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

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

**Agenda Item: 7.2.1**

**Source: Moderator (ZTE)**

**Title: Email discussion for NR 2-step RACH**

**Document for: Discussion**

# Introduction

This document is intended to address the following remaining issues for 2-step RACH by email discussion.

[103-e-NR-2Step-01] Email discussion/approval for potential CR(s) including the following issues:

* TP#1 in R1-2008418 (editorial)
* TP#1 in R1-2008785 (correction)
* TP#2 in R1-2008785 (correction/clarification)

till 10/29 – Li (ZTE)

# Editorial change on the “HARQ Feedback Timing Indicator” in 38.213

In R1-2008418, it is proposed to change the description in 38.213 in terms of the field “PDSCH-to-HARQ feedback timing indicator” in the successRAR to “HARQ Feedback Timing Indicator”, so that it is aligned with the field name used in the MAC spec.



***Proposal 1:***

* Adopt the following TP#1 in 38.213, to align the terminology of “HARQ Feedback Timing Indicator” between MAC spec and RAN1 spec.

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| **Reasons for change**To align the terminology of “HARQ Feedback Timing Indicator” between MAC spec and RAN1 spec**Summary of changes**Change the terminology of “HARQ Feedback Timing Indicator” in the successRAR to “HARQ Feedback Timing Indicator”.**Specs/Sections impacted**TS 38.213, Section 8.2A-------------------------**Text proposal #1 starts for TS 38.213** ----------------------------8.2A Random access response - Type-2 random access procedureIf the UE detects the DCI format 1\_0, with CRC scrambled by the corresponding MsgB-RNTI and LSBs of a SFN field in the DCI format 1\_0, if applicable, are same as corresponding LSBs of the SFN where the UE transmitted PRACH, and the UE receives a transport block in a corresponding PDSCH within the window, the UE passes the transport block to higher layers. The higher layers indicate to the physical layer- an uplink grant if the RAR message(s) is for fallbackRAR and a random access preamble identity (RAPID) associated with the PRACH transmission is identified, and the UE procedure continues as described in Clauses 8.2, 8.3, and 8.4 when the UE detects a RAR UL grant, or- transmission of a PUCCH with HARQ-ACK information having ACK value if the RAR message(s) is for successRAR, where - a PUCCH resource for the transmission of the PUCCH is indicated by PUCCH resource indicator field of 4 bits in the successRAR from a PUCCH resource set that is provided by *pucch-ResourceCommon* - a slot for the PUCCH transmission is indicated by a HARQ Feedback Timing Indicator field of 3 bits in the successRAR having a value $k$ from {1, 2, 3, 4, 5, 6, 7, 8} and, with reference to slots for PUCCH transmission having duration $T\_{slot}$, the slot is determined as $n+k+∆$, where $n$ is a slot of the PDSCH reception and $∆$ is as defined for PUSCH transmission in Table 6.1.2.1.1-5 of [6, TS 38.214]- the UE does not expect the first symbol of the PUCCH transmission to be after the last symbol of the PDSCH reception by a time smaller than $N\_{T,1}+0.5$ msec where $N\_{T,1}$ is the PDSCH processing time for UE processing capability 1 [6, TS 38.214]- for operation with shared spectrum channel access, a channel access type and CP extension [15, TS 37.213] for a PUCCH transmission is indicated by a ChannelAccess-CPext field in the successRAR - the PUCCH transmission is with a same spatial domain transmission filter and in a same active UL BWP as a last PUSCH transmission <Unchanged Text Omitted>------------------------- **Text proposal #1 ends for TS 38.214** ------------------------------- |

Any comments?

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| Company | Comments |
| CATT | We agree with FL proposal. |
| Apple | We agree with FL proposal. |
| Huawei | OK |
| Intel | Support |
| DOCOMO | We agree with FL proposal. |
| LG | Agree with FL proposal. |
| Spreadtrum | We agree with FL proposal. |
| Samsung  | Fine. |
| Nokia | We agree with FL proposal. |
| Qualcomm | ok |
| Ericsson | Fine. |

FL comment: Seems the TP is agreeable.

# Correction on the determination of DMRS sequences in 38.211

R1-2008785 pointed out that one TP on the DMRS sequences agreed in RAN1#100b-e has not been correctly implemented in the current TS38.211.

**Decision:** As per email decision posted on May 1st, TP is R1-2003025 is endorsed for inclusion in editor's CR to 38.211.

----------------------------- Start of TP for TS 38.211 ----------------------------

6.4.1.1.1.1 Sequence generation when transform precoding is disabled

<Unchanged Text Omitted>

The quantity $n\_{SCID}\in \left\{0,1\right\}$ is

- indicated by the DM-RS initialization field, if present, either in the DCI associated with the PUSCH transmission if DCI format 0\_1 or 0\_2, in [4, TS 38.212] is used;

- indicated by the higher layer parameter *dmrs-SeqInitialization*, if present, for a Type 1 PUSCH transmission with a configured grant;

- determined by the mapping between preamble(s) and a PUSCH occasion and the associated DMRS resource for a PUSCH transmission of Type-2 random access process in [5, TS 38.213];

- otherwise $n\_{SCID}=0$.

<Unchanged Text Omitted>

----------------------------- End of TP -----------------------------------------------

***Proposal 2:***

* Adopt the following TP#2 in 38.211, to correct the determination of the DMRS sequences.

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| **Reasons for change**To correct the determination of the DMRS sequences based on the previous agreement**Summary of changes**Implement the above update**Specs/Sections impacted**TS 38.211, Section 6.4.1.1.1.1-------------------------**Text proposal #2 starts for TS 38.211** ----------------------------6.4 Physical signals6.4.1 Reference signals6.4.1.1 Demodulation reference signal for PUSCH6.4.1.1.1 Sequence generation6.4.1.1.1.1 Sequence generation when transform precoding is disabled<Unchanged Text Omitted>The quantity $n\_{SCID}\in \left\{0,1\right\}$ is- indicated by the DM-RS initialization field, if present, either in the DCI associated with the PUSCH transmission if DCI format 0\_1 or 0\_2, in [4, TS 38.212] is used;- indicated by the higher layer parameter *dmrs-SeqInitialization*, if present, for a Type 1 PUSCH transmission with a configured grant; - determined by the mapping between preamble(s) and a PUSCH occasion and the associated DMRS resource for a PUSCH transmission of Type-2 random access process in [5, TS 38.213];- otherwise $n\_{SCID}=0$.<Unchanged Text Omitted>------------------------- **Text proposal #2 ends for TS 38.211** ------------------------------- |

Any comments?

|  |  |
| --- | --- |
| Company | Comment |
| CATT | We agree with FL proposal. |
| Apple | We agree with FL proposal. |
| Huawei | Ok |
| Intel | Support |
| DOCOMO | We agree with FL proposal. |
| LG | Agree with FL proposal.I guess FL might intend “Adopt the following TP#2 in 38.211” in proposal 2. |
| Spreadtrum | We agree with FL proposal. |
| Samsung | Fine.  |
| Nokia | Agree with LG that the target would be 38.211. Agree with FL proposal. |
| Qualcomm | Agree with the suggestions of LG. |
| Ericsson | Agree. |

FL comment: Seems the TP is agreeable. And thanks for pointing out the typo, now it is corrected :)

# Correction on the validation rule of PUSCH occasions in 38.213

In R1-2008785, it was proposed to further clarify the validation rule of PUSCH occasions. In the current specification, a PUSCH occasion is valid if it does not overlap in time and frequency with any PRACH occasion associated with either a Type-1 random access procedure or a Type-2 random access procedure. However, there are still two issues about which PRACH occasions should be considered for PUSCH validation. First, if a PUSCH occasion overlapped with an invalid PRACH occasion, the PUSCH occasion will be considered as invalid according to current specification, which can be a waste of PUSCH resource. Second, the PRACH occasions include contention-free PRACH occasions according to current specification. As a UE is not aware of contention-free PRACH occasions separately configured for other UEs, the valid PUSCH occasions and the mapping between PRACH and PUSCH will not be aligned among different UEs. Therefore, it will be preferred only the contention-based PRACH occasions are considered.

***Proposal 3:***

* Adopt the TP#3 in 38.213, to clarify the validation rule of PUSCH occasions.

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| **Reasons for change**To correct the validation rule of PUSCH occasions**Summary of changes**Implement the above update**Specs/Sections impacted**TS 38.213, Section 8.1A-------------------------**Text proposal #3 starts for TS 38.213** ----------------------------8.1A PUSCH for Type-2 random access procedure<Unchanged Text Omitted>A PUSCH occasion is valid if it does not overlap in time and frequency with any valid contention based PRACH occasion associated with either a Type-1 random access procedure or a Type-2 random access procedure. Additionally, for unpaired spectrum and for SS/PBCH blocks with indexes provided by *ssb-PositionsInBurst* in *SIB1* or by *ServingCellConfigCommon* <Unchanged Text Omitted>------------------------- **Text proposal #3 ends for TS 38.213** ------------------------------- |

Any comments?

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| Company | Comment |
| CATT | Proposed test should be modified for“valid ~~contention based~~”because the word “ valid RACH occasion” is already used in TS38.213 and we can reuse this word in here. |
| Apple | We are fine with the updated TP, i.e., “contention based” is removed. The PRACH occasion is defined since Rel.15, it covers both the preambles for CBRA and CFRA. no contention based RO is defined in the spec. |
| Huawei | We just want to make sure everyone is with the same understanding that the PRACH occasion cannot include CFRA PRACH occasions for one UE as they are not known by the other UEs. |
| Intel | It seems that even without the change, we will eventually have the same outcome. If PRACH occasion is invalid, PUSCH occasion would be invalid anyway. The invalidation rule is almost identical for both PRACH and PUSCH occasion.  |
| DOCOMO | We are fine with the TP. We have the same understanding with Huawei. |
| LG | Fine with the updated TP. |
| Spreadtrum | We agree with FL proposal. We have the same understanding with Huawei and DOCOMO.  |
| Samsung  | Some further questions on the “contention based”.As HW commented the PRACH occasion here cannot include the CFRA PRACH occasions. But since the CFRA based on 2step RACH is supported (and specified by RAN2), the separate RACH can be configured for this CFRA 2step RACH. Then for this UE who is conducting CFRA 2step RACH, does this UE need to avoid the PUSCH occasion overlapping with CF RO? If the answer is yes, then seems the RO could include the CF RO.To the fundamental question, if a UE doesn’t know other UEs’s CF RO, what does he gonna do? Nothing. In this case, gNB need to carefully do the scheduling. But a UE can know its own CF RO. Then this UE can do PO invalidation if it’s overlapped. With above said, I tend to support removing “contention-based”. |
| Nokia | We do not support this TP, as we do not see a need for this. The current specifications are clear as they are. That is, the PUSCH occasion is valid if it does not overlap with any configured PRACH occasion, which would be the intention. The CATT proposal for update could potentially be used instead if companies insist on updating this part. That is, using “valid PRACH occasion” instead. |
| Qualcomm | Ok with the TP. |
| Ericsson | To include “valid” seems a bit redundant to us as invalidated ROs will not be counted for RO to PO mapping anyway and it should be a common understanding. To add “contention based” seems not necessary, unless we add “contention based” everywhere in RAN1 spec. for both “PUSCH occasion” and “PRACH occasion” for MsgA if we’re only talking about CBRA in RAN1. Also agree with Samsung that for a UE in CFRA, both CFRA RO and CBRA RO needs to be considered to validate the dedicated PO for CFRA for this UE, other UEs don’t have to care, it’s up to network to dynamically schedule one or multiple ROs/POs for CFRA to avoid the overlap.So, this TP seems not necessary according to our understanding.  |

FL comment:

There are two aspects addressed in the TP#3.

1) for the inclusion of “valid”, it seems to be acceptable to the majority, while 3 companies thought the clarification is redundant. There is a consensus that only the valid ROs should be considered in the validation rule for the POs, the point is whether this “valid RO” should be explicitly mentioned in the spec. To me, I think it is useful to clarify this, as there is a case that if a PO is partially overlapped with a RO, it is still possible that the PO is valid while the RO is invalid (e.g. the gap between a last SS/PBCH block symbol and the PO is satisfied while the gap for the RO is not satisfied). So without this clarification, the PO will be invalidated due to the overlapping with an invalid RO, which is not desirable.

2) for the inclusion of “contention-based”, this is to exclude the ROs that are dedicated to CFRA in the validation rule for the POs. The majority view is not to mention it, as the UE still needs to check the CFRA ROs configured to itself. For the CFRA ROs configured to the other UEs, the UE does not know it and has to ignore them in the validation procedure.

Based on the above, it is proposed to update the text proposal to TP#3a as follows.

***Proposal 3a:***

Adopt the TP#3a in 38.213, to clarify the validation rule of PUSCH occasions.

-------------------------**Text proposal #3a starts for TS 38.213** ----------------------------

8.1A PUSCH for Type-2 random access procedure

<Unchanged Text Omitted>

A PUSCH occasion is valid if it does not overlap in time and frequency with any valid PRACH occasion associated with either a Type-1 random access procedure or a Type-2 random access procedure. Additionally, for unpaired spectrum and for SS/PBCH blocks with indexes provided by *ssb-PositionsInBurst* in *SIB1* or by *ServingCellConfigCommon*

<Unchanged Text Omitted>

------------------------- **Text proposal #3a ends for TS 38.213** -------------------------------

# Summary

The proposal is to agree on TP#1, TP#2, and TP#3a. The draft CR can be found in the Inbox:

https://www.3gpp.org/ftp/tsg\_ran/WG1\_RL1/TSGR1\_103-e/Inbox/drafts/7.2.1/Draft%20CRs

Any further comments?

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| Company | Comment |
| LG | We are fine with FL’s proposal to agree on TP#1, TP2, and TP#3a. |
| Huawei | Regarding the need of ‘contention based’, for the CFRA configured for other UEs, the concerned UE indeed does not need to know. However for the UE itself if configured with both CBRA and CFRA, the mapping ratio for this UE would be different from other UEs sharing the same CBRA resources, I think this is not we intended – i.e. for contention based case, all UEs share the same RO/PO resources with the same mapping ratio. Otherwise the scheduler would be much complicate for avoiding overlapping among UEs. I’d like to know if this is common understanding…. Ok with TP#1/#2. |
| CATT | We are fine with FL’s proposal to agree on TP#1, TP2, and TP#3a. |