3GPP TSG-RAN WG1 Meeting #103-e R1-2009357

e-Meeting, 26th October – 13th November, 2020

Agenda Item: 7.2.2

Source: Moderator (Ericsson)

Title: FL Summary #1 for [103-e-NR-NRU-03] Email discussion/approval

Document for: Discussion, Decision

# 1 Introduction

Based on the conclusion of the e-meeting preparation phase [1], the following e-mail discussion has been kicked-off:

[103-e-NR-NRU-03] Email discussion/approval on issue UL-01 in R1-2008888 until 10/29 with potential CRs by 11/4 – Steve (Ericsson)

Company proposals regarding issue UL-01 are listed in the following table discussed in the preparation phase:

|  |  |  |
| --- | --- | --- |
| **#** | **Issue** | **Contribution(s)** |
| UL-01 | Align UE assumption on RB set configuration for PRACH with assumption agreed in RAN1#102e for PUSCH scheduled by RAR UL grant and PUSCH scheduled by DCI 0\_0 addressed to TC-RNTI. | [2]: R1-2008042[3]: R1-2008385 |

# 2 Issue UL-01: Alignment of UE assumption on RB set configuration for PRACH with assumption agreed in RAN1#102-e for PUSCH

In RAN1#102-e, it was identified that if there is a mix of UEs in IDLE and CONNECTED that are in contention during RACH, there can be an ambiguity at the gNB side on which RBs are used by the UE for the case of PUSCH scheduled by a RAR UL Grant or PUSCH scheduled by DCI 0\_0 addressed to TC-RNTI if interlacing is configured. The ambiguity can occur since a IDLE UE assumes the nominal guard bands defined in the RAN4 spec (38.101-1) whereas a UE in CONNECTED may be configured with *intraCellGuardBandUL-r16* that is different than the nominal guardbands. This ambiguity was resolved by specifying that all UEs shall assume nominal guard bands for the case of PUSCH scheduled by RAR UL grant and PUSCH scheduled by DCI 0\_0 addressed to TC-RNTI. This is captured in Section 8.3 in 38.213 and Section 6.1.2.2.3 in 38.214, respectively, using the spec language

"… the UE assumes that the uplink RB set is defined as when the UE is not configured with *intraCellGuardBandUL-r16*"

It is observed in [2] and [3] that the same ambiguity occurs for PRACH transmission on a wideband carrier (carrier with >1 RB set) for the case that sequence length L = 571/1151 is used. For sequence length 139, there is no issue, since *msgA-RO-FrequencyStart* can be configured to be consistent with a UE assumption on nominal guard bands; furthermore, all RACH occasions are within the same RB set according to current specifications. Note that it is being discussed in email thread [103-e-NR-NRU-01] to potentially lift the latter restriction; however, that is out of scope for this email thread.

In both [2] and [3] it is proposed that the UE assumption on RB set configuration should be aligned between PRACH and PUSCH scheduled by RAR UL Grant and PUSCH scheduled by DCI 0\_0 addressed to TC-RNTI for the case when interlacing is configured. While it is proposed in [2] that the same assumptions should apply also to MsgA PUSCH, we note that this issue is out of scope for this email thread, but is being discussed in email thread [103-e-NR-NRU-01].

Based on the above, the following is proposed:

1. ~~For a carrier with more than one RB set,~~ align the UE assumption on RB set boundaries for the case of PRACH sequence lengths L=571/1151 with the UE assumption agreed in RAN1#102-e for PUSCH scheduled by RAR UL grant and PUSCH scheduled by DCI 0\_0 addressed to TC-RNTI when interlacing is configured.

TP#1 implements this proposal:

Reason for changes

For two UEs in contention, one in IDLE and one in RRC\_CONNECTED, the two UEs can have different assumptions on the intra-cell guard bands, and thus RB set sizes. This can lead to a situation that the gNB does not know exactly which PRBs are used for PRACH transmission for the case that PRACH sequence length 571 or 1151 is used.

Summary of changes

Specify that the UE should assume nominal intra-cell guard bands for PRACH transmission if sequence length 571 or 1151 is configured.

Specs/Sections impacted

38.211 Section 5.3.2

Consequences if not approved

Ambiguity at gNB side on which RBs of an interlace are used for PRACH when sequence length 571 or 1151 is configured.

------------------------------------- Text Proposal (TP#1) for 38.211, Section 5.3.2 ----------------------------------

\*\*\* Unchanged text omitted \*\*\*

5.3.2 OFDM baseband signal generation for PRACH

The time-continuous signal  on antenna port for PRACH is defined by

where  and

-  is given by clause 6.3.3;

-  is the subcarrier spacing of the initial uplink bandwidth part during initial access. Otherwise,  is the subcarrier spacing of the active uplink bandwidth part;

- is the largest value among the subcarrier spacing configurations by the higher-layer parameter *scs-SpecificCarrierList*;

-  is the lowest numbered resource block of the initial uplink bandwidth part and is derived by the higher-layer parameter *initialUplinkBWP* during initial access. Otherwise,  is the lowest numbered resource block of the active uplink bandwidth part and is derived by the higher-layer parameter *BWP-Uplink*;

- is the frequency offset of the lowest PRACH transmission occasion in frequency domain with respect to physical resource block 0 of the active uplink bandwidth part. The quantity is given by the higher-layer parameter *msgA-RO-FrequencyStart* if configured and a type-2 random-access procedure is initiated as described in clause 8.1 of [5, TS 38.213], otherwise by *msg1-FrequencyStart* as described in clause 8.1 of [5 TS 38.213];

-  is the PRACH transmission occasion index in frequency domain for a given PRACH transmission occasion in one time instance as given by clause 6.3.3.2;

-  is the number of resource blocks occupied and is given by the parameter allocation expressed in number of RBs for PUSCH in Table 6.3.3.2-1.

- is the start CRB index of uplink RB set . The UE assumes that the RB set is defined as when the UE is not provided *intraCellGuardBandUL-List-r16* as described in Clause 7 of [6, TS 38.214].

- is the index of the RB set which contains the lowest PRACH transmission occasion in frequency domain indicated by . The UE may assume that is configured such that each PRACH transmission occasion is fully contained within an RB set.

\*\*\* Unchanged text omitted \*\*\*

------------------------------------------------------ End Text Proposal -------------------------------------------------------

## 2.1 <1st Round Comments>

Please provide your company view on TP#1 above

|  |  |
| --- | --- |
| **Company** | **View/Position** |
| LG | We are fine with TP#1.However, regarding Proposal 1, this issue is also necessary for a carrier with one RB set, since the parameter “” is the start CRB index of uplink RB set . Therefore, we prefer to remove “for a carrier with more than one RB set” in the Proposal 1. |
| Sharp | We are OK with TP#1. |
| Samsung | We’re fine with TP#1.  |
| ZTE | We are fine with TP#1. |
| OPPO | OK |
| Qualcomm | We are fine with the TP |
| Moderator | In response to LG's question, it is fine to remove the restriction "For a carrier with more than one RB set," from Proposal 1. I agree, for a 20 MHz carrier with a single RB set and PRACH sequence length L = 571/1151, the quantity is still valid. In this case it will just be the first CRB of the carrier since there are no guard bands for such a carrier anyway. Please see modified Proposal 1 above (it does not affect TP#1). |
| Huawei | We are fine with the TP. |
| vivo | We are fine with the TP. |
| CATT | We are fine with the TP#1. |
| Lenovo, Motorola Mobility | We are fine with TP#1. |
| Nokia, NSB | We are fine with the TP |

## 2.2 < Summary of 1st Round Comments >

Based on the company feedback, there is consensus to support TP#1.

**FL Proposal Support TP#1**

# References

1. R1-2007778 Clarification on resource allocation for PUSCH scheduled by RAR UL grant or DCI addressed to TC-RNTI Fujitsu
2. R1-2008042 Remaining issues of random access for NR-U LG Electronics
3. R1-2008385 Remaining issues on initial access and UL signals/channels for NR-U Sharp
4. R1-2008521 Correction on SRS position CATT
5. R1-2008888, "Preparation phase email discussion for NR-U," Moderator (Qualcomm), RAN1#103-e, October 2020