**3GPP TSG RAN WG1 Meeting #103-e R1-200xxxx**

**Oct 26th – Nov 13th, 2020**

**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

## 2.1 Initial access signals and channels

For initial access signals and channels [1], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| IA-A | FDM of ROs under multiple RB sets | 3 |
| IA-B | FDM of RO/PO under multiple RB set for 2-step RACHUE assumption on RB set configuration for MsgA | 4 |
| IA-C | Editorial bug fix for PRACH generation | 2 |
| IA-D | SSB based CSI-RS validation in DRS | 1 |

FL recommendations:

* A and B can be combined in an email discussion
* C is editorial and straightforward. May not worth a separate email thread by itself
* D has been discussed without consensus before. May not need to revisit.

## 2.2 DL signals and channels

For DL signals and channels [2], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| DL-A6 | Search space BD adjustments/dropping | 1 |
| DL-B1 | Special states/ indications in "available RB set indication" (e.g. no RB set information available yet) | 1 |
| DL-B5 | SFI (+other fields) presence configurability in DCI format 2\_0 | 1 |
| DL-B6 | COT duration indication/ determination | 5 |
| DL-D1 | CSI-RS transmission power, measurements, validity/ presence of periodic/semi-persistent CSI-RS | 1 |
| DL-G1 | UE behaviour for deactivation of semi-persistent CSI-RS reporting | 3 |
| DL-Z1 | CSI-RS measurements and averaging | 3 |
| DL-Z2 | Introduction of new PDSCH Mapping Type B Durations | 1 |
| DL-Z3 | Search space set switching behaviour | 2 |

FL recommendations:

* Discuss DL-B6 and DL-D1 together in an email thread
* Discuss DL-G1 in an email thread
* DL-Z1/-Z2/-Z3 can be discussed together in a TP approval thread outside the limited budget.

## 2.3 UL signals and channels

For UL signals and channels [3], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| **Issue #** | **Issue summary** | **# Contribution(s)** |
| UL-01 | UE assumption on RB set configuration for PRACH to align with agreement from RAN1#102e for PUSCH scheduled by RAR UL Grant or by DCI 0\_0 addressed to TC-RNTI. | 2 |
| UL-02 | Starting OFDM symbol index for SRS resource | 1 |
| UL-03 | FDRA for PUSCH scheduled by RAR UL Grant or by DCI 0\_0 Addressed to TC-RNTI | 1 |
| UL-04 | Clarification on DCI size matching rules for DCI 0\_0 | 2 |

FL recommendations (see further details in [3]):

* Discuss UL-01
	+ Essential correction in order to align with the agreement from RAN1#102e for the case of PUSCH scheduled by RAR UL Grant or by DCI 0\_0 addressed to TC-RNTI
* Discuss UL-02
	+ Straightforward, editorial
* Do not discuss UL-03
	+ It is the moderator's view that the scenario identified in Fujitsu's contribution can be viewed as misconfiguration. Such a misconfiguration is easily avoided by gNB implementation: the gNB should avoid configuring *intraCellGuardBandUL-r16* and *BWP-UplinkDedicated* such that the identified scenario occurs, since the UE cannot be expected to transmit on RBs outside the active UL BWP
* Do not discuss UL-04
	+ This issue was raised in the previous meeting for potential discussion, and a large majority of companies identified this as low priority. Hence it is the moderator's view that this issue is not essential discuss.

## 2.4 Channel access

For channel access [4], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| CA2.1 | LBT type for non-contiguous SRS and PUSCH/PUCCH | 6 |
| CA2.2 | Clarifications to LBT with consecutive UL transmissions | 1 |
| CA2.3 | Clarifications to channel access for semi-static channel occupancy | 4 |
| CA2.4 | Clarifications to restrictions for Type 1 DL channel access / DRS | 1 |
| CA2.5 | Clarifications to UL CWS adjustment | 3 |
| CA2.6 | Clarifications to UL Multi-channel access procedures | 2 |
| CA2.7 | Channel access for 2-step RACH and indication of LBT type for RACH | 2 |
| CA2.8 | RAN2 LS on CAPC (Also discussed under AI 5) | 4 |

FL recommendations:

* 2.1, 2.3, 2.7, 2.8 higher priority
* 2.2, 2.4, 2.6, check if consensus, if not, drop
* 2.5 Discussed before, can drop

## 2.5 Initial access procedures

For Initial access procedures [5], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| IAP-2.1 | Merge the determination process of QCL and SSB index in Clause 4.1 in TS 38.213 to clarify the relationship between SSBs with the same SSB index within a same DRS transmission window or across DRS transmission windows. | 1 |
| IAP-3.1 | The “if [included and] applicable” wording related to the LSBs of the SFN is replaced by the “if included” wording within TS 38.213 subclauses 8.2/8.2A | 1 |
| IAP-3.2 | Since 38.300 is Stage 2 spec, update TS 38.211 to restrict both the use of these new long ZC sequences to NR-U and the use of the long ZC sequence corresponding to L\_RA = 839 to NR according to [7], section 5.3.4. | 1 |

FL recommendations: All these issues have been previously discussed. No need for additional discussion given limited email threads available.

## 2.6 HARQ enhancements

For HARQ enhancements [6], the following issues have been identified

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| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| HARQ-OOO | which codebook type(s) can be used for the HARQ-ACK information retransmission (FFS from RAN1#102e), and then if needed any TP | 7 |
| HARQ-NFI-ULDAI | whether a correction is needed to specify the UE assumption on the values of NFI and DAI for a non-scheduled PDSCH group (in case of reporting in PUSCH or PUCCH). | 3 |
| HARQ-B4 | whether there is a need to address FFS: Type-3 codebook with NDI where the UE has not yet obtained HARQ-ACK information for a TB corresponding to a scheduled PDSCH reception | 6 |
| HARQ-B14 | whether there is any ambiguity in Type-3 codebook with CBG-based HARQ (proposals 3, 4, 5 in R1-2008661) | 1 |
| Multi-PUSCH | whether there is any ambiguity in bitfield size wrt RRC parameter pusch-TimeDomainAllocationListForMultiPUSCH-r16 | 1 |

FL recommendations:

* NRU-HARQ-OOO: discuss at RAN1#103e in order to agree which codebook type(s) can be allowed for requesting HARQ-ACK information retransmission without causing an OOO condition with DL SPS
* HARQ-NFI-ULDAI: discuss only if there is consensus that it is an essential correction (there was no such consensus in earlier meetings on the same issue A16 and part of A9)
* HARQ-B4: discuss only if there is consensus that it is an essential correction (there was no such consensus in earlier meetings on the same issue B4)
* HARQ-B14: discuss only if there is consensus that it is an essential correction (there was no such consensus in earlier meetings on the same issue B14)
* Multi-PUSCH: RRC parameter name alignment is handled by editor’s CR R1-2008792. The FL thinks there is no issue with the bitwidth of DCI fields, but companies are invited to comment on the proposals in R1-2008661

## 2.7 CG enhancements

For CG enhancements [7], the following issues have been identified

|  |  |  |
| --- | --- | --- |
| Issue # | Issue summary | # Contributions |
| CG1 | clarification on HARQ-ACK multiplexing | 1 |
| CG2 | HARQ-ACK feedback in CG-DFI for dynamic grant PUSCH | 4 |
| CG3 | On beta offset | 1 |
| CG4 | clarification on min DFI delay | 1 |
| CG5 | multi PUSCH related TPs | 1 |

FL recommendations:

* CG1. Can be discussed
* CG2. This has been discussed for a few meetings, need to resolve
* CG3. This has been proposed in last few meetings. No consensus. Can be dropped
* CG4. New proposal. Can be discussed
* CG5. New proposal. Can be discussed

## 2.8 Wideband operation

On wideband operation enhancements [8], the following issues have been identified.

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| Issue # | Issue summary | # Contributions |
| WB01 | Clarification of initial BWP configuration: Initial BWP should follow nominal GB specified in RAN4 spec, even if UE-specific GB is configured. | 1 |
| WB02 | UE capabilities on wideband operation: No further UE capabilities on DL wideband operation, but need to consider introducing UE capabilities on the number of LBT sub-bands | 1 |
| WB03 | RB set indicator in DCI format 2\_0: UE behaviour when RB set indicator is not configured or indicates all zero state. | 1 |
| WB04 | Editorial changes of Clause 7 in TS 38.214 | 2 |

FL recommendations:

* WB01 seems not necessary, as described in [8].
* WB02 can be discussed under AI 7.2.11 (for NR Rel-16 UE Features).
* WB03 can be merged with DL-B1 or DL-B5.
* WB04 is editorial, and can be discussed together with other editorial issues, if available.

# Preparation phase discussion

We have identified many issues and we have limited email thread to discuss them. In the next tables, please provide your view on which issues you prefer to be discussed in an email thread (Add “Y” in the cell). The **bold** columns are issues recommended by FL for further email discussion.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | **IA-AIA-B** | IA-D | **DL-B6DL-D1** | **DL-G1** | DL-A6 | DL-B1 | DL-B5 | **UL-01** | UL-03 | UL-04 |
| LG | Y |  | Y | Y | Y |  |  | Y |  | Y |
| Nokia, NSB | Y | N | Y | Y | Y (see comment) | N | N | Y | N | N |
| Ericsson | Y | N | Y | Y | N | N | N | Y | N | N |
| Fujitsu | Y |  | Y | Y |  |  |  | Y | Y |  |
| Sharp | Y |  | Y | Y | Y |  |  | Y |  | Y |
| ZTE | Y |  | Y | Y |  |  |  | Y |  |  |
| vivo | Y | N | Y | Y | N | N | N | Y | N | N |
| MTK | Y |  | Y | Y |  |  |  | Y |  |  |

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| Company | **CA2.1** | **CA2.3** | **CA2.7** | **CA2.8** | CA2.2 | CA2.4 | CA2.6 | CA2.5 | IAP-2.1 | IAP-3.1 | IAP-3.2 |
| LG | Y | Y | Y | Y |  |  | Y | Y |  |  |  |
| Nokia, NSB | Y | Y | Y | Y | N | N | Y | N | N | Y(see comment) | Y(see comment) |
| Ericsson | Y | Y | Y | Y | N | N | N | N | N | N | N |
| Fujitsu | Y | Y | Y | Y |  |  |  |  |  |  |  |
| Sharp | Y |  |  | Y |  |  | Y |  |  |  |  |
| ZTE | Y | Y | Y | Y |  |  |  |  |  |  |  |
| vivo | Y | Y | Y | Y | N | N | Y | N | N | N | N |
| MTK | Y | Y | Y | Y |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- |
| Company | **HARQ-OOO** | HARQ-NFI-ULDAI | HARQ-B4 | HARQ-B14 | Multi-PUSCH |
| LG | Y | Y | Y |  |  |
| Nokia, NSB | Y | Y | N | N | Y (see comment) |
| Ericsson | Y | Y | Y | N | N |
| Fujitsu | Y |  |  |  |  |
| Sharp | Y | Y | Y |  | Y |
| ZTE | Y |  |  |  | Y |
| vivo | Y | Y | Y | Y | N |
| MTK | Y |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Company | **CG1** | **CG4** | **CG5** | CG2 | CG3 | WB01 | WB02 | WB03 |
| LG |  |  |  | Y |  |  |  |  |
| Nokia, NSB | Y | Y | Y | Y | N | N | Y(fine to discuss under features) | N |
| Ericsson | N | Y | N | Y | N | N | N | N |
| Fujitsu | Y |  |  | Y |  |  |  |  |
| Sharp |  |  |  |  |  |  |  |  |
| ZTE | Y | Y |  | Y |  |  |  |  |
| vivo | Y | Y | Y | Y | N | N | N | N |
| MTK |  |  |  |  |  |  |  |  |

Editorial and straightforward changes, possibly covered by one email thread

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Company | IA-C | DL-Z1 | DL-Z2 | DL-Z3 | UL-02 | WB04 |
| LG | Y | Y | Y | Y |  | Y |
| Nokia, NSB | Y | Y | Y | Y | Y | Y |
| Ericsson | Y | Y | Y | Y | Y | Y |
| Fujitsu | Y | Y | Y | Y | Y | Y |
| Sharp |  | Y | Y | Y | Y | Y |
| ZTE | Y | Y | Y | Y |  |  |
| vivo | Y | Y | Y | Y | Y | Y |
| MTK | Y | Y | Y | Y | Y | Y |

Please provide additional company views below

|  |  |
| --- | --- |
| **Company** | **View** |
| LG | For DL-A6, we believe this is essential. Unless SS set dropping caused by BD/CCE overbooking is performed per SS set group, roughly speaking, each SS set group may have only half of PDCCH BD/CCE limit. This leads to inefficient PDCCH monitoring, since UE shall not monitor both of SS set groups at the same time.For UL-04, it seems necessary to clarify the group’s understanding on the determination of DCI size for DCI 0\_0 with UL RA type 2.For CA2.6, since most companies agreed with our proposal related to the no intra-cell guard in RAN1#102-e meeting, the corresponding TPs can be discussed to make a consensus. |
| Nokia, NSB | **DL-A6:** we haven’t seen anyone contributing against the LG proposal in previous meetings, so unless there are some concerns this could be fast and small change to agree.**IAP-3.1**) we disagree with the FL’s statement. There was broad consensus, only one company blocking progress**IAP-3.2)** As indicated in our contribution the issue is not only an inconsistency between 38.300 and 38.211 but also 38.211 self-inconsistency; We would like to hear other companies views on the matter.**Multi-PUSCH :** V16.3.0 of TS38.212 still talks about “if the number of scheduled PUSCH indicated by the Time domain resource assignment field is larger than 1” |
| Ericsson | **IA-D:** Do not discuss. This issue has been discussed before without consensus.**DL-A6:** Do not discuss.Prefer to maintain Rel-15 dropping rules**DL-B1**: Do not discuss.Same issue as WB-03. This issue has been discussed many times without consensus. We prefer to drop it.**DL-B5**: Do not discuss.There is no requirement that RB set indicator field is configured, even if DCI 2\_0 is configured.**WB-01**: Do not discuss.Agree with WB FL's recommendation. This is not an issue since the identified scenario will not occur with proper gNB configuration.**WB-02**: Do not discuss.Will be discussed in 7.2.11 (UE features) as proposed by Hiroki**WB-03**: Do not discuss.This issue has been discussed many times without consensus. We prefer to drop it.**IAP 2.1, 3.1, 3.2**: Do not discuss.Agree with IAP FL's recommendation. These issues were either raised before and agreed not to discuss or discussed without consensus.**WB-04:** Agree to discuss, but the TPs proposed in [1] and [3] in the WB FL summary will mostly likely require modification.**UL-03**: Do not discuss (not an issue). The scenario identified by the proponent can be viewed as misconfiguration. Such a misconfiguration is easily avoided by gNB implementation: the gNB should avoid configuring *intraCellGuardBandUL-r16* and *BWP-UplinkDedicated* such that the identified scenario occurs, since the UE cannot be expected to transmit on RBs outside the active UL BWP.**UL-04:** Do not discuss (not an issue).No need to specify new UE behavior for DCI size matching for DCI 0\_0 with UL RA type 2. Truncation of the FDRA field is not expected when interlacing is configured since the size of the FDRA field for DCI 0\_0 is always less than or equal to the size of the FDRA field for DCI 1\_0. The existing size matching rules work fine. |
| Fujitsu | 1. Regarding UL-03, thanks moderator for sharing the view. We understand the point. However, in the spec., ambiguity is still there and may be misleading. To be specific, it is ambiguous whether the scenario (i.e. some of the RBs of the assumed nominal RB set is outside of the BWP) is valid and whether the UE should use the RBs outside of the BWP in the scenario assuming it is valid. In order to avoid misunderstanding in the future, we think collecting companies view and having some clarification are necessary.
2. Regarding WB01, thanks moderator for clarifying previous discussion. Now we understand the situation and agree that further discussion on WB01 is not necessary.
3. It seems UL-01 and IA-A/B can be merged.
4. It seems CG1 is editorial and can be covered by the email thread for editorial changes.
 |
| Sharp | **IA-A and UL01:** Proposal 1 in R1-2008385 has been captured in both IA-A and UL-04. Basically, our proposal should be discussed in UL-01, except for the PRACH sequence length issue which should be discussed in IA-A.**UL03:** Not necessary to be discussed. Agree with Ericsson. Such a mis-configuration can be avoided by gNB.**UL04:** In current specification, the size of the FDRA field is not defined in a case that interlaced waveform is configured, because, there is no “else” statement corresponding to “if” statement in the main bullet of the FDRA field.**CA2-6:** discuss only proposals #3 and #4 from R1- 2008043 |
| ZTE | **DL-Z1:**It seems our TP [R1-2007960] is missing in the FL summary.**Multi-PUSCH:**We would like to clarify the intention of the TP. For example, if we look at the following description itself, it might be misunderstood that the bitwidth of the NDI field is depending on another DCI field of TDRA (although eventually it can be derived from the RRC configuration), this is what we tried to avoid in the proposed TP.* New data indicator – 1 bit if the number of scheduled PUSCH indicated by the Time domain resource assignment field is 1; otherwise…

In addition, the TP#3 in [R1-2007961] contains an editorial correction on the parameter name is missing in the FL summary.< Start of text proposal for 38.214>6.1.2 Resource allocation 6.1.2.1 Resource allocation in time domain\*\*\* Unchanged text omitted \*\*\*If *pusch-TimeDomainAllocationListForMultiPUSCH-r16* in *pusch-Config* contains row indicating resource allocation for two to eight contiguous PUSCHs, *K2* indicates the slot where UE shall transmit the first PUSCH of the multiple PUSCHs. Each PUSCH has a separate SLIV and mapping type. The number of scheduled PUSCHs is signalled by the number of indicated valid SLIVs in the row of the *pusch-TimeDomainAllocationListForMultiPUSCH-r16* signalled in DCI format 0\_1. < End of text proposal 3> |
| vivo | **IA-A/B**: No need to discuss support of length 139 PRACH on multiple RB sets. **CA2-6**: discuss only the TP related with no intra-guard band case**DL-A6:** Optimization and not suitable for discussion in current stage**CG5:** Missing part according to current spec. In last meeting, it is agreed that multi-PUSCH table will be used if configured even when DCI is scrambled by CS-RNTI. In this case, how to validate CG-PUSCH activation/deactivation and schedule re-transmission for CG-PUSCH should be discussed. |

# Reference

[1]. R1-20xxxxx, FL summary for initial access signals and channels, Qualcomm, Incorporated

[2]. R1-20xxxxx, FL summary for DL signals and channels, Lenovo

[3]. R1-20xxxxx, FL summary for UL signals and channels v2, Ericsson

[4]. R1-20xxxxx, FL summary for channel access procedures for NR-U, Nokia

[5]. R1-20xxxxx, FL summary for initial access procedure enhancements, Charter Communications

[6]. R1-20xxxxx, FL summary on NR-U HARQ maintenance, Huawei

[7]. R1-20xxxxx, FL summary for on NRU configured grant enhancement, Vivo

[8]. R1-20xxxxx, FL summary on remaining issues of wide-band operation for NR-U, LGE