**3GPP TSG RAN WG1 Meeting #106-e R1-2108222**

**August 16th – 27th, 2021**

**Agenda item: 7.2.2**

**Source: Moderator (Qualcomm Incorporated)**

**Title: Preparation phase email discussion for NR-U**

**Document for: Discussion and Decision**

# Introduction

The paper summarizes the preparation phase email discussion for contribution submitted to 7.2.2 on NR-U CR.

# Issues identified

Issues may need technical discussion:

|  |  |  |  |
| --- | --- | --- | --- |
| Issue ID | Brief summary | Summary document | Supporting document |
| T1 | 5GHz channel access update for MIIT | [22] | Discussion paper: [2]  CR for 37.213: [1]  CR for 38.212: [5] |
| T2 | Corrections on CG-UCI multiplexing in TS38.212 | [24] | CR for 38.212: [6] |
| T3 | CORESET configuration for wideband operation | [25] | [9], [17] |
| T4 | Enhanced type-2 HARQ codebook NFI toggling and PUCCH | [23] | CR for 38.213: [10] |
| T5 | Correction related to search space set group switching | [21] | Discussion and TP: [15] |
| T6 | On frequency hopping for multi-PUSCH scheduling with single DCI | [24], [23] | CR for 38.214: [16]  Discussion: [18] |

Issues more editorial in nature:

|  |  |  |  |
| --- | --- | --- | --- |
| Issue ID | Brief summary | Summary document | Supporting document |
| E1 | Correction on RRC parameter name of HARQ-ACK codebook in TS 38.213 | [23] | CR for 38.213: [3] |
| E2 | Correction on DFI flag in DCI format 0-1 in TS38.212 | [24] | CR for 38.212: [4] |
| E3 | Editorial correction on the channel access for type-2 random access | [22] | CR for 38.213: [7] |
| E4 | Alignment CR on the parameter name of discovery burst window length |  | CR for 38.213: [8] |
| E5 | Clarification on the usage of cg-minDFI-Delay | [24] | CR for 38.213: [11] |
| E6 | Clarification on OCC for PUCCH format 1 | [26] | CR for 38.213: [12] |
| E7 | PDSCH-to-HARQ feedback timing indicator field values | [23] | CR for 38.213: [13] |
| E8 | Clarification on the definition of a channel for LBT | [22] | CR for 37.213: [14] |
| E9 | Correction on channel access type and CP extension indication | [22] | CR for 38.212: [19]  CR for 38.213: [20] |

# Discussion on which CR to treat

Please provide your view below. “Y” to discuss.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Company | T1 | T2 | T3 | T4 | T5 | T6 |
| Samsung |  |  | Y |  |  | Y |
| Sharp |  |  | Y | N |  | N |
| Ericsson |  |  | Y |  |  | Y |
| LG |  | Y | Y |  |  | Y |
| Intel | Y | Y | Y |  |  | Y |
| MediaTek |  |  | Y |  | Y | Y |
| Apple |  |  | Y |  |  | Y |
| Nokia, NSB |  |  | Y |  |  | Y |
| ASUSTeK |  |  | Y |  |  | Y |
| Huawei, HiSilicon | Y | Y | Y |  |  | Y |
| OPPO |  |  | Y | Y |  |  |
| vivo |  |  | Y | Y |  | Y |
| ZTE, Sanechips |  |  | Y | Y |  | Y |
| Lenovo |  |  | Y |  |  | Y |
| WILUS |  |  | Y |  |  | Y |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | E1 | E2 | E3 | E4 | E5 | E6 | E7 | E8 | E9 |
| Samsung | Y | Y | Y | Y |  |  | Y |  | Y |
| Sharp | Y | Y | Y | Y |  |  | Y |  |  |
| Ericsson |  |  |  | Y |  | Y |  |  |  |
| LG | Y | Y | Y | Y |  | Y | Y | Y | Y (only CR for 38.213) |
| Intel | Y | Y | Y | Y |  | Y | Y | Y | Y - Requires discussion – not all changes are agreeable and editorials |
| Apple | Y | Y | Y | Y |  | Y | Y |  |  |
| Nokia, NSB | Y | Y | Y |  |  | Y | Y |  | Y |
| ASUSTeK | Y | Y | Y | Y |  | Y | Y |  | Y Note that we presume companies would like to discuss E3 would at least be fine to discuss CR [20] for 38.213 as [20] covers the change in E3 and an additional change alone the same line |
| Huawei, HiSilicon | Y | Y | Y | Y |  |  | Y |  | Y |
| OPPO |  |  |  |  | Y | Y | Y | Y |  |
| vivo | Y | Y | Y | Y |  | Y | Y |  | Y |
| ZTE, Sanechips | Y | Y | Y | Y |  |  | Y |  | Y |
| Lenovo | Y | Y | Y | Y |  | Y | Y |  | Y |
| WILUS | Y | Y | Y | Y |  |  | Y | Y |  |

|  |  |
| --- | --- |
| Company | Comments |
| Samsung | * For T1, seems not update of the status of the regulation, so we prefer to delay the discussion. * For T2, we didn’t see an essential issue with current wording in the specification. * For T4, no need for the specification change. gNB can ensure a proper scheduling by implementation. * For T5, the TP is not essential, and didn’t see a difference of UE behaviour with/without the TP. * For E5, seems all timelines in current specification didn’t use the wording “at least”, and it should be ok to keep current wording. * For E6, the TP is correct, but may not be that essential. It can be understood as a general description in the beginning, and an exception in the later paragraph. Even with current wording, UE will not implement in an alternative way. * For E8, the TP is not essential, and may not be beneficial for future compatibility. |
| Ericsson | * T5: We also do not see the need for the spec change as we don't see an ambiguity; it seems the behavior would be the same (without ambiguity) both with and without the CR. * E6: I believe the spec would benefit from clarification to avoid ambiguity on which OCC index is applied (0 or 1) |
| MediaTek | * For T5, we are fine if companies have common understanding that UE behavior would be the same with or without the CR. If not, we concern the ambiguity whether UE should perform SSSG switching if UE detects a DCI on a PDCCH candidate associated with multiple search space sets and not all of the associated search space sets belong to SSSG#0. |
| Nokia, NSB | T1: we prefer to wait with any spec updates until the updated regulatory rules have been formally published and are in effect. |
| ASUSTeK | For T6, it seems the change complies with existing spec as analyzed by vivo’s paper (i.e. multi-PUSCH scheduling could be categorized as “single slot PUSCH transmission” already in existing spec), while we are open to discuss if further clarification is needed. |
| Huawei, HiSilicon | * For **T1**, the new MIIT regulation will be published in this year and the deadline for comment collection passed for almost half year ago. The draft is stable enough for 3GPP to adapt its specification. Note that we also take draft of HS as reference when defining NR-U and NR-U-60. * For **T2**, the identified text on the CG-UCI multiplexing bit calculation assumes there exists no UL-SCH. However, CG-UCI is always together with CG-PUSCH which include UL-SCH. On the other hand, there is already condition for CG-UCI+UL-SCH individually andit can work together the condition of ACK+CG-UCI+UL-SCH and CSI+UL-SCH to cover all cases. So we think the identified text is incorrect and should be deleted. * For **E9**, A correction is needed in the field description but not in the table header. |
| OPPO | * For T4, from UE implementation point of view, it indeed contradicts to the fact that PDSCH groups, if it is simply left up to gNB scheduling. When the point-out case in our CR is allowed, the UE has to prepare for the case, which impacts the UE implementation and buffer size, leading to increased complexity. During the NRU WI, 4 PDSCH groups were discussed but not adopted. However, without this CR, in practice, the UE still needs to prepare a buffer size equivalent to 4 PDSCH groups in order to prepare for the worst case. For the above reason, we think the CR should be discussed. * For E5: without the CR, from the current spec it seems that a timeline beyond minDFI-delay will not make the HARQ-ACK information valid. Only equality will make it valid, which contradicts the original agreement. Moreover, we think that E5 is not just an editorial CR, it intends to correct the wrong concept in the current spec. * For E8: the bandwidth of the ‘channel’ in 37.213 is not defined, leading to an uncertainty about the LBT bandwidth. How shall a UE implement the LBT bandwidth? |
| vivo | * For E9, a CR is needed and how to make it clear need some further discussion. |
| ZTE, Sanechips | * For T1, considering that no further newly regulation/version has been updated so far, we think that this implies that the current MIIT regulation can be regarded as a relatively stable version to a certain extent. Therefore, at this stage, we can also consider discussing or updating MIIT rules in 3GPP spec. |
| Lenovo | * T5: We think the current spec language is sufficiently clear that switching needs to be performed in the described scenario * E5: The current spec says "after a last symbol", so adding "at least" neither changes nor clarifies the behaviour. * E6: We think this TP is needed to make the standard clearer and is not just editorial. |

To summarize, there seems to be strong support to discuss T3, T6, E1, E2, E3, E4, E6, E7, E9 (each with more than 50% support).

# Reference

1. R1-2106441, Changes of channel access procedure in TS 37.213, Huawei, HiSilicon
2. R1-2106507, Discussion on the impact of MIIT consultation to channel access procedure, Huawei, HiSilicon
3. R1-2106508, Correction on RRC parameter name of HARQ-ACK codebook in TS37.213, Huawei, HiSilicon
4. R1-2106509, Correction on DFI flag in DCI format 0-1 in TS38.212, Huawei, HiSilicon
5. R1-2106510, Changes of channel access procedure according to MIIT regulation in TS 38.212, Huawei, HiSilicon
6. R1-2106518, Corrections on CG-UCI multiplexing in TS38.212, Huawei, HiSilicon
7. R1-2107010, Editorial correction on the channel access for type-2 random access, ZTE, Sanechips
8. R1-2107012, Alignment CR on the parameter name of discovery burst window length, ZTE, Sanechips
9. R1-2107049, Correction related to wideband operation, Ericsson
10. R1-2107232, Draft CR on e-type 2 HARQ codebook, OPPO
11. R1-2107233, Draft CR on HARQ-ACK for PUSCH, OPPO
12. R1-2107234, Draft CR on PUCCH resource determination, OPPO
13. R1-2107235, Draft CR on PDSCH-to-HARQ feedback timing indicator field values, OPPO
14. R1-2107236, Draft CR on LBT bandwidth, OPPO
15. R1-2107484, Correction related to search space set group switching, MediaTek Inc.
16. R1-2107695, Correction on frequency hopping for multi-PUSCH scheduling with single DCI, Ericsson Inc.
17. R1-2107712, Correction on Wideband Operation for NRU, Apple
18. R1-2107976, Discussion on frequency hopping for multi-PUSCH scheduling, vivo
19. R1-2108049, Correction on channel access type and CP extension indictaion, ASUSTeK
20. R1-2108051, Correction on ChannelAccess-CPext field in RAR, ASUSTeK
21. R1-2108232, Feature lead summary for NR-U DL Signals and Channels, Moderator(Lenovo)
22. R1-2108226, Feature lead summary for NR-U channel access, Moderator(Nokia)
23. R1-2108218, Feature lead summary for HARQ enhancements, Moderator(HW)
24. R1-2108216, FL summary for NR-U configured grant, Moderator(vivo)
25. R1-2108205, Feature lead summary for NR-U wideband operations, Moderator(LGE)
26. R1-2108218, Feature lead summary for Maintenance of UL Signals and Channels, Moderator(Ericsson)