**3GPP TSG RAN WG1 #102-e R1-200xxxx**

**e-Meeting, August 17th – 28th, 2020**

Source: moderator (vivo)

Title: Feature lead summary on URLLC enhanced configured grant transmission

Agenda Item: 7.2.5.6

Document for: Discussion and Decision

1. Introduction

In this contribution, contributions submitted in AI 7.2.5.6 are summarized. In section 2, recommendations on the issues to be handled during this e-meeting are made. Details for the issues raised in the contributions are listed in section 3.

1. Recommendations on issues with high priority

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| --- | --- | --- |
| Issues | Priority | Suggestion |
| * Issue 2 Cancellation and initial transmission occasion of RV0 * Issue 3 Clarification the intra-UE prioritization is per actual or per nominal repetition for PUSCH with repetition Type B | High   * Issue 2 is raised by two companies; better to clarify the initial transmission occasion determination order * Issue 3 can be clarified by extending the Rel.15 conclusion to Rel.16 | One email discussion to include issue 2, issue 3 and RRC parameter name corrections proposed in issue 4 |
| * Issue 1: PHR handling for multiple CGs | Medium or low  There seems ambiguity issue, but not sure companies’ interests and it seems LS R1-2006759 discussed the similar issue related to PHR calculation, so better to wait? |

1. Issues with details
   1. Issue 1: PHR handling for multiple CG

[ZTE, R1-2005418] proposed to clarity that in case of multiple overlapping CGs with different priorities, actual PHR calculation is based on the one with higher priority. One illustration is shown in Figure.1. The corresponding TP is also provided as shown in appendix.



Figure 1 PHR calculation in case of multiple CGs with different priorities

* **FL views:**

In Rel.15, only one CG configuration for a BWP is supported. For example, in Figure 1, only take the CG PUSCH#2 into account without considering the CG PUSCH#1. Actually, when the MAC layer delivers the CG PUSCH to PHY is not clear (before or after t3). Therefore, whether the PH for CG PUSCH#2 is based on actual transmission or reference format can be left to UE implementation and by MAC CE format, “V” field, the PH for the CG PUSCH is actual or virtual can be known by gNB.

In Rel.16, when multiple CGs are configured for a BWP, if all CGs are with the same priority, which one to transmit is left to UE implementation; if all CGs are with different priorities, it is up to UE implementation to make sure that the low priority CG PUSCH transmission can be cancelled before the start of the high priority CG PUSCH. Still it is not sure when the MAC CE delivers the “final” CG and whether the delivering time is within or beyond the calculation time deadline. For example, as shown in Figure 2, by t3, UE starts PH calculation based on the CG PUSCH#1; at time t4, higher priority CG PUSCH#2 cancels the low priority CG PUSCH#1, it may not be possible/feasible to re-place the PH calculation based on CG PUSCH#2 instead of CG PUSCH#1. For such case, there may be ambiguity at the gNB side on which CG configuration the PH is for.

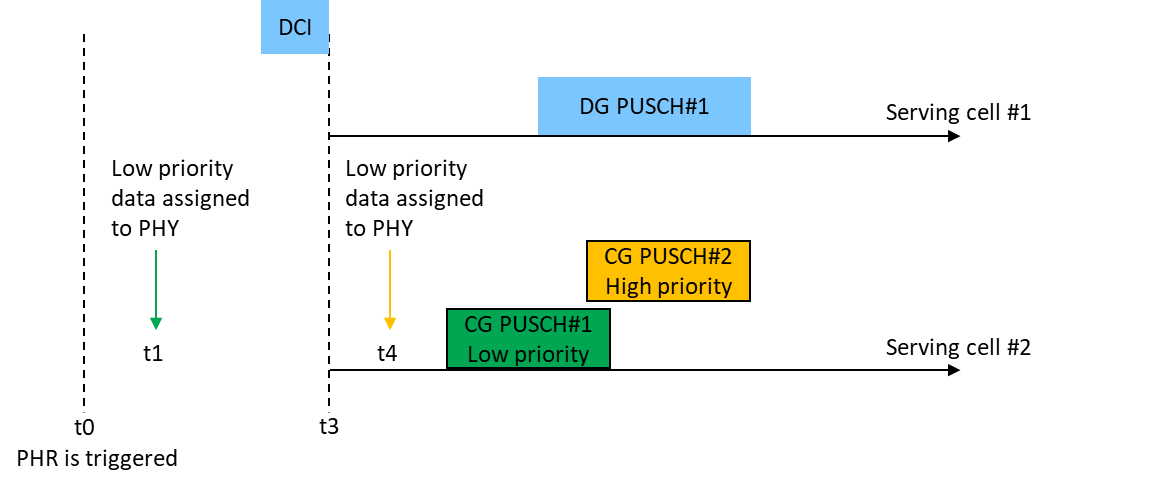


Figure 2 PHR calculation for multiple overlapped CGs

Regarding to the proposal from [ZTE, R1-2005418], followings need to be discussed

1. The “issue” illustrated in Figure 1 seems not exist, based on the timeline for PH calculation defined in 38.213 section 7.7 and 7.7.1, if the PHR is carried by DG since the PHR is triggered, the calculation time for PH should probably starts at t3, while both t1 for low CG PUSCH#1 and t2 for high priority CG PUSCH#2 are earlier than t3, there should be no issue for UE to calculate the PH based on the high priority CG PUSCH#2.
2. It is not sure whether the proposal of the PH calculation always based on the one with higher priority has impacts on the calculation timeline.
3. The proposal only covers the overlapping CGs with different priorities, it does not cover the case that the overlapping CGs have the same priorities and/or the case that the number of CGs with higher priorities is more than 1.
4. For issue illustrated in Figure 2, further discussion may be necessary on whether and how to handle this case.

* **FL suggestions: Discuss whether and how to handle the issue illustrated in Figure 2.**

Any comments?

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| --- | --- |
| Company | Comments |
| Nokia, NSB | Seems the PHR issue seems to be popping up in several places and would be good to clarify this (to prevent any miss-interpretation there). And agree with FL, that all cases should be clarified / discuss to make sure we all have the same understanding.  But as suggested by the FL, we could also wait still a bit on this one. |
| Huawei, HiSilicon | We are fine to further discuss whether and how to handle the issue, though we think the issue is not essential and the current spec can work. |
|  |  |

* 1. Issue 2: Cancellation and initial transmission occasion of RV0

[Ericsson, R1-2005511] and [Apple, R1-2006493] discussed the similar issue about the understanding on the cancellation/prioritization order and initial transmission occasion associated with RV0. [Ericsson, R1-2005511] proposed to clarify that for CG with repetitions, UE should check the condition of repetition series start described in 6.1.2.3.1 and then cancel the occasion(s) due to intra UE or inter UE prioritization. The TP is proposed as below

----------------------------------------Start of TP of section 6.1.2.3.1 in TS 38.214 ---------------------------------

**6.1.2.3.1 Transport Block repetition for uplink transmissions of PUSCH repetition Type A with a configured grant**

<Unchanged Text Omitted>

If a configured grant configuration is configured with Configuredgrantconfig-StartingfromRV0 set to 'off', the initial transmission of a transport block may only start at the first transmission occasion of the K repetitions. Otherwise, the initial transmission of a transport block may start at

- the first transmission occasion of the K repetitions if the configured RV sequence is {0,2,3,1},

- any of the transmission occasions of the K repetitions that are associated with RV=0 if the configured RV sequence is {0,3,0,3},

- any of the transmission occasions of the K repetitions if the configured RV sequence is {0,0,0,0}, except the last transmission occasion when K≥8.

A UE may further omit configured grant transmission according to the conditions in Clause 9, Clause 11.1, Clause 11.2A of [6, TS38.213].

----------------------------------------End of TP for TS 38.214 -------------------------------------------------------

* **FL suggestions:** it seems necessary to have the clarification that the condition of repetition series start described in 6.1.2.3.1 of TS 38.214 does not consider the impact from intra-UE and/or inter-UE prioritization first, then the cancellation is performed based on the intra-UE and/or inter-UE prioritization, if any.
* **Proposal 1: Adopt above TP for section 6.1.2.3.1 in TS 38.214**

Any comments?

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| --- | --- |
| Company | Comments |
| Nokia, NSB | We thought this to be clear already (so we agree with what is discussed here). But anyhow, we will not block any clarification here in order to prevent miss-understanding later on.  Maybe still a question to the group here: Would we need a similar clause then also for CG with PUSCH repetition Type B in 6.1.2.3.2? |
| Huawei, HiSilicon | Since the conditions to cancel the configured grant transmission have been clearly defined in the corresponding clauses in 38.213, such TP provides no additional information and makes the spec redundant.  Moreover, if the issue is considered as valid, we think it should be first fixed for R15, where the configured grant transmission may also be omitted due to the conditions in Clause 11.1 of 38.213. |

* 1. Issue 3: Clarification the intra-UE prioritization is per actual or per nominal repetition for PUSCH with repetition Type B

In RAN1#101 e-meeting, following conclusion was made:

**Conclusion**

In Rel.15, for a DG PUSCH scheduled by a DCI overriding a CG PUSCH configured with repetition factor K>1,

* If the HARQ process is the same between the DG and the CG, DG overrides all remaining repetition occasions after the end of PDCCH reception, under the timeline specified in TS 38.214 section 6.1.
* Otherwise, DG overrides only the CG repetition overlapped with DG, under the timeline specified in TS 38.214 section 6.1.

[Apple, R1-2006439] proposed to clarify for Rel.16, if CG and/or DG PUSCH is configured with repetition Type B, for a DG PUSCH scheduled by a DCI overriding a CG PUSCH configured with repetition factor K>1, if the HARQ process is different between the DG and the CG, under the timeline specified in TS 38.214 section 6.1, whether the actual or nominal repetition of the CG repetition that overlapped with DG, the DG will override.

It is noted that following agreements were made for the “actual” repetition cancellation in case of PUSCH configured with repetition Type B.

Agreements @ 99 meeting:

For CG PUSCH with PUSCH repetition type B, if dynamic SFI is configured, segmentation occurs at least around semi-static DL symbols, which results in actual repetitions.

* If dynamic SFI is received for the entire duration of an actual repetition, an actual repetition is not transmitted if it conflicts with a dynamic DL/flexible symbol.
* If dynamic SFI is not received for at least one symbol of an actual repetition, an actual repetition is not transmitted if it conflicts with a semi-static flexible symbol.
* FFS the handling of semi-statically configured invalid symbols for PUSCH repetition type B transmissions (if supported)

Note that the cancellation behavior is the same as Rel-15, including Rel-15 cancellation timeline

Agreements @ 98bis meeting:

* In case of PUSCH repetitions, UL CI is applied to each repetition individually (actual repetition in case of Rel-16 PUSCH repetition) that overlaps with the resource (in time and frequency) indicated by UL CI.

Therefore, it is reasonable to assume the overriding is per actual repetition. It is also noticed in TS 38.214, section 6.1.2.3.2 Transport Block repetition for uplink transmissions of PUSCH repetition Type B with a configured grant (see appendix), the transmission occasion is described in terms of the actual repetition.

* **FL views: following conclusion can be draw:**

Conclusion

In Rel.16, for a DG PUSCH scheduled by a DCI overriding a CG PUSCH configured with nominal repetition factor K>1,

* If the HARQ process is the same between the DG and the CG, DG overrides all remaining repetition occasions after the end of PDCCH reception, under the timeline specified in TS 38.214 section 6.1.
* Otherwise, DG overrides only the **actual** repetition of the CG overlapped with DG, under the timeline specified in TS 38.214 section 6.1.

Any comments?

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| --- | --- |
| Company | Comments |
| Nokia, NSB | We are fine the proposed conclusion but may just need to use plural in the formulation above, i.e. *… only the actual repetetition(s) of the CG…* |
| Huawei, HiSilicon | Support the FL’s suggestion. |
|  |  |

* 1. Issue 4: RRC parameter corrections in RAN1 specifications

[ZTE, 5418], [CATT, 5677], [vivo, 6657] proposed following corrections to align the RRC parameters used in RAN1 specification with RAN2. FL suggestion is to agree following corrections.

* **Proposal 1: Adopt following TPs for TS 38.214 to align 38.214 and 38.331.**

----------------------------------------Start of TP for TS 38.214 -------------------------------------------------------

**6 Physical uplink shared channel related procedure**

**6.1 UE procedure for transmitting the physical uplink shared channel**

PUSCH transmission(s) can be dynamically scheduled by an UL grant in a DCI, or the transmission can correspond to a configured grant Type 1 or Type 2. The configured grant Type 1 PUSCH transmission is semi-statically configured to operate upon the reception of higher layer parameter of *configuredGrantConfig* including *rrc-ConfiguredUplinkGrant* without the detection of an UL grant in a DCI. The configured grant Type 2 PUSCH transmission is semi-persistently scheduled by an UL grant in a valid activation DCI according to Clause 10.2 of [6, TS 38.213] after the reception of higher layer parameter *configuredGrantConfig* not including *rrc-ConfiguredUplinkGrant*. If *configuredGrantConfigToAddModList-r16* is configured, more than one configured grant configuration of configured grant Type 1 and/or configured grant Type 2 may be active at the same time on an active BWP of a serving cell.

For the PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant activated by DCI format 0\_0 or 0\_1, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*, *codebookSubset*, *maxRank*, *scaling of UCI-OnPUSCH*, which are provided by *pusch-Config*. For the PUSCH transmission corresponding to a Type 2 configured grant activated by DCI format 0\_2, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*,  *codebookSubsetForDCI-Format0-2*,  *maxRankForDCI-Format0-2*, *scaling* of *UCI-OnPUSCH*, *resourceAllocationType1GranularityForDCI-Format0-2* provided by *pusch-Config*.If the UE is provided with *transformPrecoder* in *configuredGrantConfig*, the UE applies the higher layer parameter *tp-pi2BPSK*, if provided in *pusch-Config*, according to the procedure described in Clause 6.1.4 for the PUSCH transmission corresponding to a configured grant.

<Unchanged Text Omitted>

**6.1.1.1 Codebook based UL transmission**

<Unchanged Text Omitted>

For codebook based transmission, the UE determines its codebook subsets based on TPMI and upon the reception of higher layer parameter *codebookSubset* in *pusch-Config* for PUSCH associated with DCI format 0\_1 and *codebookSubsetForDCI-Format0-2* in *pusch-Config* for PUSCH associated with DCI format 0\_2 which may be configured with *'*fullyAndPartialAndNonCoherent*'*, or *'*partialAndNonCoherent*'*, or 'nonCoherent' depending on the UE capability. When higher layer parameter *ul-FullPowerTransmission* is set to '*fullpowerMode2'* and the higher layer parameter *codebookSubset* or the higher layer parameter *codebookSubsetForDCI-Format0-2* is set to *'*partialAndNonCoherent', and when the SRS-resourceSet with usage set to "codebook" includes at least one SRS resource with 4 ports and one SRS resource with 2 ports, the codebookSubset associated with the 2-port SRS resource is 'nonCoherent'. The maximum transmission rank may be configured by the higher layer parameter *maxRank* in *pusch-Config* for PUSCH scheduled with DCI format 0\_1 and *maxRankForDCI-Format0-2* for PUSCH scheduled with DCI format 0\_2*.*

A UE reporting its UE capability of 'partialAndNonCoherent' transmission shall not expect to be configured by either *codebookSubset* or *codebookSubsetForDCI-Format0-2* with 'fullyAndPartialAndNonCoherent*'*.

A UE reporting its UE capability of 'nonCoherent' transmission shall not expect to be configured by either *codebookSubset* or *codebookSubsetForDCI-Format0-2* with *'*fullyAndPartialAndNonCoherent*'* or with *'*partialAndNonCoherent'.

A UE shall not expect to be configured with the higher layer parameter *codebookSubset* or the higher layer parameter *codebookSubsetForDCI-Format0-2* set to *'*partialAndNonCoherent' when higher layer parameter *nrofSRS-Ports* in an *SRS-ResourceSet* with *usage* set to 'codebook' indicates that the maximum number of the configured SRS antenna ports in the *SRS-ResourceSet* is two.

<Unchanged Text Omitted>

A UE shall not expect to be configured with higher layer parameter *ul-FullPowerTransmission* set to '*fullpowerMode1'* and *codebookSubset* or *codebookSubsetForDCI-Format0-2* set to *'fullyAndPartialAndNonCoherent'* simultaneously.

<Unchanged Text Omitted>

**6.1.2 Resource allocation**

**6.1.2.1 Resource allocation in time domain**

<Unchanged Text Omitted>

* for PUSCH scheduled by DCI format 0\_1, if *pusch-RepTypeIndicatorForDCI-Format0-1* is set to '*pusch-RepTypeB*', the UE applies PUSCH repetition Type B procedure when determining the time domain resource allocation. For PUSCH scheduled by DCI format 0\_2, if *pusch-RepTypeIndicatorForDCI-Format0-2* is set to '*pusch-RepTypeB*', the UE applies PUSCH repetition Type B procedure when determining the time domain resource allocation. Otherwise, the UE applies PUSCH repetition Type A procedure when determining the time domain resource allocation for PUSCH scheduled by PDCCH.

<Unchanged Text Omitted>

**6.1.2.2.2 Uplink resource allocation type 1**

<Unchanged Text Omitted>

When the scheduling grant is received with DCI format 0\_2, an uplink type 1 resource allocation field consists of a resource indication value (*RIV*) corresponding to a starting resource block group *RBGstart*=0, 1, …, *NRBG*-1 and a length in terms of virtually contiguously allocated resource block groups *LRBGs*=1, …, *NRBG*, where the resource block groups are defined as in 6.1.2.2.1 with *P* defined by *resourceAllocationType1GranularityForDCI-Format0-2* if the UE is configured with higher layer parameter  *resourceAllocationType1GranularityForDCI-Format0-2* , and *P*=1 otherwise*.* The resource indication value is defined by

<Unchanged Text Omitted>

**6.1.2.3 Resource allocation for uplink transmission with configured grant**

<Unchanged Text Omitted>

- 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 the rules for DCI format 0\_0 on UE specific search space, as defined in Clause 6.1.2.1.1.

- For PUSCH repetition type B, the selection of the time domain resource allocation table is as follows:

- If *pusch-RepTypeIndicatorForDCI-Format0-1* in *pusch-Config* is configured and set to *'pusch-RepTypeB'*, *pusch-TimeDomainAllocationListForDCI-Format0-1* in *pusch-Config* is used;

- Otherwise,  *pusch-TimeDomainAllocationListForDCI-Format0-2* in *pusch-Config* is used.

- It is not expected that *pusch-RepTypeIndicator* in *rrc-ConfiguredUplinkGrant* is configured with *'pusch-RepTypeB'* when none of  *pusch-RepTypeIndicatorForDCI-Format0-1* and  *pusch-RepTypeIndicatorForDCI-Format0-2* in *pusch-Config* is set to *'pusch-RepTypeB'*.

<Unchanged Text Omitted>

For PUSCH transmissions with a Type 1 or Type 2 configured grant, the number of (nominal) repetitions *K* to be applied to the transmitted transport block is provided by the indexed row in the time domain resource allocation table if *numberOfRepetitions* is present in the table; otherwise *K* is provided by the higher layer configured parameters *repK.*

The UE shall not transmit anything on the resources configured by *configuredGrantConfig* if the higher layers did not deliver a transport block to transmit on the resources allocated for uplink transmission without grant.

----------------------------------------End of TP for TS 38.214 -------------------------------------------------------

Any comments?

|  |  |
| --- | --- |
| Company | Comments |
| Nokia, NSB | We agree that RRC parameters in some specs need changes (I guess specifically 38.213 & 38.214, Zukang did some of it in 38.212 last time already).  But we are thinking if we could have one email thread for the RAN1 specs, where the editors (38.214 – Mihai, 38.213 – Aris, 38.212 - Zukang) could directly provide the draft CRs e.g. during week 1 of the e-meeting to have consistent RRC parameter notation in the relevant specs for all Rel-16 WIs (i.e. editors to guarantee consistency there). And please note, the editor will anyhow need to provide all the changes (with Editor track changes anyhow), so this will not be more work in the end for them.  There are also in other AIs similar proposed changes, so having all in one place (e.g. in 7.2.5 drafts folder) and one related email thread for 38.213 and one for 38.214 or similar? Having the RRC parameter alignment of a WI spread over the 7 AIs does not seem to make too much sense here. |
| Huawei, HiSilicon | We prefer the way proposed by Nokia to deal the misalignment issue, which seems more efficient. |
|  |  |

* **Proposal 2: Adopt following text proposal in TS 28.213.**

|  |
| --- |
| TS 38.213  10.2 PDCCH validation for DL SPS and UL grant Type 2  A UE validates, for scheduling activation or scheduling release, a DL SPS assignment PDCCH or a configured UL grant Type 2 PDCCH if  - the CRC of a corresponding DCI format is scrambled with a CS-RNTI provided by *cs-RNTI*, and  - the new data indicator field in the DCI format for the enabled transport block is set to '0', and  - the DFI flag field, if present, in the DCI format is set to '0', and  - if validation is for scheduling activation and if the PDSCH-to-HARQ\_feedback timing indicator field in the DCI format is present, the PDSCH-to-HARQ\_feedback timing indicator field does not provide an inapplicable value from *dl-DataToUL-ACK*.  If a UE is provided a single configuration for UL grant Type 2 PUSCH or for SPS PDSCH, validation of the DCI format is achieved if all fields for the DCI format are set according to Table 10.2-1 or Table 10.2-2.  If a UE is provided more than one configurations for UL grant Type 2 PUSCH or for SPS PDSCH, a value of the HARQ process number field in a DCI format indicates an activation for a corresponding UL grant Type 2 PUSCH or for a SPS PDSCH configuration with a same value as provided by *Configuredgrantconfig-index* or by *SPSconfig-index*, respectively. Validation of the DCI format is achieved if the RV field for the DCI format is set as in Table 10.2-3.  If a UE is provided more than one configuration for UL grant Type 2 PUSCH or for SPS PDSCH  - if the UE is provided *ConfiguredGrantConfigType2DeactivationStateList~~Type2Configuredgrantconfig-ReleaseStateList~~* or *sps-ConfigDeactivationStateList ~~SPS-ReleaseStateList~~*, a value of the HARQ process number field in a DCI format indicates a corresponding entry for scheduling release of one or more UL grant Type 2 PUSCH or SPS PDSCH configurations  - if the UE is not provided *ConfiguredGrantConfigType2DeactivationStateList ~~Type2Configuredgrantconfig-ReleaseStateList~~* or *sps-ConfigDeactivationStateList ~~SPS-ReleaseStateList~~*, a value of the HARQ process number field in a DCI format indicates a release for a corresponding UL grant Type 2 PUSCH or for a SPS PDSCH configuration with a same value as provided by *Configuredgrantconfig-index* or by *SPSconfig-index*, respectively  [omit the unchanged part] |

Any comments?

|  |  |
| --- | --- |
| Company | Comments |
| Nokia, NSB | Same comments as above, i.e.:  *We agree that RRC parameters in some specs need changes (I guess specifically 38.213 & 38.214, Zukang did some of it in 38.212 last time already).*  *But we are thinking if we could have one email thread for the RAN1 specs, where the editors (38.214 – Mihai, 38.213 – Aris, 38.212 - Zukang) could directly provide the draft CRs e.g. during week 1 of the e-meeting to have consistent RRC parameter notation in the relevant specs for all Rel-16 WIs (i.e. editors to guarantee consistency there). And please note, the editor will anyhow need to provide all the changes (with Editor track changes anyhow), so this will not be more work in the end for them.*  *There are also in other AIs similar proposed changes, so having all in one place (e.g. in 7.2.5 drafts folder) and one related email thread for 38.213 and one for 38.214 or similar? Having the RRC parameter alignment of a WI spread over the 7 AIs does not seem to make too much sense here.* |
| Huawei, HiSilicon | We prefer the way proposed by Nokia to deal the misalignment issue, which seems more efficient. |
|  |  |

* 1. Other corrections
     1. Issue 5: RRC parameter related

[OPPO, R1-2006056] proposed following corrections:

|  |
| --- |
| ------------------------------------ Start of TP 38.214 V16.2.0 section 6.1---------------------------------  For the PUSCH transmission corresponding to a Type 1 configured grant or a Type 2 configured grant activated by DCI format 0\_0 or 0\_1, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*, *codebookSubset*,if configured, otherwise *codebookSubset-ForDCIFormat0\_2*, *maxRank*, if configured, otherwise *maxRank-ForDCIFormat0\_2*, *scaling* of *UCI-OnPUSCH,* which are provided by *pusch-Config*. For the PUSCH transmission corresponding to a Type 2 configured grant activated by DCI format 0\_2, the parameters applied for the transmission are provided by *configuredGrantConfig* except for *dataScramblingIdentityPUSCH*, *txConfig*, *codebookSubset-ForDCIFormat0\_2*, *maxRank-ForDCIFormat0\_2*, *scaling* of *UCI-OnPUSCH*, *ResourceAllocationType1-granularity-ForDCIFormat0\_2* provided by *pusch-Config*.If the UE is provided with *transformPrecoder* in *configuredGrantConfig*, the UE applies the higher layer parameter *tp-pi2BPSK*, if provided in *pusch-Config*, according to the procedure described in Clause 6.1.4 for the PUSCH transmission corresponding to a configured grant.  -------------------------------------- End of TP 38.214 V16.2.0 section 6.1----------------------------------- |

* **FL views: Above update is not correct and necessary since 331 specifies if those fields are absent, default values should be used as specified in 331 and 214.** 
  + dataScramblingIdentityPUSCH: If the field is absent, the UE applies the physical cell ID.
  + txConfig: If the field is absent, the UE transmits PUSCH on one antenna port, see TS 38.214, clause 6.1.1
  + codebookSubset, maxRankFor are conditioned on codebook based transmission.

Any comments?

|  |  |
| --- | --- |
| Company | Comments |
| Nokia, NSB | Clearly, for the Rel-15 DCI format operation, there is no need for additional default values than what is given by Rel-15. Therefore, no changes seen as needed (no need to discuss this). |
| Huawei, HiSilicon | Agree with the FL’s view. |
|  |  |

* + 1. Issue 6: Apply invalid symbol pattern to Type 1 CG

In addition, [OPPO, R1-2006056] proposed to clarify that invalidSymbolPattern is always applied to type 1 configured grant if invalidSymbolPattern is configured.

* **FL views: such clarification is not necessary since it was already captured in current spec 214 based on agreements made in RAN1 100 e-meeting.**

Agreements@100 e-meeting:

For Type 1 CG PUSCH with repetition Type B, regardless of whether dynamic SFI is configured or not, if *InvalidSymbolPattern* is configured, the configured pattern is applied (that is, segmentation occurs around semi-static DL symbols and invalid symbols indicated by *InvalidSymbolPattern*).

======================38.214 section 6.1.2.1 Resource allocation in time domain =============

For PUSCH repetition Type B, the UE determines invalid symbol(s) for PUSCH repetition Type B transmission as follows:

[omit the irrelevant part]

- The UE may be configured with the higher layer parameter *InvalidSymbolPattern*, which provides a symbol level bitmap spanning one or two slots (higher layer parameter *symbols* given by *InvalidSymbolPattern*). A bit value equal to 1 in the symbol level bitmap *symbols* indicates that the corresponding symbol is an invalid symbol for PUSCH repetition Type B transmission. The UE may be additionally configured with a time-domain pattern (higher layer parameter *periodicityAndPattern* given by *InvalidSymbolPattern*), where each bit of *periodicityAndPattern* corresponds to a unit equal to a duration of the symbol level bitmap *symbols*, and a bit value equal to 1 indicates that the symbol level bitmap *symbols* is present in the unit. The *periodicityAndPattern* can be {1, 2, 4, 5, 8, 10, 20 or 40} units long, but maximum of 40ms. The first symbol of *periodicityAndPattern* every 40ms/P periods is a first symbol in frame 𝑛𝑓 mod 4 = 0, where P is the duration of *periodicityAndPattern* in units of ms. When *periodicityAndPattern* is not configured, for a symbol level bitmap spanning two slots, the bits of the first and second slots correspond respectively to even and odd slots of a radio frame, and for a symbol level bitmap spanning one slot, the bits of the slot correspond to every slot of a radio frame. If *InvalidSymbolPattern* is configured, when the UE applies the invalid symbol pattern is determined as follows:

- if the PUSCH is scheduled by DCI format 0\_1, or corresponds to a Type 2 configured grant activated by DCI format 0\_1, and if *InvalidSymbolPatternIndicator-ForDCIFormat0\_1* is configured,

- if invalid symbol pattern indicator field is set 1, the UE applies the invalid symbol pattern;

- otherwise, the UE does not apply the invalid symbol pattern;

- if the PUSCH is scheduled by DCI format 0\_2, or corresponds to a Type 2 configured grant activated by DCI format 0\_2, and if *InvalidSymbolPatternIndicator-ForDCIFormat0\_2* is configured,

- if invalid symbol pattern indicator field is set 1, the UE applies the invalid symbol pattern;

- otherwise, the UE does not apply the invalid symbol pattern;

- otherwise, the UE applies the invalid symbol pattern.

[omit the irrelevant part]

Any comments?

|  |  |
| --- | --- |
| Company | Comments |
| Nokia, NSB | Agree with FL assessment, this is clarified in 38.214 already. |
| Huawei, HiSilicon | We proposed a TP in last meeting trying to make the spec clearer. At that time, most companies thought that the current spec is clear enough and no TP is needed to further clarify the application of invalid symbol pattern for Type 1 CG.  Since this is not an essential issue, we are ok with the FL’s suggestion to leave the spec as it is now. |
|  |  |

# References

1. [R1-2005418](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005418.zip) Remaining issues on enhancements for UL configured grant transmission ZTE
2. [R1-2005511](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005511.zip) Remaining Issue of Enhancements to UL Configured Grant Transmission for NR URLLC Ericsson
3. [R1-2005677](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005677.zip) Corrections on Enhanced UL configured grant transmission CATT
4. [R1-2006056](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006056.zip) Configured grant enhancements for URLLC OPPO
5. [R1-2006493](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006493.zip) Remaining issues on enhanced UL configured grant transmission Apple
6. [R1-2006657](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006657.zip) Corrections for configured grant PUSCH vivo

# Appendix

[ZTE, R1-2005418] ***Proposal 1:*** *In case of multiple overlapping CGs with different priorities, actual PHR calculation is based on the one with higher priority. RAN1 endorses the TP#1 below.*

|  |
| --- |
| *TP#1 on section 7.7.1 of TS 38.213* |
| If a UE is configured with multiple cells for PUSCH transmissions, where a SCS configuration  on active UL BWP  of carrier  of serving cell  is smaller than a SCS configuration  on active UL BWP  of carrier  of serving cell , and if the UE provides a Type 1 power headroom report in a PUSCH transmission in a slot on active UL BWP  that overlaps with multiple slots on active UL BWP , the UE provides a Type 1 power headroom report for the first PUSCH with larger priority index, if any, on the first slot of the multiple slots on active UL BWP  that fully overlaps with the slot on active UL BWP . If a UE is configured with multiple cells for PUSCH transmissions, where a same SCS configuration on active UL BWP  of carrier  of serving cell  and active UL BWP  of carrier  of serving cell , and if the UE provides a Type 1 power headroom report in a PUSCH transmission in a slot on active UL BWP  , the UE provides a Type 1 power headroom report for the first PUSCH with larger priority index, if any, on the slot on active UL BWP  that overlaps with the slot on active UL BWP .  If a UE is configured with multiple cells for PUSCH transmissions and provides a Type 1 power headroom report in a PUSCH transmission with PUSCH repetition Type B having a nominal repetition that spans multiple slots on active UL BWP  and overlaps with one or more slots on active UL BWP , the UE provides a Type 1 power headroom report for the first PUSCH with larger priority index, if any, on the first slot of the one or more slots on active UL BWP  that overlaps with the multiple slots of the nominal repetition on active UL BWP . |

TS 38.214

6.1.2.3.2 Transport Block repetition for uplink transmissions of PUSCH repetition Type B with a configured grant

The procedures described in this Clause apply to PUSCH transmissions of PUSCH repetition type B with a Type 1 or Type 2 configured grant.

For PUSCH transmissions with a Type 1 or Type 2 configured grant, the nominal repetitions and the actual repetitions are determined according to the procedures for PUSCH repetition Type B defined in Clause 6.1.2.1. The higher layer configured parameters *repK-RV* defines the redundancy version pattern to be applied to the repetitions. If the parameter *repK-RV* is not provided in the *configuredGrantConfig*, the redundancy version for each actual repetition with a configured grant shall be set to 0. Otherwise, for the *n*th transmission occasion among all the actual repetitions (including the actual repetitions that are omitted) of the *K* nominal repetitions, it is associated with *(mod(n-1,4)+1)th* value in the configured RV sequence. If a configured grant configuration is configured with *Configuredgrantconfig-StartingfromRV0* set to *'off'*, the initial transmission of a transport block may only start at the first transmission occasion of the actual repetitions. Otherwise, the initial transmission of a transport block may start at

- the first transmission occasion of the actual repetitions if the configured RV sequence is {0,2,3,1},

- any of the transmission occasions of the actual repetitions that are associated with RV=0 if the configured RV sequence is {0,3,0,3},

- any of the transmission occasions of the actual repetitions if the configured RV sequence is {0,0,0,0}, except the actual repetitions within the last nominal repetition when *K≥8*.

For any RV sequence, the repetitions shall be terminated after transmitting K nominal repetitions, or at the last transmission occasion among the *K* nominal repetitions within the period *P*, or from the starting symbol of a repetition that overlaps with a PUSCH with the same HARQ process scheduled by DCI format 0\_0, 0\_1 or 0\_2, whichever is reached first. The UE is not expected to be configured with the time duration for the transmission of *K* nominal repetitions larger than the time duration derived by the periodicity *P*.

## 6.1 UE procedure for transmitting the physical uplink shared channel

[omit the irrelevant part]

A UE is not expected to be scheduled by a PDCCH ending in symbol to transmit a PUSCH on a given serving cell overlapping in time with a transmission occasion, where the UE is allowed to transmit a PUSCH with configured grant according to [10, TS38.321], starting in a symbol on the same serving cell if the end of symbol is not at least symbols before the beginning of symbol . The value in symbols is determined according to the UE processing capability defined in Clause 6.4, and and the symbol duration are based on the minimum of the subcarrier spacing corresponding to the PUSCH with configured grant and the subcarrier spacing of the PDCCH scheduling the PUSCH.

[omit the irrelevant part]