3GPP TSG-RAN WG2 Meeting #115 Electronic R2-210xxxx

Elbonia, 16th- 27th, August, 2021

**Agenda item: 6.1.3.1**

**Source: ZTE (Rapporteur)**

**Title: [AT115-e][021][NR16] MAC III (ZTE)**

**WID/SID: NR\_unlic-Core, NR\_IIOT-Core,** **, NR\_2step\_RACH-Core, NR\_UE\_pow\_sav-Core, TEI16 - Release 16**

**Document for: Discussion and Decision**

# 1 Introduction

This document is the report of the following email discussion:

* [AT115-e][021][NR16] MAC III (ZTE)

Scope: Determine agreeable parts and agree CRs, Treat R2-2108267, R2-2107481, R2-2107569, R2-2107199, R2-2108120, R2-2108343, R2-2107062, R2-2107656, R2-2108785, R2-2108767, R2-2107010, R2-2107782, R2-2108096, R2-2108266, R2-2108603,

Intended outcome: Report, Agreed CRs.

Deadline: Schedule 1

# 2 Contact Points

Respondents to the email discussion are kindly asked to fill in the following table.

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| --- | --- | --- |
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# Discussion

## **NRIIOT/URLLC**

[**R2-2108267**](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108267.zip) **Correction to 38.321 on priority handling about the UL grant addressed to TC-RNTI    ZTE Corporation, Sanechips    CR    Rel-16    38.321    16.5.0    1145    -    F    NR\_IIOT-Core**

R2-2108267 mentioned that in the current specification, the priority handling for the collision between the UL grant addressed to TC-RNTI and dynamic grant (i.e DG) is self-contradictory:

------------------- From 38.321 g50 -----------------------------------------------

When the MAC entity is configured with *lch-basedPrioritization*, for each uplink grant delivered to the HARQ entity and whose associated PUSCH can be transmitted by lower layers, the MAC entity shall:

1> if this uplink grant is received in a Random Access Response (i.e. in a MAC RAR or fallback RAR), or addressed to Temporary C-RNTI, or is determined as specified in clause 5.1.2a for the transmission of the MSGA payload:

2> consider **this uplink grant** as a prioritized uplink grant.

1> else if this uplink grant is addressed to CS-RNTI with NDI = 1 or C-RNTI:

2> if there is no overlapping PUSCH duration of a configured uplink grant which was not already de-prioritized, in the same BWP whose priority is higher than the priority of the uplink grant; and

2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:

3> consider this uplink grant as a prioritized uplink grant;

3> consider the **other overlapping uplink grant(s)**, if any, as a de-prioritized uplink grant(s);

3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s).

------------------- From 38.321 g50 -----------------------------------------------

The root reason is because, according to the current MAC spec, the UL grant addressed to TC-RNTI and UL grant addressed to C-RNTI will be sent to HARQ entity together even though their PUSCH duration is overlapped with each other.

So R2-2108267 suggest to make a modification as shown below from which only one UL grant can be sent to the HARQ entity when the collision case between UL grant addressed to TC-RNTI and dynamic grant happens.

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| NOTE 3: If the MAC entity receives a grant in a Random Access Response (i.e. MAC RAR or fallbackRAR), addressed to Temporary C-RNTI or determines a grant as specified in clause 5.1.2a for MSGA payload and if the MAC entity also receives an overlapping grant for its C-RNTI or CS-RNTI, requiring concurrent transmissions on the SpCell, the MAC entity may choose to continue with either the grant for its RA-RNTI/Temporary C-RNTI/MSGB-RNTI/the MSGA payload transmission or the grant for its C-RNTI or CS-RNTI. |

Q1: Do companies agree with this issue?, and if yes, is the suggested change (in R2-2108267) fine or does the change need be improved?

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| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes | The case of TC-RNTI was unintentionally missed when the note was added to the spec. |
| CATT | Yes | NOTE 3 clarifies that UE selects by implementation between a dynamic grant and a grant in a Random Access Response or MSGA, so that they do not end-up colliding in the following LCH-based prioritization procedure. But NOTE 3 is missing the TC-RNTI case. For more readable, “), addressed to Temporary C-RNTI” should be “), or addressed to Temporary C-RNTI” |
| Nokia | Neutral | Discussed a few times and concluded with no change? |
| ZTE(Proponent) | Yes | Regarding the comments from NOKIA, this is because we have achieved the consensus that every UL grant sent to HARQ entity shall take part in the LCH prioritization handling procedure,that’s why we have the following prerequisite condition as below yellow highlighted:  ------------------- From 38.321 g50 -----------------------------------------------  When the MAC entity is configured with *lch-basedPrioritization*, for each uplink grant delivered to the HARQ entity and whose associated PUSCH can be transmitted by lower layers, the MAC entity shall:  1> if this uplink grant is received in a Random Access Response (i.e. in a MAC RAR or fallback RAR), or addressed to Temporary C-RNTI, or is determined as specified in clause 5.1.2a for the transmission of the MSGA payload:  2> consider **this uplink grant** as a prioritized uplink grant.  1> else if this uplink grant is addressed to CS-RNTI with NDI = 1 or C-RNTI:  2> if there is no overlapping PUSCH duration of a configured uplink grant which was not already de-prioritized, in the same BWP whose priority is higher than the priority of the uplink grant; and  2> if there is no overlapping PUCCH resource with an SR transmission which was not already de-prioritized and the priority of the logical channel that triggered the SR is higher than the priority of the uplink grant:  3> consider this uplink grant as a prioritized uplink grant;  3> consider the **other overlapping uplink grant(s)**, if any, as a de-prioritized uplink grant(s);  3> consider the other overlapping SR transmission(s), if any, as a de-prioritized SR transmission(s).  ------------------- From 38.321 g50 -----------------------------------------------  According to this new addition, we need to make sure only one UL grant can be sent to HARQ entity, otherwise, UE may have no idea which UL grant can be prioritized as shown in green highlighted.Hence, the explicit indication for instruction is needed in Note3. |
| Samsung | No | RAN2 discussed the issue earlier, and decided to leave the text as it is. |
| LG | No | In RAN2#109e, RAN2 already agreed to keep Rel-15 principle for resource overlapping with uplink grant received in RAR:  B) For the collision with case UL grant received in RAR (or addressed to temporary C-RNTI) vs DG, it is up to UE implementation which resource is chosen. (no need to change)  In RAN2#111e, the same issue was discussed in R2-2007861 but the CR was not pursued as an outcome of e-mail discussion (R2-2108448), where we think that the UE implementation would anyway select one of the collided uplink grants based on the NOTE3. |
| OPPO | Yes | If TC-RNTI and C-RNTI are both delivered to HARQ entity, it’s not clear how to handle this case for grant prioritization. Thus we think it’s a reasonable clarification. |
| Huawei, HiSilicon | Neutral | In R2-2008448, it was agreed not to pursue the same change in our CR in R2-2007861. When the MAC entity, configured with lch-basedPrioritization, receives dynamic grant and uplink grant addressed to TC-RNTI, we understand that the uplink grant addressed to TC-RNTI will be considered as prioritized, the dynamic grant will NOT be considered as a prioritized uplink grant. |
| Intel | Neutral | Understood that the issue was discussed before and we don’t have a strong view on whether change is needed. |
| MediaTek | Yes | This change to the Note resolves the contradiction highlighted by ZTE |
| Ericsson | No | This does not seem critical as there are no functional changes.  The consequences if not approved are not sufficiently explained. |
| Apple | Yes | We agree with the analysis in the CR and by the rapporteur. Also, the NOTE 3 was updated after RAN2#111e. The clarification in the CR is fine to us. |

**R2-2108266 Correction to 38.321 on application of the information element for extension    ZTE Corporation, Samsung    CR    Rel-16    38.321    16.5.0    1144    -    F    NR\_IIOT-Core, NR\_eMIMO-Core**

R2-2108266 have mentioned that the below information elements are introduced for extending the value range compare to the original ones:

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| ***candidateBeamRSList, candidateBeamRSListExt-v1610***  The list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery and the associated RA parameters. The UE shall consider this list to include all elements of *candidateBeamRSList* (without suffix) and all elements of *candidateBeamRSListExt-v1610*. The network configures these reference signals to be within the linked DL BWP (i.e., within the DL BWP with the same *bwp-Id*) of the UL BWP in which the *BeamFailureRecoveryConfig* is provided. |

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| ***periodicityExt***  This field is used to calculate the periodicity for UL transmission without UL grant for type 1 and type 2 (see TS 38.321 [3], clause 5,8.2). If this field is present, the field *periodicity* is ignored.  The following eriodicitys are supported depending on the configured subcarrier spacing [symbols]:  15 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 640.  30 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 1280.  60 kHz with normal CP: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 2560.  60 kHz with ECP: *periodicityExt*\*12, where *periodicityExt* has a value between 1 and 2560.  120 kHz: *periodicityExt*\*14, where *periodicityExt* has a value between 1 and 5120. |

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| ***periodicityExt***  This field is used to calculate the periodicity for DL SPS (see TS 38.214 [19] and see TS 38.321 [3], clause 5,8.1). If this field is present, the field *periodicity* is ignored.  The following periodicities are supported depending on the configured subcarrier spacing [ms]:  15 kHz: *periodicityExt*, where *periodicityExt* has a value between 1 and 640.  30 kHz: 0.5 x *periodicityExt*, where *periodicityExt* has a value between 1 and 1280.  60 kHz with normal CP. 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560.  60 kHz with ECP: 0.25 x *periodicityExt*, where *periodicityExt* has a value between 1 and 2560.  120 kHz: 0.125 x *periodicityExt*, where *periodicityExt* has a value between 1 and 5120. |

However, the MAC specification does not capture above information elements which may result in that the UE behavior with above information elements contradict with their field description as highlighted. Therefore, the intention of R2-2108266 is to align the MAC spec with the RRC spec about above information elements.

The correction is shown as below

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| **First Change** 5.1.1 Random Access procedure initialization The Random Access procedure described in this clause is initiated by a PDCCH order, by the MAC entity itself, or by RRC for the events in accordance with TS 38.300 [2]. There is only one Random Access procedure ongoing at any point in time in a MAC entity. The Random Access procedure on an Scell shall only be initiated by a PDCCH order with *ra-PreambleIndex* different from 0b000000.  /\*omit for short\*/  - *rsrp-ThresholdSSB*: an RSRP threshold for the selection of the SSB for 4-step RA type. If the Random Access procedure is initiated for beam failure recovery, *rsrp-ThresholdSSB* used for the selection of the SSB within *candidateBeamRSList* and *candidateBeamRSListExt* refers to *rsrp-ThresholdSSB* in *BeamFailureRecoveryConfig* IE;  - *rsrp-ThresholdCSI-RS*: an RSRP threshold for the selection of CSI-RS for 4-step RA type. If the Random Access procedure is initiated for beam failure recovery, *rsrp-ThresholdCSI-RS* is equal to *rsrp-ThresholdSSB* in *BeamFailureRecoveryConfig* IE;  - *msgA-RSRP-ThresholdSSB*: an RSRP threshold for the selection of the SSB for 2-step RA type;  - *rsrp-ThresholdSSB-SUL*: an RSRP threshold for the selection between the NUL carrier and the SUL carrier;  *- msgA-RSRP-Threshold*: an RSRP threshold for selection between 2-step RA type and 4-step RA type when both 2-step and 4-step RA type Random Access Resources are configured in the UL BWP;  - *msgA-TransMax*: The maximum number of MSGA transmissions when both 4-step and 2-step RA type Random Access Resources are configured;  - *candidateBeamRSList, candidateBeamRSListExt*: a list of reference signals (CSI-RS and/or SSB) identifying the candidate beams for recovery and the associated Random Access parameters; |

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| **The Second Change:** 5.1.2 Random Access Resource selection If the selected *RA\_TYPE* is set to *4-stepRA*, the MAC entity shall:   1. if the Random Access procedure was initiated for SpCell beam failure recovery (as specified in clause 5.17); and 2. if the *beamFailureRecoveryTimer* (in clause 5.17) is either running or not configured; and 3. if the contention-free Random Access Resources for beam failure recovery request associated with any of the SSBs and/or CSI-RSs have been explicitly provided by RRC; and 4. if at least one of the SSBs with SS-RSRP above *rsrp-ThresholdSSB* amongst the SSBs in *candidateBeamRSList* and *candidateBeamRSListExt* or the CSI-RSs with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the CSI-RSs in *candidateBeamRSList* and *candidateBeamRSListExt* is available:   2> select an SSB with SS-RSRP above *rsrp-ThresholdSSB* amongst the SSBs in *candidateBeamRSList* and *candidateBeamRSListExt* or a CSI-RS with CSI-RSRP above *rsrp-ThresholdCSI-RS* amongst the CSI-RSs in *candidateBeamRSList* and *candidateBeamRSListExt*;  2> if CSI-RS is selected, and there is no *ra-PreambleIndex* associated with the selected CSI-RS:  3> set the *PREAMBLE\_INDEX* to a *ra-PreambleIndex* corresponding to the SSB in *candidateBeamRSList* and *candidateBeamRSListExt* which is quasi-colocated with the selected CSI-RS as specified in TS 38.214 [7].  /\*omit for short\*/   1. else if a CSI-RS is selected above:   2> if there is no contention-free Random Access Resource associated with the selected CSI-RS:  3> determine the next available PRACH occasion from the PRACH occasions, permitted by the restrictions given by the *ra-ssb-OccasionMaskIndex* if configured, corresponding to the SSB in *candidateBeamRSList* and *candidateBeamRSListExt* which is quasi-colocated with the selected CSI-RS as specified in TS 38.214 [7] (the MAC entity shall select a PRACH occasion randomly with equal probability amongst the consecutive PRACH occasions according to clause 8.1 of TS 38.213 [6], corresponding to the SSB which is quasi-colocated with the selected CSI-RS; the MAC entity may take into account the possible occurrence of measurement gaps when determining the next available PRACH occasion corresponding to the SSB which is quasi-colocated with the selected CSI-RS).  2> else:  3> determine the next available PRACH occasion from the PRACH occasions in *ra-OccasionList* corresponding to the selected CSI-RS (the MAC entity shall select a PRACH occasion randomly with equal probability amongst the PRACH occasions occurring simultaneously but on different subcarriers, corresponding to the selected CSI-RS; the MAC entity may take into account the possible occurrence of measurement gaps when determining the next available PRACH occasion corresponding to the selected CSI-RS).  1> perform the Random Access Preamble transmission procedure (see clause 5.1.3). |

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| **The Third Change:** 5.3.1 DL Assignment reception /\*omit for short\*/  For configured downlink assignments without *harq-ProcID-Offset*, the HARQ Process ID associated with the slot where the DL transmission starts is derived from the following equation:  HARQ Process ID = [floor (CURRENT\_slot × 10 / (*numberOfSlotsPerFrame* × *P*))] modulo *nrofHARQ-Processes*  where CURRENT\_slot = [(SFN × *numberOfSlotsPerFrame*) + slot number in the frame] and *numberOfSlotsPerFrame* refers to the number of consecutive slots per frame as specified in TS 38.211 [8], *P* refers to either *periodicity or periodicityExt* according to TS 38.331[5].  For configured downlink assignments with *harq-ProcID-Offset*, the HARQ Process ID associated with the slot where the DL transmission starts is derived from the following equation:  HARQ Process ID = [floor (CURRENT\_slot × 10 / (*numberOfSlotsPerFrame* × *eriodicity*))] modulo *nrofHARQ-Processes* + *harq-ProcID-Offset*  where CURRENT\_slot = [(SFN × *numberOfSlotsPerFrame*) + slot number in the frame] and *numberOfSlotsPerFrame* refers to the number of consecutive slots per frame as specified in TS 38.211 [8], *P* refers to either *periodicity or periodicityExt* according to TS 38.331[5]. |

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| **The Fourth Change:** 5.4.1 UL Grant reception /\*omit for short\*/  For configured uplink grants neither configured with *harq-ProcID-Offset2* nor with *cg-RetransmissionTimer*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:  HARQ Process ID = [floor(CURRENT\_symbol/*P*)] modulo *nrofHARQ-Processes*  Where *P* refers to either *periodicity or periodicityExt* according to TS 38.331 [5].  For configured uplink grants with *harq-ProcID-Offset2*, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:  HARQ Process ID = [floor(CURRENT\_symbol / *eriodicity*)] modulo *nrofHARQ-Processes* + *harq-ProcID-Offset2*  where CURRENT\_symbol = (SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot* + slot number in the frame × *numberOfSymbolsPerSlot* + symbol number in the slot), and *numberOfSlotsPerFrame* and *numberOfSymbolsPerSlot* refer to the number of consecutive slots per frame and the number of consecutive symbols per slot, respectively as specified in TS 38.211 [8], *P* refers to either *periodicity or periodicityExt* according to TS 38.331 [5]. |

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| **The Fifth Change：**5.8.1 Downlink Semi-Persistent Scheduling (SPS) is configured by RRC for a Serving Cell per BWP. Multiple assignments can be active simultaneously in the same BWP. Activation and deactivation of the DL SPS are independent among the Serving Cells.  For the DL SPS, a DL assignment is provided by PDCCH, and stored or cleared based on L1 signalling indicating SPS activation or deactivation.  RRC configures the following parameters when the SPS is configured:  - *cs-RNTI*: CS-RNTI for activation, deactivation, and retransmission;  - *nrofHARQ-Processes*: the number of configured HARQ processes for SPS;  - *harq-ProcID-Offset*: Offset of HARQ process for SPS;  - *periodicity, periodicityExt*: periodicity of configured downlink assignment for SPS.  When the SPS is released by upper layers, all the corresponding configurations shall be released.  After a downlink assignment is configured for SPS, the MAC entity shall consider sequentially that the Nth downlink assignment occurs in the slot for which:  (*numberOfSlotsPerFrame* × SFN + slot number in the frame) = [(*numberOfSlotsPerFrame* × SFNstart time + slotstart time) + N ×*P* × *numberOfSlotsPerFrame* / 10] modulo (1024 × *numberOfSlotsPerFrame*)  where SFNstart time and slotstart time are the SFN and slot,respectively, of the first transmission of PDSCH where the configured downlink assignment was (re-)initialised, *P* refers to either *periodicity or periodicityExt* according to TS 38.331 [5]  NOTE: In case of unaligned SFN across carriers in a cell group, the SFN of the concerned Serving Cell is used to calculate the occurrences of configured downlink assignments. 5.8.2 Uplink /\*omit for short\*/  - *periodicity, periodicityExt*: periodicity of the configured grant Type 1;  …  - *periodicity, periodicityExt*: periodicity of the configured grant Type 2;  /\*omit for short\*/  After an uplink grant is configured for a configured grant Type 1, the MAC entity shall consider sequentially that the Nth (N >= 0) uplink grant occurs in the symbol for which:  [(SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*) + (slot number in the frame × *numberOfSymbolsPerSlot*) + symbol number in the slot] =  (*timeReferenceSFN* × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot* *+* *timeDomainOffset* × *numberOfSymbolsPerSlot* + *S* + N × *eriodicity*) modulo (1024 × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*).  Where *P* refers to either *periodicity or periodicityExt* according to TS 38.331 [5].  After an uplink grant is configured for a configured grant Type 2, the MAC entity shall consider sequentially that the Nth (N >= 0) uplink grant occurs in the symbol for which:  [(SFN × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*) + (slot number in the frame × *numberOfSymbolsPerSlot*) + symbol number in the slot] = [(SFNstart time × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot* + slotstart time × *numberOfSymbolsPerSlot* + symbolstart time) + N × *eriodicity*] modulo (1024 × *numberOfSlotsPerFrame* × *numberOfSymbolsPerSlot*).  Where SFNstart time, slotstart time, and symbolstart time are the SFN, slot, and symbol, respectively, of the first transmission opportunity of PUSCH where the configured uplink grant was (re-)initialised, *P* refers to either *periodicity or periodicityExt* according to TS 38.331 [5] |

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| **The Sixth Change**: 5.17 Beam Failure Detection and Recovery procedure /\*omit for short\*/  …  - *ra-OccasionList*: *ra-OccasionList* for the SpCell beam failure recovery using contention-free Random Access Resources;  - *candidateBeamRSList, candidateBeamRSListExt*: list of candidate beams for SpCell beam failure recovery;  - *candidateBeamRSSCellList*: list of candidate beams for Scell beam failure recovery. |

Q2: Do companies agree with this issue?, and if yes, are the suggested changes in R2-2108266 fine or do the changes need be improved?

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| Company | Yes/No | Technical Arguments |
| Qualcomm | No | Our preference is that MAC spec does not need to capture release-specific changes in parameters and keep MAC spec focusing on procedural aspects. Users of the MAC spec should refer to 38.331 to find the exact definition, range, values, etc of a parameter. |
| CATT | Not sure | We need to discuss if all extended parameters should be captured in UP specification first. If needed, we will elaborate all such parameters and impacted specifications, such as *discardTimerExt* in PDCP specification. |
| Nokia | No | Agree with Qualcomm |
| ZTE(Proponent) | Yes | According to the general principle in 38.331:  - *For future extension:* When an extension is introduced a suffix is added to the identifier of the concerned ASN.1 field and/or type. A suffix of the form “‑rX” is used, with X indicating the release, for ASN.1 fields or types introduced in a later release (i.e. a release later than the original/first release of the protocol) as well as for ASN.1 fields or types for which a revision is introduced in a later release replacing a previous version, *e.g.*, *Foo-r9* for the Rel-9 version of the ASN.1 type *Foo*. A suffix of the form “‑rXb” is used for the first revision of a field that it appears in the same release (X) as the original version of the field, “‑rXc” for a second intra-release revision and so on. A suffix of the form “‑vXYZ” is used for ASN.1 fields or types that only are an extension of a corresponding earlier field or type (see sub-clause A.4), e.g., *AnElement-v10b0* for the extension of the ASN.1 type *AnElement* introduced in version 10.11.0 of the specification. A number *0…9, 10, 11, etc.* is used to represent the first part of the version number, indicating the release of the protocol. Lower case letters *a, b, c, etc.* are used to represent the second (and third) part of the version number if they are greater than 9. In the procedural specification, in field descriptions as well as in headings suffices are not used, unless there is a clear need to distinguish the extension from the original field.  It can be seen the candidateBeamListExt/periodicityExt is not simply add a –rX, vXYZ based on the original information element which can be elliptical, and candidateBeamListExt/periodicityExt is totally independent information element than the original one, so we propose to have this CR for the preciseness of specification |
| Samsung | Yes | Minor change for clarification. We see the point from Qualcomm, but in general, RRC naming should first be designed in that way (e.g. to use the same name but different suffix), but the cases in the CR seem exceptional cases, and so we prefer to correct it to avoid any misinterpretation. |
| LG | Neutral | No strong view but we tend to agree with QC. For some cases, e.g., when parameters have different meanings depending on its high level IE, detailed IE name has been specified in MAC. However, in this case, the original parameter and the extended one have exactly the same meaning but only with different values. Thus, it wouldn’t be much necessary to specify all the extended parameters. |
| OPPO | No | Maybe it would be good to decouple all the release dependent parameters from the MAC spec, otherwise, we need to review all other specs. |
| Huawei, HiSilicon | No | Agree with Qualcomm. We are open to discuss, as Samsung mentioned, “extended” names that would lead to misinterpretation however these name in this CR might not be problematic in this regard. |
| Intel | No strong view | We don’t have strong view on whether to capture the extension parameters in MAC specification. |
| MediaTek | Yes | Agree with Samsung and ZTE. This would align the MAC spec with the RRC spec |
| Ericsson | No | We understand that one reason to use the suffix “Ext” in those names is to allow an easier update in the MAC spec so that, e.g., “periodicity” in the MAC spec is understood as either “*periodicity*” or “*periodicityExt*” in the RRC configuration. |
| Apple | Yes | This may not be so essential, but we prefer to correct it. Similar view as Samsung. |

**R2-2108096 Corrections to pdsch-HARQ-ACK-CodeBookList    Ericsson    CR    Rel-16    38.321    16.5.0    1137    -    F    NR\_L1enh\_URLLC-Core**

R2-2108096 have mentioned that filed description of *pdsch-HARQ-ACK-CodebookList-r16* is not aligned with the RAN1 specification.

In RAN1 specification:

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| If a UE is provided *pdsch-HARQ-ACK-CodebookList-r16*, *pdsch-HARQ-ACK-Codebook* is replaced by the relevant entry in *pdsch-HARQ-ACK-CodebookList-r16*. |
| If a UE is provided *pdsch-HARQ-ACK-CodebookList*, the UE can be indicated by *pdsch-HARQ-ACK-CodebookList* to generate one or two HARQ-ACK codebooks. If the UE is indicated to generate one HARQ-ACK codebook, the HARQ-ACK codebook is associated with a PUCCH of priority index 0. If a UE is provided *pdsch-HARQ-ACK-CodebookList*, the UE multiplexes in a same HARQ-ACK codebook only HARQ-ACK information associated with a same priority index. |

However, the filed description of *pdsch-HARQ-ACK-CodebookList-r16* is as below:

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| ***pdsch-HARQ-ACK-CodebookList***  A list of configuration for at least two simultaneously constructed HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored for the case at least two HARQ-ACK codebooks are simultaneously constructed. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured). For the HARQ-ACK for sidelink, the UE uses *pdsch-HARQ-ACK-Codebook* and ignores *pdsch-HARQ-ACK-CodebookList* if this field is present. |

So the **R2-2108096** suggested to have the following correction:

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| ***pdsch-HARQ-ACK-CodebookList***  A list of configuration for one or two HARQ-ACK codebooks. Each configuration in the list is defined in the same way as *pdsch-HARQ-ACK-Codebook* (see TS 38.212 [17], clause 7.3.1.2.2 and TS 38.213 [13], clauses 7.2.1, 9.1.2, 9.1.3 and 9.2.1). If this field is present, the field *pdsch-HARQ-ACK-Codebook* is ignored. If this field is present, the value of this field is applied for primary PUCCH group and for secondary PUCCH group (if configured). |

Q3: Do companies agree with this issue?, and if yes, is the suggested change in R2-2108096 fine or does the change need be improved?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes | We are fine with the CR. |
| CATT | Yes | The proposed change seems reasonable. |
| Nokia | Yes |  |
| ZTE | Yes | Agree with this CR |
| Samsung | Yes | It’s ok to make it aligned with RAN1 specification. |
| LG | Yes |  |
| OPPO | Yes |  |
| Huawei, HiSilicon | With comments | We are not clear about the scenario to use Codebooklist IE to configure only one HARQ-ACK codebook given that it can be configured by the Codebook IE without the list. Since the text is from RAN1 spread sheet, it would be safer to double check with RAN1 or raised in RAN1. |
| Intel | Yes |  |
| MediaTek | Yes | This change aligns the RRC spec with the R1 specifications |
| Ericsson | Yes | We are the proponent company. |
| Apple | Yes | We are fine with the suggested change. |

## **eMIMO**

**R2-2107010 Corrections to SCell BFR    Samsung Electronics Co., Ltd    CR    Rel-16    38.321    16.5.0    1121    -    F    NR\_eMIMO-Core**

R2-2107010 have mentioned that, for the current SCell BFR procedure, UE cannot generate the BFR MAC CE until candidate beams evaluation is finished, which is not time efficient, so that they suggest once at least one suitable DL beam is found out during the candidate beams evaluation period, UE is allowed to generate the BFR MAC CE.

The CR is shown as below:

|  |
| --- |
| 5.17 Beam Failure Detection and Recovery procedure /\*omit for short\*/  The MAC entity shall:  1> if the Beam Failure Recovery procedure determines that at least one BFR has been triggered and not cancelled for an SCell for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available:  2> if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the BFR MAC CE plus its subheader as a result of LCP:  3> instruct the Multiplexing and Assembly procedure to generate the BFR MAC CE.  2> else if UL-SCH resources are available for a new transmission and if the UL-SCH resources can accommodate the Truncated BFR MAC CE plus its subheader as a result of LCP:  3> instruct the Multiplexing and Assembly procedure to generate the Truncated BFR MAC CE.  2> else:  3> trigger the SR for SCell beam failure recovery for each SCell for which BFR has been triggered, not cancelled, and for which evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available.  All BFRs triggered for an SCell shall be cancelled when a MAC PDU is transmitted and this PDU includes a BFR MAC CE or Truncated BFR MAC CE which contains beam failure information of that SCell. |

|  |
| --- |
| 6.1.3.23 BFR MAC CEs The MAC CEs for BFR consists of either:  - BFR MAC CE; or  - Truncated BFR MAC CE.  The BFR MAC CE and Truncated BFR MAC CE are identified by a MAC subheader with LCID/eLCID as specified in Table 6.2.1-2 and Table 6.2.1-2b.  The BFR MAC CE and Truncated BFR MAC CE have a variable size. They include a bitmap and in ascending order based on the *ServCellIndex*, beam failure recovery information i.e. octets containing candidate beam availability indication (AC) for SCells indicated in the bitmap. For BFR MAC CE, a single octet bitmap is used when the highest *ServCellIndex* of this MAC entity's SCell for which beam failure is detected and either the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available, is less than 8, otherwise four octets are used. A MAC PDU shall contain at most one BFR MAC CE.  For Truncated BFR MAC CE, a single octet bitmap is used for the following cases, otherwise four octets are used:  - the highest *ServCellIndex* of this MAC entity's SCell for which beam failure is detected and either the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available is less than 8; or  - beam failure is detected for SpCell (as specified in Clause 5.17) and the SpCell is to be indicated in a Truncated BFR MAC CE and the UL-SCH resources available for transmission cannot accommodate the Truncated BFR MAC CE with the four octets bitmap plus its subheader as a result of LCP.  The fields in the BFR MAC CEs are defined as follows:  - SP: This field indicates beam failure detection (as specified in clause 5.17) for the SpCell of this MAC entity. The SP field is set to 1 to indicate that beam failure is detected for SpCell only when BFR MAC CE or Truncated BFR MAC CE is to be included into a MAC PDU as part of Random Access Procedure (as specified in 5.1.3a and 5.1.4), otherwise, it is set to 0;  - Ci (BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) and the presence of an octet containing the AC field for the SCell with *ServCellIndex* i as specified in TS 38.331 [5]. The Ci field set to 1 indicates that beam failure is detected, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available, and the octet containing the AC field is present for the SCell with *ServCellIndex* i. The Ci field set to 0 indicates that the beam failure is either not detected or the beam failure is detected but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed, and the octet containing the AC field is not present for the SCell with *ServCellIndex* i. The octets containing the AC field are present in ascending order based on the *ServCellIndex*;  - Ci (Truncated BFR MAC CE): This field indicates beam failure detection (as specified in clause 5.17) for the SCell with *ServCellIndex* i as specified in TS 38.331 [5]. The Ci field set to 1 indicates that beam failure is detected, the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed or at least one candidate beam above *rsrp-ThresholdBFR* is available, and the octet containing the AC field for the SCell with *ServCellIndex* i may be present. The Ci field set to 0 indicates that the beam failure is either not detected or the beam failure is detected but the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has not been completed, and the octet containing the AC field is not present for the SCell with *ServCellIndex* i. The octets containing the AC field, if present, are included in ascending order based on the *ServCellIndex*. The number of octets containing the AC field included is maximised, while not exceeding the available grant size;  ... |

Q3: Do companies agree with this issue?, and if yes, is the suggested change in **R2-2107010** fine or does the change need be improved?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | See comment | We think whether this CR is needed depends on what the text "the evaluation of the candidate beams according to the requirements as specified in TS 38.133" means, i.e.   * If it means UE has to measure RS for the entire evaluation period before sending BFR MAC CE, then SS's CR is necessary; * if UE can terminate the evaluation period once it finds a candidate beam, then SS's CR is not needed.   Our current understanding is the second one. To ensure all companies have the same understanding, RAN2 should capture this understanding in the chair’s meeting minutes. However, if our understanding is not in line of majority of companies, we are fine with Samsung’s CR. |
| CATT | No | Agree with QC’s understanding 2. We think it is UE implementation issue and no need to revise MAC specification. |
| Nokia | No | Agree with second interpretation from Qualcomm that as soon as the UE finds a candidate beam, the search can be considered as completed. This is also clear from RAN4 specifications. |
| ZTE | Not sure | Agree with QC’s understanding 2, but still want to hear the voice from other companies, we can follow majorities |
| Samsung | Yes | Our understanding is that in case multiple candidate beam RSs are configured (say RS1, RS2 and RS3), only after measuring all candidate beams RSs, BFR MAC CE can be triggered. For example, UE measures RS1 and if it is above a threshold, UE still measures RS2 and RS3 in the respective resources and then trigger BFR MAC CE. |
| LG | No but | Our understanding was the first one because the specification clearly says that ‘the evaluation of the candidate beams according to the requirements as specified in TS 38.133 [11] has been completed’. But, as commented by Nokia, if the evaluation is completed when the UE finds a candidate beam, we also think the change is not needed.  Even with understanding 1, we don’t think it is problematic because the intention from R2-2010805 seems to not starting generation of BFR MAC CE while the evaluation is still ongoing. |
| OPPO | No | We don’t think the CR is needed, and we agree the 2nd interpretation from Qualcomm |
| Huawei, HiSilicon | No | We are not convinced by the motivation of this CR as anyways the UE has to wait for the UL grant for assemble the SCell BFR MAC CE. Meanwhile, we think there is no restriction on how to evaluate the candidate beams, and thus we should leave it to sensible UE implementation. |
| Intel | Not sure | We agree that the current description is ambiguous about how to define the completion of the evaluation because RAN4 specification defines the minimum evaluation period that the UE shall detect candidate beam rather than defining the evaluation procedure. We could assume that the exact timing that PHY layer provides the detected beam information should be left to the implementation. Therefore, we think that there is no strong reason to update specification. Nevertheless, Samsung’s proposed description would be reasonable implementation. |
| MediaTek | Yes | We are fine with the intention and the CR - UE should be able to report the qualified candidate beam, if found, as early as possible, even before the end of the evaluation period. |
| Ericsson |  | The proposal is to reduce the time to transmit the BFR MAC CE, so the UE does not have to wait for the process to complete for all beams of the failed SCell, if there is one candidate beam above the threshold. That is, as soon a "suitable" beam is found the UE can send the BFR MAC CE.  Questions to Samsung:  - How much time are we talking about?  - If more than one beam is above the threshold, would the UE report a) all the "suitable" beams; or b) only the first found beam, and if so, what if there is a better beam which is not reported in that case?  There could be a risk the NW does not get the complete picture.  - The actual addition means we mix "and" and "or" on the same line which is never a good thing. Can this be avoided? |
| Apple | Yes/No | We agree with the understanding in the CR, but we think that the current spec allows the UE to trigger BFR when detecting one suitable candidate beam. Thus, we have no strong view, can follow the majority. |

## **PowerSaving**

In this subclause, the following contributions are considered:

[R2-2107062](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107062.zip) Discussion on reporting multiplexed CSI on PUCCH    OPPO    discussion    Rel-16    NR\_UE\_pow\_sav-Core

[R2-2107656](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107656.zip) Clarification on reporting multiplexed CSI on PUCCH    OPPO, Nokia, ZTE    CR    Rel-16    38.321    16.5.0    1133    -    F    NR\_UE\_pow\_sav-Core

[R2-2108785](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108785.zip) Periodic CSI reporting with DCP    LG Electronics UK    discussion    TEI16

[R2-2108767](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108767.zip) 38.321\_CRxxxx\_(Rel-16)\_R2-210xxxx Periodic CSI report with DCP    LG Electronics UK    CR    Rel-16    38.321    16.5.0    1155    -    F    TEI16

Above contributions are addressing the same issue, for the convenience, the background of the issue is shown as below:

|  |  |  |
| --- | --- | --- |
| According to the current specification TS38.321, UE behaviour of periodic CSI reporting is specified as follows:   |  | | --- | | 1> if DCP monitoring is configured for the active DL BWP as specified in TS 38.213 [6], clause 10.3; and  1> if the current symbol n occurs within *drx-onDurationTimer* duration; and  1> if *drx-onDurationTimer* associated with the current DRX cycle is not started as specified in this clause:  2> if the MAC entity would not be in Active Time considering grants/assignments/DRX Command MAC CE/Long DRX Command MAC CE received and Scheduling Request sent until 4 ms prior to symbol n when evaluating all DRX Active Time conditions as specified in this clause:  3> not transmit periodic SRS and semi-persistent SRS defined in TS 38.214 [7];  3> not report semi-persistent CSI configured on PUSCH;  3> if *ps-TransmitPeriodicL1-RSRP* is not configured with value *true*:  4> not report periodic CSI that is L1-RSRP on PUCCH.  3> if *ps-TransmitOtherPeriodicCSI* is not configured with value *true*:  4> not report periodic CSI that is not L1-RSRP on PUCCH. |   Besides, a note regarding reporting multiplexed CSI on PUCCH is given as below:   |  | | --- | | NOTE 4: If a UE multiplexes a CSI configured on PUCCH with other overlapping UCI(s) according to the procedure specified in TS 38.213 [6] clause 9.2.5 and this CSI multiplexed with other UCI(s) would be reported on a PUCCH resource either outside DRX Active Time of the DRX group in which this PUCCH is configured or outside the on-duration period of the DRX group in which this PUCCH is configured if CSI masking is setup by upper layers, it is up to UE implementation whether to report this CSI multiplexed with other UCI(s). |   According to the procedure text, in the case when *drx-onDurationTimer* is not started due to DCP and UE is not in DRX Active Time, whether to report periodic CSI or not is configurable, while according to the note, in the case when CSI configured on PUCCH is multiplexed with other overlapping UCI(s), it’s up to UE implementation whether to report such CSI outside DRX Active Time.  It’s not clear whether UE should report CSI multiplexed with UCI(s) within the on-duration period when *drx-onDurationTimer* is not started due to DCP.    Figure 1 |

For above issue, R2-2108785 would like to propose:

|  |
| --- |
| **Proposal 4.** If *drx-onDurationTimer* is not running for its on-duration period, if *ps-TransmitPeriodicL1-RSRP* and *ps-TransmitOtherPeriodicCSI* is configured with value *true*, and if the CSI is multiplexed with other UCIs, the reasonable implementation is to report the periodic CSI on PUCCH. Further clarification is not essential to the NOTE 4. |

Meanwhile, R2-2107062 would like to propose:

|  |
| --- |
| 1. RAN2 further clarify the following two UE behaviours of reporting CSI in the case that the multiplexed CSI would be reported on PUCCH inside an on-duration period whose *drx-onDurationTimer* is not started due to DCP and ps-TransmitPeriodicL1-RSRP or ps-TransmitOtherPeriodicCSI is configured.  * Option 1: Up to UE implementation, no CR is needed * Opion 2: UE reports the multiplexed CSI, a CR to further clarify Note 4 is needed |

Q4: Do companies agree that this issue shall be clarified?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | No | We acknowledge that the issue described in the CR is valid. But we think this issue is best left to UE implementation, for the following reasons.  First, all scenarios of concern are corner cases. An example among them is that when there is a HARQ feedback for a transmission whose 1st Tx is initiated during DRX active time and this HARQ A/N happens to overlap with a CSI report whose PUCCH resource is scheduled within the next on duration, which is skipped due to DCP. Additional examples can be found in our comment on the same issue in the summary of email discussion [AT114-e][018][NR16] MAC III (Nokia).  Second, it is not clear what the right UE behavior should be in some of those scenarios. For example, in the above example, it is possible that after HARQ A/N multiplexes with CSI, the PUCCH resource for the multiplexed UCIs shifts and is located outside the on duration. When that happens, it is not clear what UE’s behavior should be. One may argue that we should follow the original principle behind the Note and leave that to UE implementation (i.e. RAN2 agreed to leave them to UE implementation because those are rare corner cases!).  Third, since we are adding an exception to a note, all scenarios covered by that exception become normative. Hence all of them need to be defined precisely. However, we do not think any of the TPs is able to correctly define UE behaviors in ALL possible scenarios. And we do not think it is an easy goal to accomplish.  Lastly, even when those scenarios happen and CSI reports are canceled due to the current text, we don’t expect that would have critical impact on the system. And if needed, network has all the information to determine if an overlap is going to happen and hence has means to avoid them, e.g. schedule HARQ A/N in a different resource, send DCP to wake up UE, etc.  Therefore, we’d suggest RAN2 to leave this corner-case issue to UE implementation instead of spending more time and effort trying to develop a perfect TP for it. |
| CATT | Yes | We believe there is little room for misinterpretation that UE behaviour could (erroneously) be as Option 1 in R2-2107062 (otherwise *ps-TransmitPeriodicL1-RSRP* and *ps-TransmitOtherPeriodicCSI* would become useless), it seems that it might be better removing any ambiguity (that it is Option 2). |
| Nokia | Yes |  |
| ZTE(Proponent) | Yes |  |
| Samsung | No | We indeed share the view with Qualcomm, and think it can be left to UE implementation. |
| LG | No | The implementation could handle this.  If drx-onDurationTimer is not running for its on-duration period, if ps-TransmitPeriodicL1-RSRP and ps-TransmitOtherPeriodicCSI is NOT configured with value true, it is clear from the normative text that the MAC shall not report CSI. From this, we believe a reasonable implementation would assume that MAC shall report CSI if those parameters are configured with value true. |
| OPPO | Yes |  |
| Huawei, HiSilicon | Yes | We share the intention and think the UE should follow the DCP instruction of p-CSI reporting which is expected by the NW. So it would be desirable to have aligned understanding between UE and NW. |
| Intel | No | We agree with the intention but we also share Qualcomm’s view that the issue can be left to UE implementation. |
| MediaTek | No | As discussed at the last meeting, this is an extremely corner case: DRX active time has expired before DCP occasion, but the CSI to be reported falls in the onDuration time after the DCP occasion. We do not therefore see this issue as essential for clarification. |
| Ericsson | Yes but maybe not only change the NOTE? | We think it is important that the spec is clear.  NOTEs are only informative though (i.e. not normative). Perhaps the best way out is to clarify the normative part of the spec to make sure that clearly specify the UE behaviour. Now it seems the NOTE contradicts the normative part of the spec. And procedural text (which is normative) always overrides NOTEs (which are informative). |
| Apple | No | We share the view from Qualcomm, it is preferable to leave the behavior up to UE implementation. |

For the companies who agrees that the issue shall be improved, please provide which option as shown below is preferred?

**Option 1:**

|  |
| --- |
| **R2-2107656:**  NOTE 4: If a UE multiplexes a CSI configured on PUCCH with other overlapping UCI(s) according to the procedure specified in TS 38.213 [6] clause 9.2.5 and this CSI multiplexed with other UCI(s) would be reported on a PUCCH resource either outside DRX Active Time of the DRX group in which this PUCCH is configured except when inside an on-duration period whose associated *drx-onDurationTimer* is not started due to DCP and *ps-TransmitPeriodicL1-RSRP* or *ps-TransmitOtherPeriodicCSI* is configured with value true, or outside the on-duration period of the DRX group in which this PUCCH is configured if CSI masking is setup by upper layers, it is up to UE implementation whether to report this CSI multiplexed with other UCI(s). |

**Option 2:**

|  |
| --- |
| **R2-2108767**  NOTE 4: If *ps-TransmitPeriodicL1-RSRP* or *ps-TransmitOtherPeriodicCSI* is not configured with value *true* and if a UE multiplexes a CSI configured on PUCCH with other overlapping UCI(s) according to the procedure specified in TS 38.213 [6] clause 9.2.5 and this CSI multiplexed with other UCI(s) would be reported on a PUCCH resource either outside DRX Active Time of the DRX group in which this PUCCH is configured or outside the on-duration period of the DRX group in which this PUCCH is configured if CSI masking is setup by upper layers, it is up to UE implementation whether to report this CSI multiplexed with other UCI(s). |

**Option 3: Other**

Q4: To companies who agree that the issue shall be improved, which option is the preferable? Or you can provide your suggestion on the modification other than Option 1 and Option 2:

|  |  |  |
| --- | --- | --- |
| Company | Option1/option2/Option3 | Technical Arguments |
| CATT | Option 1 | We think it exactly addresses the issue. |
| Nokia | Option 1 | Option 2 is not correct since “or outside the on-duration period of the DRX group in which this PUCCH is configured if CSI masking is setup by upper layers” should be applicable even if ps-TransmitPeriodicL1-RSRP or ps-TransmitOtherPeriodicCSI is configured with value true, the condition should only be added for the first part of the sentence as proposed in option 1. |
| ZTE (Proponent) | Option 1 |  |
| OPPO | Option 1 |  |
| Huawei, HiSilicon | With comments | NOTE 4 is not okay with us since it implies DCP is not applicable to NOTE 4, which is not the intention. We are fine to discuss the wording in the next phase. |
| MediaTek | Option 1 | If we do decide to go with a solution, Option 1 is preferable to Option 2, as Option 2 removes the applicability of the legacy note to the case where the PS-Transmit\* flags are set. |
| Ericsson | Option 3 | The best case is if the normative part of the spec is clear on its own. |

## **NR-U**

[R2-2107481](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2107481.zip) Correction on starting of RetransmissionTimerDL ZTE Corporation, Sanechips CR Rel-16 38.321 16.5.0 1129 - F NR\_unlic-Core

In the above CR ([R2-2107481](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2107481.zip)), it was pointed out that the starting point for the *drx-RetransmissionTimerDL* is not clear for the case when pdsch-AggregationFactor is configured. It was proposed that that the timer should be started after the end of the last PDSCH transmission in case of bundling.

Q5: Do companies agree that the correction as proposed in [R2-2107481](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2107481.zip) for the starting of the drx-RetransmissionTimerDL is necessary?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes | We are fine with the proposed clarification. |
| CATT | Yes | The proposed change is OK. |
| Nokia | No | Not needed since it should already be clear after the PDSCH transmission means after all the transmissions. It was added only for the cases if it is not after the whole bundle, e.g. after the first transmission. |
| ZTE | Yes | Proponents. It seems not clear that the PDSCH transmission in case of bundle would mean it is after all transmissions (i.e. where is this clarified)? |
| Samsung | No | We have the same understanding as what CR proposes, but the specification seems already clear. Can follow the view from majority. |
| LG | No | No strong view but it seems already straightforward way of handling RetransmissionTimerDL. |
| OPPO | Yes |  |
| Huawei, HiSilicon | No | We don’t think the change is needed as the specification is already clear. |
| Intel | Yes | It is fine to clarify. |
| MediaTek | Yes |  |
| Ericsson | Yes | Makes it clear when to start the DL retx timer. |
| Apple | Yes/No | We are OK to have this clarification, but no strong view. |

[R2-2107569](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107569.zip) Clarification on ConfigurationGrantTimer operation with the repetition transmission    Apple    CR    Rel-16    38.321    16.5.0    1130    -    F    NR\_newRAT-Core

In the above CR ([R2-2107569](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107569.zip)), it was pointed out that For the configured grant with repetition transmission, each repetition transmission is modelled as the HARQ retransmission, and each transmission within the bundle is a ransmiss UL grant. Therefore, the subsequent ransmission within the bundle can also be regarded as the retransmission with the configured grant. Hence, the configuredGrantTimer will be (re)started for the repetition transmission, which is incorrect. Based on this, it was proposed to add an expception for the case where the configured grant is part of bundle for the start/restart condition of the configuredGrantTimer.

Q6: Do companies agree that the correction as proposed in [R2-2107569](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107569.zip) for the (re)starting of the configuredGrantTimer is necessary?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes | We agree with the reason for change and think this clarification is good to have |
| CATT | No | The CGT is started only if the HARQ process is pending, meaning LBT failed on the first transmission. In this case the CGT was not started by the first transmission of the bundle. And if LBT succeeds for this transmission, the HARQ process will no longer be considered as pending, hence, the CGT won’t be restarted on the subsequent repetitions. Hence we see no problem to fix. |
| Nokia | No | The CR seemed to be incorrect. CG timer is started for the case when the HARQ process is pending and the transmission is performed without LBT. It should be applicable to bundling case as well when first success transmission happens within a bundle. After the first transmission, the HARQ process would not be pending any more. Retransmission over CG does not restart the timer. |
| ZTE | Yes | We agree |
| Samsung | Yes | We are fine with this.  The WI code should be NR\_unlic-Core. The change is only for NR-U behaviour. |
| LG | No | Agree with CATT and Nokia. In S5.4.2.1, it says  4> if the uplink grant is a configured uplink grant:  5> if the identified HARQ process is pending:  6> start or restart the *configuredGrantTimer*, if configured, for the corresponding HARQ process when the transmission is performed if LBT failure indication is not received from lower layers; |
| OPPO | No | The comments from CATT/Nokia are reasonble |
| Huawei, HiSilicon | No | We understand the agreements in RAN2#AH1801 are for licensed band, the proposed changes are NR-U behaviour. We are not sure it is needed to optimize in Rel-16. |
| Intel | No | Our understanding is that a bundle can also occur for CG in NR-u and by saying that it is not part a bundle may not be correct? |
| MediaTek | No | The specs are intentionally written this way to ensure that the configuredGrantTimer only starts after at least one transmission has gone through with a successful LBT (i.e. a HARQ process is no longer pending). When LBT was not successful for any previous transmission attempt of a TB in the HARQ buffer, this ensures that a retransmission attempt takes place immediately on the next occasion, instead of waiting for the expiry of the CG-RetransmissionTimer. Once a successful LBT has taken place, the CGT is no longer restarted even in case of bundling. |
| Ericsson | No | There is a misunderstanding about the meaning of “HARQ process is pending”.  Pending HP can only happen if a CG failed the first (initial new) transmission (for each grant in the bundle in case of bundling with multiple opportunities to send a first message and to do LBT) and then when a following autonomous retx happens, the grant in the bundle can be pending only until one transmission in a bundle succeeds LBT and is transmitted, after this the HP will not be pending anymore and CGT will not be restarted after that. |
| Apple | Yes | Proponent |

[R2-2107199](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2107199.zip) Handling of Multi-TB CGs in MAC CATT discussion NR\_IIOT-Core

In the above tdoc ([R2-2107199](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2107199.zip)) the HPID related MAC ehavior is discussed and the following proposals are made:

**Proposal 1: RAN2 confirms the understanding that, for multi-TB CG configurations, MAC delivers the CG repetitions of a repetition bundle to the HARQ entity as a whole, but treats each repetition bundle opportunity independently as another group of CG transmissions delivered to the HARQ entity.**

**Proposal 2: RAN2 confirms no change is needed in the HPID determination formula for configured grants to address multi-TB CGs in licensed bands.**

Q7: Do companies agree that Proposal 1: RAN2 confirms the understanding that, for multi-TB CG configurations, MAC delivers the CG repetitions of a repetition bundle to the HARQ entity as a whole, but treats each repetition bundle opportunity independently as another group of CG transmissions delivered to the HARQ entity? Is there any change needed in specs to clarify this?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments (clarify whether you think any changes are needed in the specs and if so, why) |
| Qualcomm | Yes | We agree with proposal 1. |
| CATT | Yes | Proponent |
| Nokia | Yes | No change needed. |
| Samsung | No | Proposals looks ok but specification change is not needed. |
| LG | Yes | Agree with proposal 1 but no changes is needed. |
| OPPO | Yes |  |
| ZTE | comments | For NR-U, since LBT is needed, transmission may be performed in the last PUSCH within the first bundle. If so, transmission reliability cannot be guaranteed. Hence, another understanding is that the bundle is changed with LBT outcome, not fixed. For example, LBT succeeds before the fourth TO, repetition will be performed in the following consecutive transmission occasions as shown in the below figure.      So we prefer that all Tos are passed altogether to the HARQ entity considering whether transmission is performed or not is related to LBT outcome.  Note that at RAN2#113-bis, this aspect was discussed and we discussed the following Note:  *All uplink grants associated with a transmission within a bundle are delivered to the HARQ entity along with the first uplink grant of the bundle.*  Although companies agreed that the UE behaviour is clear we decided not to add any note as above. So, we think no need to clarify anything now either. |
| Huawei, HiSilicon | No | We don’t see obvious issues and there seems no impacts on specs from the proposal. Besides, we understand multi TB CG configuration is not intended for license spectrum operation. |
| Intel | Yes | Agree with proposal 1. |
| MediaTek | Yes for P1,  No for P2 | Agree with CATT that each set of transmission opportunities is independently provided to the HARQ entity. However we do not see any reason to change the specifications to clarify this.  Regarding P2, we disagree with extending this mechanism to licensed bands. This feature was introduced by RAN1 for shared spectrum, and RAN2 have not discussed the applicability of this feature to licensed spectrum. Given that the HARQ process ID selection and indication procedures are completely different for shared spectrum and licensed bands, it is highly likely that we will introduce issues into the MAC spec if we agree to P2. |
| Ericsson | Yes with comments on wording. | We are fine with the proposal 2, i.e., no change is needed, since there are no companies proposing to change the HARQ Process ID determination formula in Rel-16. In the reference [1] (by Ericsson) cited in the paper, the proposal is not to change the HARQ process ID either.  We are a bit hesitant to the wording in the proposal 1, even though we agree with the intention. Without any context, it is not clear what it means by “CG repetitions of a repetition bundle”, “repetition bundle” and “another group of CG transmissions”. The RRC parameter name is “cg-nrofPUSCH-InSlot” and “cg-nrofSlots”. We wonder if the below has captured the gist and easier to read.  For multi-TB CG configuration, MAC delivers all PUSCH transmission opportunities to the HARQ entity as a whole, but treats the repetition transmissions for one TB independently. |
| Apple | No | We think that multi-TB CG configuration is specified as FG 10-28, which should be only supported in Unlicensend. In Rel-17, the feature may be used in Licensed going forward. In Rel-16, per 38.306 this FG (cg-resourceConfig-r16) is defined in sub-clause 4.2.7.2a SharedSpectrumChAccessParamsPerBand.  No spec change is needed. |

[R2-2108120](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108120.zip) Condition for setting LBT\_COUNTER to Zero ZTE Wistron Telecom AB CR Rel-16 38.321 16.5.0 1138 - F NR\_unlic-Core

In the above CR ([R2-2108120](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108120.zip)), it was pointed out that there is redundant check for the reconfiguration of lbt-FailureDetectionTimer or lbt-FailureInstanceMaxCount in section 5.21.2 of the MAC spec. It is proposed to remove this redundancy.

Q8: Do companies agree with the reason for change and the change proposed in [R2-2108120](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108120.zip)?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Neutral | It appears to be a spec text clean up. No strong view. |
| CATT | No | Current description is clearer. |
| Nokia | No | Nothing broken. |
| ZTE | Yes | Proponents |
| Samsung | No | No strong view but to leave the existing text would be okay |
| LG | No | In RAN2#109bis, it has been decided to reset the LBT\_COUNTER when LBT is cancelled by reconfiguration [R2-2003951]. It was pointed out by Ericsson that *LBT\_COUNTER* is already reset to zero when the timer or the counter is reconfigured but, for some reason, it has been additionally specified to reset *LBT\_COUNTER* upon cancellation. We see no harm to have it. |
| OPPO | No |  |
| Huawei, HiSilicon | Neutral | The spec is not broken (even seems redundant). Also condition 1 "all triggered consistent LBT failures are cancelled in this Serving Cell" doesn't necessarily cause "lbt-FailureRecoveryConfig" strictly speaking. |
| Intel | No | It is not really an essential change since nothing is broken. |
| MediaTek | No strong view | While the change removes redundant text, we also see no issues with the current specification. So we see no strong reasons to agree to this change. However, if the majority are willing to accept such a change, we are also ok to have this clarification. |
| Ericsson | No | We tend to agree that the text is redundant, but we would like to keep it for clarity. |
| Apple | No | Looks ok but the change is not essential and the current text is fine. |

[R2-2108343](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108343.zip) Start of DRX RTT timer for one-shot HARQ feedback Qualcomm Incorporated CR Rel-16 38.321 16.5.0 1148 - F NR\_unlic-Core

In the above CR ([R2-2108343](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2108343.zip)), it was proposed to clarify that the start of the drx-HARQ-RTT-TimerDL for the corresponding HARQ process should be done only for the case of one-shot HARQ-ACK request to align it with the intention in 38.213.

Q9: Do companies agree with the reason for change and the change proposed in [R2-2108343](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108343.zip)?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes | Currently Type-3 HARQ feedback (aka one-shot HARQ feedback) transmission is missing from the conditions for starting drx-HARQ-RTT-TimerDL |
| CATT | Yes |  |
| Nokia | Yes |  |
| ZTE | Yes, with slight modification | The RAN1 specs are based on the following agreement:    DCI including one shot HARQ-ACK request can either schedule or not schedule a PDSCH. So, the clarification applies to the case when the DCI does not schedule a PDSCH. Hence, we prefer to make a modification for the above CR as follows.  1> if a DRX group is in Active Time:  2> monitor the PDCCH on the Serving Cells in this DRX group as specified in TS 38.213 [6];  2> if the PDCCH indicates a DL transmission or includes a One-shot HARQ-ACK request without scheduling PDSCH as specified in TS 38.213 [6]: |
| Samsung | No | We have some sympathy with this but nothing is broken. |
| LG | Yes |  |
| OPPO | Yes |  |
| Huawei, HiSilicon | Neutral | If the DCI is not for DL transmission but only for one time HARQ request, the change seems reasonable, however the spec is not broken. Can follow majority. |
| Intel | Yes |  |
| MediaTek | Question for proponent | We have already modelled the expected retransmission timer behaviour, by starting the retransmission timer right away when we get a DL with non-numerical HARQ.  Why do we need to start the RTT timer, and therefore the retransmission timer again, given that the retransmission timer has already started for the DL, for which the one-shot HARQ feedback is now being sent? |
| Ericsson | No | 1> if a DRX group is in Active Time:  2> monitor the PDCCH on the Serving Cells in this DRX group as specified in TS 38.213 [6];  2> if the PDCCH indicates a DL transmission:  3> start the *drx-HARQ-RTT-TimerDL* for the corresponding HARQ process in the first symbol after the end of the corresponding transmission carrying the DL HARQ feedback;  NOTE 3: When HARQ feedback is postponed by PDSCH-to-HARQ\_feedback timing indicating a non-numerical k1 value, as specified in TS 38.213 [6], the corresponding transmission opportunity to send the DL HARQ feedback is indicated in a later PDCCH requesting the HARQ-ACK feedback.  3> stop the *drx-RetransmissionTimerDL* for the corresponding HARQ process.  3> if the PDSCH-to-HARQ\_feedback timing indicate a non-numerical k1 value as specified in TS 38.213 [6]:  4> start the *drx-RetransmissionTimerDL* in the first symbol after the PDSCH transmission for the corresponding HARQ process.  The yellow highlight states that the RTT timer shall be started after sending HARQ feedback, which will be sometime in the future regardless of NNK1 or not.  For NNK1, this time in the future is not known after receiving the assignment while it is known in case of numerical K1.  NOTE 3 clarifies that for NNK1 assignments, the time to send HARQ feedback will be indicated in a later PDCCH request for HARQ-ACK feedback.  When the request for HARQ-ACK feedback is received the UE will know when to send the feedback, and thus also when to start the RTT timer (for each HARQ process that HARQ feedback is sent for).  Thus, it is already clear from the spec when the timer shall be started. |
| Apple | Yes |  |

## **PHR handling for E-UTRA MAC entity**

[R2-2107782](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2107782.zip) Clarification on E-UTRA MAC entity in PHR Samsung CR Rel-16 38.321 16.5.0 1134 - F NR\_newRAT-Core

In the above CR ([R2-2107782](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2107782.zip)), it was proposed to clarify that the action to obtain the Type 1 or Type 3 PHR for the corresponding UL carrier applies to both E-UTRA and NR MAC entities (clarification was noted as necessary because the preceding condition is written with NR in mind – i.e. includes a check about the BWP which doesn’t exist in E-UTRA).

Q10: Do companies agree with the reason for change and the change proposed in [R2-2107782](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2107782.zip)?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | Yes but | We agree with the intention. But we think “and” instead of “or” should be used, since UE needs to report PH for cells in both cell groups, i.e.  2> if *multiplePHR* with value *true* is configured:  3> for each activated Serving Cell with configured uplink associated with any MAC entity of which the active DL BWP is not dormant BWP; and  3> for each activated Serving Cell with configured uplink associated with E-UTRA MAC entity: |
| CATT |  | Agree with QC’s revision. |
| Nokia | Neutral | OK in principle. But there is no case where in E-UTRA the DL BWP could be dormant so the existing text would be equally true. |
| Samsung | Yes | We are also fine with suggestion from Qualcomm. |
| LG | Neutral | As there is no BWP, there is no dormant BWP for E-UTRA MAC. Accordingly, the condition would be satisfied for E-UTRA MAC anyway.  But, if some reads that, the condition is not satisfied because there is no active DL BWP for the E-UTRA MAC, we are fine to clarify. In this case, the text from QC is correct. |
| OPPO | No strong view |  |
| ZTE | No strong view | Okay with QC suggestion. |
| Huawei, HiSilicon | See comments | We share the intention. But we are not sure if the CR can completely address this issue, as it may also affect the dual-connectivity PHR report at the E-UTRA MAC entity. So we would like to have more time to check if anything additional needs to be corrected. |
| Intel | Yes | Agree with the change proposed by Qualcomm. |
| MediaTek | Yes | This results in clear text that is less likely to cause confusion. |
| Ericsson | Yes | We are generally supportive and understand the issue.  Adding the line is fine, but isn't it better to also change the line above the added line so it explicitly refers to "any NR MAC Entity" instead of "any MAC entity"? |
| Apple | Neutral | We agree with the intention of this CR and we are fine with the suggestion from Qualcomm. Though there are other cases MAC specification where “any MAC entity” is used, and the change is not so essential. |

## **2-step RACH**

[R2-2108603](file:///C:\evutukuri\work\5G\RAN2\docs\R2-2108603.zip) Correction to MsgA grant overlapping with another UL grant for a HARQ process Huawei, HiSilicon CR Rel-16 38.321 16.5.0 1153 - F NR\_2step\_RACH-Core

In the above CR ([R2-2108603](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2108603.zip)), it was noted that in section 5.4.2.2, there is no case that retransmission on dynamic grant or configured grant collides with the transmission of MSGA and hence it was proposed to remove the corresponding condition.

Q11: Do companies agree with the reason for change and the change proposed in [R2-2108603](file://D://__会议\2021\202108_RAN2\TSGR2_115-e\Docs\R2-2108603.zip)?

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Technical Arguments |
| Qualcomm | No | Our understanding is that “the retransmission” in the current text can include retransmission of a dynamic grant, which can overlap with msgA or msg3. So the current text is not wrong. |
| CATT | Yes | The issue raised seems correct, although not dramatic. |
| Nokia | No | Agree with Qualcomm |
| Samsung | No | Nothing is wrong with the current specification. |
| LG | No | If retransmission of a dynamic grant overlaps with MsgA, it seems the MAC chooses one of them based on the NOTE 3 in 5.4.1.  If retransmission of a configured grant within bundle overlaps with MsgA, it seems that the MAC ignores the configured grant as in 5.4.2.1.  However, retransmission of a configured grant on another configuration grant can still be overlapped with MsgA. So, the current text seems correct.  **Explanation from Chong (Huawei) over the reflector**  **1. Retransmission of a CG on a CG**: I suppose Sunyoung refers to NR-U. If so, we think the overlapping issue doesn’t exist for HARQ process handling, since the MAC entity will not deliver the CG grant for retransmission as in 5.4.1. Otherwise, we are wondering the current spec might be problematic in the HARQ process handling for NRU since no specific handling is done for CGRT and HARQ process pending there.  For each Serving Cell and each configured uplink grant, if configured and activated, the MAC entity shall:  --  1> if the MAC entity is not configured with *lch-basedPrioritization*, and the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received on the PDCCH or in a Random Access Response or the PUSCH duration of a MSGA payload for this Serving Cell:  [--](file:///C:\\Program%20Files%20(x86)\\zMail\\app\\zMail\\WebContent\\simplePcWeb\\Mail\\null" \t "_blank)  3> else if the previous uplink grant delivered to the HARQ entity for the same HARQ process was a configured uplink grant (i.e. retransmission on configured grant):  [4> deliver the configured uplink grant and the associated HARQ information to the HARQ entity.](file:///C:\\Program%20Files%20(x86)\\zMail\\app\\zMail\\WebContent\\simplePcWeb\\Mail\\null" \t "_blank)  **2. Fallback transmission from 2-step to 4-step**: Similar to Yujian’s concern, we are wondering how to model the fallback transmission where MAC PDU is obtained from MSGA buffer to Msg3 buffer. In this case, we think it should be considered as “Msg3 transmission”, not “MsgA transmission” since it uses the grant received in RAR (including Fallback RAR). If it is our common understandings? Otherwise, it may cause more confusions when “MsgA” is used in HARQ procedure.  ---------------------------  [LGv14] Thanks to further explanation from Huawei, it seems true that there is no case that retransmission is overlapped with MsgA in the end. However, nothing seems broken. |
| OPPO | Yes |  |
| ZTE | Neutral | Seems nothing is broken, but we can go with majority view if any clarification is needed or not. |
| Huawei, HiSilicon | Yes, Proponent | Response to QC: It is true that retransmission of a dynamic grant can overlap with MsgA. However, the overlapping issue has been addressed when receiving RAR as in NOTE 3 in 5.4.1, which implies only the selected grant will be delivered to the HARQ entity and process. So it is problematic and ambiguous to check the overlapping again in HARQ process, i.e. the correct understanding should be it is up to UE implementation to select either MsgA grant or another one. |
| Intel | No | We are just wondering whether the MsgA buffer is obtained because of fallbackRAR and hence the transmission in MsgA buffer is sent again as UL grant in RAR, which may collide with a retransmission. |
| MediaTek | No strong view | While the change removes redundant text, we also see no issues with the current specification. So we see no strong reasons to agree to this change. However, if the majority are willing to accept such a change, we are also ok to have this clarification. |
| Ericsson | No | The CR implies no functional changes and is not critical. It might be good to clean up and the CR can be merged with other editorial CRs. The current text has no errors as the removed text is never fulfilled. |
| ZTE (rapp) | discuss | Indeed, it seems that there is a redundant check here. However, the same redundancy then also exists for MSG3, isn’t it? i.e. doesn’t the NOTE 3 in section 5.4.1 apply to both MSG3 grant and also the MSGA grant then? If yes, then why should we only remove MSGA from this sentence.  It seems we should either clean-up for both MSG3 and MSGA or we could leave it as it is (with the understanding that the redundant condition check may never result in any action, but implementation may skip check as the check is redundant for both MSG3 and MSGA).  Should we then check it also for MSG3? |
| Huawei, HiSilicon |  | Response to ZTE:  Thanks to our rapporteur to handle the follow-up comments. Actually we have indeed checked the past LTE discussions. As indicated in the coversheet of this CR, the legacy part of Msg3 is intended for “Msg3 retransmission” only, not “Msg3 initial transmission” (as in R2-091851) although the text is a bit unclear (at least) to us…..  1> if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer or the MSGA buffer:   |  |  | | --- | --- | | ***Reason for change:*** ⌘ | UE behaviours regarding how to handle the collision between Msg3 retransmission and bundle retransmission are not clear in the current spec. |   So for the people who have followed LTE discussions, we would like to avoid the misleading impression that “MSGA” here means “MSGA retransmission”, which is not true in NR. As we commented in the email thread (initiated by HW), we think fallback should be considered as “MSG3 transmissoin”, not “MSGA retransmission”.  Again, our intention is to clarify our common understanding in NR in presence of the “legacy text”. We are okay to follow the rapporteur’s decision on this correction. |
| Apple | No | Agree with Qualcomm on the handling in 5.4.2.2. |

# 4 Conclusion

TBD.