol(s) of an SS/PBCH block ......*”.  In this agreement, both “is not collided with DL symbol” and “is not collided with SSB” are modifiers of “the configured PUSCH grant”, and therefore are both contained in definition of CG validation. In comparison, the current specification text in 38.214 says the following:  “*a valid configured PUSCH grant is the one not colliding with the DL symbol(s) ......, and is not colliding with a symbol(s) of an SS/PBCH block ......*”, which can be interpreted in a different way:   * On one hand, “*not colliding with the DL symbol(s)*” is the modifier of “the one [i.e., the valid CG]”. * On the other hand, “*is not colliding with SSB*” does not read as the modifier of “the one [i.e., the valid CG]” (it is in parallel to “is the one” in English reading). This SSB-related description sounds more like a separate restriction that is applied to gNB configuration, rather than a part of definition of CG validation.   The above text description does not exactly match RAN1#115-agreed TP, and may cause misaligned definition of “valid CG-PUSCH grant” between RAN1 and RAN2, given RAN2 specification refers to clause 6.1 for the definition of “valid grant/TO”. To be noted, RAN1 specifications (e.g., clause 9.3.1 in TS38.214) already take both semi-statically configured DL symbol and SSB symbol into the definition of valid CG-PUSCH grant/TO. |
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| ***Summary of change:*** | | Remove “is” in “*and* ***is*** *not colliding with a symbol(s) of an SS/PBCH block ...*” so that “not colliding with SSB” becomes a part of definition of valid CG-PUSCH grant/TO. |
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| ***Consequences if not approved:*** | | The definition of valid CG-PUSCH grant/TO in TS38.214 does not match the RAN1 agreement as well as the existing spec description in TS38.213, and provides misaligned reference to RAN2 specification. |

The following TP is provided accordingly:

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| TP for 38.2146.1 UE procedure for transmitting the physical uplink shared channel \*\*\* Unchanged parts are omitted \*\*\*  When the UE is configured *dl-OrJointTCI-StateList* or *ul-TCI-StateList*, the UE shall perform PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant or a dynamic grant according to the spatial relation, if applicable, with a reference to the RS for determining UL Tx spatial filter. The RS is determined based on an RS configured with *qcl-Type* set to 'typeD' of the indicated *TCI-State* or an RS in the indicated *TCI-UL-State*. The reference RS in the indicated *TCI-State* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, or a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info.* The reference RS in the indicated *TCI-UL-State* can be a CSI-RS resource in a *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *repetition*, a CSI-RS resource in an *NZP-CSI-RS-ResourceSet* configured with higher layer parameter *trs-Info*, an SRS resource in an SRS resource set with the higher layer parameter *usage* set to 'beamManagement', or SS/PBCH block associated with the same or different PCI from the PCI of the serving cell. When *[nrofSlots\_InCGperiod]* is configured for Type 1 configured grant or Type 2 configured grant, HARQ process ID for the first configured PUSCH grant and each subsequent valid configured PUSCH grant within a *periodicity* of the configuration is determined as in clause 5.4.1 of [10, TS 38.321], where a valid configured PUSCH grant is the one not colliding with the DL symbol(s) indicated by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated* if provided, and ~~is~~ not colliding with a symbol(s) of an SS/PBCH block with index provided by *ssb-PositionsInBurst* as described in clause 11.1 of [6, TS 38.213].  \*\*\* Unchanged parts are omitted \*\*\* |

**Moderator’s observation:** At first, it seemed to Moderator that the current description should be clear. After careful reading Moderator realized that the point raised by OPPO is valid, although it seems unlikely to misunderstand the intention of the description to be misinterpreted.

It is helpful to understand companies’ interpretations.

### 2.1.1 Initial discussion

**Question:** What is your view about the issue raised above? Do you support adopting the proposed draft CR?

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| Company | Comment |
| OPPO | This is basically an editorial issue that could lead to misunderstanding upon the exact definition of valid/invalid TOs. We certainly support the proposed draft CR. |
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## 2.2 Issue#2: Multi-PUSCH CG resource allocation (OPPO)

OPPO has raised the following as the first issue in [2].

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| ***Reason for change:*** | 1. Although RAN1 agrees that the PUSCH repetition (both Type-A and Type-B) is not supported with Rel-18 multi-PUSCH CG, the PUSCH CG resource allocation is currently described in TS38.214 in a way either for Type-A repetition or Type-B repetition. RAN1 #113 agreement contains the following notes to indicate that the time-domain resource allocation for Rel-18 multi-PUSCH CG assumes Type-A repetition:   *Note(for Type-1): To determine the configuration of TDRA, PUSCH repetition type A is assumed according to description in 6.1.2.3 in 38.214.*  *Note(for Type-2): The DCI format for activation DCI with pusch-RepTypeA is applicable.*  There was no further agreement to amend for Type-B repetition. In fact, the PUSCH resource allocation with repetition Type-B allows cross-slot resource allocation (at least ref. Table 6.1.2.1-1 in TS38.214), which has been agreed not to be supported in Rel-18 multi-PUSCH CG. It is too late in RAN1 maintenance phase now to make new functional agreement to selectively support some of resource allocations within Type-B repetition (e.g.,the ones restricted to single slot) but not all. So a simple fix is to limit the PUSCH resource allocation in multi-PUSCH CG to assume Type-A repetition only (Note: this does not mean Type-A repetition is supported).   1. According to the current description in TS38.214, whatever PUSCH resource allocation happening in the first PUSCH occasion/slot in a multi-PUSCH CG period also applies to the remaining PUSCH occasions in the same CG period. Such text unexpectedly includes K2, which creates a faulty suggestion that the same K2 is applied individually in every consecutive PUSCH slot. This is not an expected UE behavior. |
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| ***Summary of change:*** | 1. Clarify that UE does not expect to be configured with PUSCH repetition Type-B for resource allocation with multi-PUSCH CG. 2. Clarify that the derivation from *timeDomainAllocation* applies to the first PUSCH occasion per multi-PUSCH CG period, i.e., the same behavior as in NRU description. |
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| ***Consequences if not approved:*** | The specification does not prevent UE from receiving a configuration resulting in unsupported function; gNB and UE can have inconsistent understanding of symbols/slots being used for multi-PUSCH CG transmission. |

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| TP for 38.214 6.1.2.3 Resource allocation for uplink transmission with configured grant  \*\*\* Unchanged parts are omitted \*\*\*  A set of allowed periodicities *P* are defined in [12, TS 38.331]. The higher layer parameter *cg-nrofSlots*, provides the number of consecutive slots allocated within a configured grant period. The higher layer parameter *cg-nrofPUSCH-InSlot* provides the number of consecutive PUSCH allocations within a slot, where the first PUSCH allocation follows the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or the higher layer configuration according to [10, TS 38.321], and UL grant received on the DCI for Type 2 PUSCH transmissions, and the remaining PUSCH allocations have the same length and PUSCH mapping type, and are appended following the previous allocations without any gaps. The higher layer parameter *[nrofSlots\_InCGperiod]* provides the number of consecutive slots allocated within a configured grant period. The same combination of start symbol and length and PUSCH mapping type repeats over the consecutively allocated slots if *cg-nrofSlots* or [*nrofSlots\_InCGperiod*] is configured. If [*nrofSlots\_InCGperiod*] is configured, the first PUSCH allocation ~~in each consecutive slot~~ follows the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or the higher layer configuration according to [10, TS 38.321], and UL grant received in the DCI for Type 2 PUSCH transmissions. If a UE is configured with higher layer parameter [*nrofSlots\_InCGperiod*] in a *configuredGrantConfig*, the UE does not expect to be configured with *cg-nrofSlots* and *cg-nrofPUSCH-InSlot* in the *configuredGrantConfig*, and the UE does not expect to be configured with *pusch-RepTypeIndicator* in *rrc-ConfiguredUplinkGrant* being set to 'pusch-RepTypeB'.  \*\*\* Unchanged parts are omitted \*\*\* |

**Moderator’s observation:**

**Change 1)** If Moderator understands correctly, OPPO refers to the case that an instant of Type-B repetition configuration can effectively become like Type A due to cross-slot repetition.

The specification clearly states that repetition in not supported. That means that repetition factor, if it is configured, should be set to one. If Moderator understands correctly, OPPO raises the case that repetition Type B is configured by repetition factor is set to one. However, enabling Type-B repetition, even with repetition factor equal to one, is not allowed according to the agreement.

**Change 2)** Moderator understands the issue that is raised, but it seems if one reads the whole paragraph it is clear that the start symbol and length and mapping type are meant. Therefore, although K2 is provided by timeDomainAllocation the description is not applicable to that parameter.

On one hand, the proposed changes make the specification clear and improves the accuracy of specification. On the other hand, it is not clear to Moderator if the suggested corrections make any difference in practice, or there is a risk for ambiguity in operation.

It is helpful to understand companies’ interpretations.

### 2.2.1 Initial discussion

**Question:** What is your view about the two issues raised above? Do you support adopting the proposed draft CR?

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| Company | Comment |
| OPPO | For “Change 1”:  It is not our intention to say “Type-B repetition configuration can effectively become like Type A”. In fact, we believe our “reason for change” clearly says we prefer to let resource allocation to “assume Type-A repetition only” (i.e., no Type-B!). Note that what we focuses here is about the resource allocation, not just repetition (we well know repetition factor can be only 1 for R18 XR). The existing CG-PUSCH resource allocation is formulated in such a way that has to depend on one of {Type-A repetition, Type-B repetition}. There is no such choice that it is neither Type-A not Type-B, due to the following 38.214 text:   |  | | --- | | - For the determination of the PUSCH repetition type, if the higher layer parameter *pusch-RepTypeIndicator* in *rrc-ConfiguredUplinkGrant* is configured and set to 'pusch-RepTypeB', PUSCH repetition type B is applied; otherwise, PUSCH repetition type A is applied;  - For PUSCH repetition type A, the selection of the time domain resource allocation table follows .......  - For PUSCH repetition type B, the selection of the time domain resource allocation table is as follows ...... |   Then the concern with Type-B repetition is that the Type-B allows cross-slot repetition, which is not something R19 XR can be compatible with. That is also partially why RAN1 #113 agreement contains a note saying to assume Type-A repetition. However, the current R19 CR package does not explicitly reflect this restriction (i.e., not to use Type-B) and therefore needs a correction. This is the motivation of our proposed draft CR.  For “Change 2”:  The current R18 CR says following:   |  | | --- | | The same combination of start symbol and length and PUSCH mapping type repeats over the consecutively allocated slots if *cg-nrofSlots* or [*nrofSlots\_InCGperiod*] is configured. If [*nrofSlots\_InCGperiod*] is configured, the PUSCH allocation in each consecutive slot follows the higher layer parameter *timeDomainAllocation* for Type 1 PUSCH transmission or the higher layer configuration according to [10, TS 38.321], and UL grant received in the DCI for Type 2 PUSCH transmissions. |   What we see here is:   1. The same <start symbol, length, mapping type> is applied over slots, for both NRU case and R18 XR case. 2. For R18 XR case, there is something additional, saying “If [*nrofSlots\_InCGperiod*] is configured, the **PUSCH allocation** in each consecutive slot follows ....”, where “PUSCH allocation” requires K2 in Type-2 CG, which is the trouble-maker here. There is no text suggesting the “PUSCH allocation” added here specifically for R19 XR case does not include K2.   So we think the proposed “Change 2” is needed. |
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## 2.3 Issue#3: UTO-UCI indication (DOCOMO)

DOCOMO has raised the following as the first issue in [3][4].

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| ***Reason for change:*** | | In RAN1#114, it was concluded that the UTO-UCI indication for CG PUSCHs of other CG configuration(s) is not supported. The current spec describes that the bits of UTO-UCI are mapped to subsequent CG PUSCH TOs. However, it doesn’t clarify that that subsequent CG PUSCH TOs are of the same CG configuration as the CG PUSCH on which the UTO-UCI is multiplexed. |
|  | |  |
| ***Summary of change:*** | | Clarify UTO-UCI bits are mapped to subsequent CG PUSCH TOs of the same CG configuration. |
|  | |  |
| ***Consequences if not approved:*** | | Understanding ambiguity on mapping the UTO-UCI bits to CG PUSCH TOs is possible. |

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| TP for 38.213 9.3.1 UE procedure for reporting UTO-UCI  If the UE is provided *nrof\_UTO\_UCI* with value equal to in *configuredGrantConfig* of a CG-PUSCH configuration, the UE multiplexes UTO-UCI represented by a bitmap of bits in each CG-PUSCH transmission for the CG-PUSCH configuration.  The bits of UTO-UCI, , have a one-to-one mapping to subsequent CG-PUSCH TOs of the same CG configuration as the CG PUSCH on which the UTO-UCI is multiplexed in ascending order of start time. For unpaired spectrum operation, the subsequent CG-PUSCH TOs exclude invalid ones where a UE does not transmit a PUSCH due to collision of the PUSCH with DL symbol(s) indicated by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated* if provided, or with symbol(s) of an SS/PBCH block with index provided by *ssb-PositionsInBurst*, based on the procedures in Clause 11.1. A bit value of '0' indicates that the UE may transmit CG-PUSCH, and a bit value of '1' indicates that the UE will not transmit CG-PUSCH, in a corresponding CG-PUSCH TO. When the UE indicates by UTO-UCI a value of '1' for a CG-PUSCH TO, the UE continues to indicate the value of '1' for the CG-PUSCH TO by UTO-UCI multiplexed in subsequent CG-PUSCH transmissions, and the UE does not transmit CG-PUSCH in the CG-PUSCH TO. |

**Moderator’s observation:** Although Moderator understands the concern, but in Moderator’s understanding the applicability of UTO-UCI for the same configuration should be clear from the first paragraph (by highlighted “for”) which clarifies that the context is the same CG configuration. If one reads second paragraph without considering the context provided in the first paragraph, the clarification in second paragraph is helpful. At least Moderator reads the second paragraph considering the context provided in the first paragraph.

It is helpful to understand companies interpretations.

### 2.3.1 Initial discussion

**Question:** What is your view about the issue raised above? Do you support adopting the proposed draft CR?

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| Company | Comment |
| OPPO | In our reading, the first paragraph, where “for” is highlighted, is about where to send UTO-UCI, while the second paragraph talks about what UTO-UCI means for each bit in the bitmap. Therefore it is a bit broken when using the first paragraph to justify the second paragraph. Without the proposed CR, we agree the meaning in the second paragraph may differ from what it intends to mean.  So we support the proposed CR. |
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## 2.4 Issue#4: Correction of RRC parameter name

Nokia has identified mismatch in an RRC parameter name as described below [5][6][7].

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| ***Reason for change:*** | The parameter name mismatch in Clauses 6.2.7, 6.3.2. RAN2 has chosen the parameter name *nrofBitsInUTO-UCI* in their latest version of 38.331, while the current version of TS 38.212 uses *nrof\_UTO\_UCI.* |
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| ***Summary of change:*** | RRC parameter change from *nrof\_UTO\_UCI* to *nrofBitsInUTO-UCI*. |
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| ***Consequences if not approved:*** | Different names for the same RRC parameter in TS 38.331 and TS 38.212 |

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| ***Reason for change:*** | The parameter name mismatch in Clause 9.3.1. RAN2 has chosen the parameter name *nrofBitsInUTO-UCI* in their latest version of 38.331, while the current version of TS 38.213 uses *nrof\_UTO\_UCI.* |
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| ***Summary of change:*** | RRC parameter change from *nrof\_UTO\_UCI* to *nrofBitsInUTO-UCI*. |
|  |  |
| ***Consequences if not approved:*** | Different names for the same RRC parameter in TS 38.331 and TS 38.213 |

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| ***Reason for change:*** | The parameters names mismatch in Clauses 5.2.3, 6.1, 6.1.2.3.   1. RAN2 has chosen the parameter name *nrofBitsInUTO-UCI* in their latest version of 38.331, while the current version of TS 38.214 uses *nrof\_UTO\_UCI.* 2. RAN2 has chosen the parameter name *nrofSlotsInCG-Period* in their latest version of 38.331, while the current version of TS 38.214 uses *nrofSlots\_InCGperiod.* |
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| ***Summary of change:*** | 1) RRC parameter change from *nrof\_UTO\_UCI* to *nrofBitsInUTO-UCI*.  2) RRC parameter change from *nrofSlots\_InCGperiod* to *nrofSlotsInCG-Period* |
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| ***Consequences if not approved:*** | Different names for the same RRC parameters in TS 38.331 and TS 38.214 |

**Moderator’s observation:** The names should be corrected to align with 38.331 spec.

### 2.4.1 Initial discussion

**Question:** What is your view about the issues raised above? Do you support adopting the proposed draft CR?

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| Company | Comment |
| OPPO | We agree with the intention. Normally the parameter name alignment between RAN1 spec and RAN2 spec is implemented by editor, even without a CR. |
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# 3 Conclusion

TBD

# References

1. **[R1-2400594](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400594.zip)** DraftCR on CG-PUSCH grant validation; OPPO
2. **[R1-2400595](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2400595.zip)** Draft CR on time-domain resource allocation for multi-PUSCH CG configuration; OPPO
3. **[R1-2401098](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401098.zip)** Remaining issues on UTO-UCI indication for XR; NTT DOCOMO, INC.
4. **[R1-2401099](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401099.zip)** Draft CR on UTO-UCI indication for same CG configuration; NTT DOCOMO, INC.
5. **[R1-2401343](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401343.zip)** Correction of RRC parameter names for XR in TS 38.212; Nokia, Nokia Shanghai Bell
6. **[R1-2401344](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401344.zip)** Correction of RRC parameter names for XR in TS 38.213; Nokia, Nokia Shanghai Bell
7. **[R1-2401345](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_116/Docs/R1-2401345.zip)** Correction of RRC parameter names for XR in TS 38.214; Nokia, Nokia Shanghai Bell