3GPP TSG RAN WG1 #101 R1-20xxxxx

e-Meeting, May 25th – June 5th, 2020

Source: vivo

Title: Summary of email discussion [101-e-NR-7.1CRs-06]

Agenda Item: 7.1.3

Document for: Discussion and Decision

# Introduction

The document provides a summary for email discussion thread [101-e-NR-7.1CRs-06]. **Note that the deadline for the email thread is set to be 5/29. Please provide the first round of comments by 5/27 UTC 12:00.**

[101-e-NR-7.1CRs-06] Correction on PUSCH skipping with overlapping UCI on PUCCH ([R1-2003364](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003364.zip), [R1-2003363](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003363.zip), [R1-2003705](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003705.zip), [R1-2004616](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004616.zip), [R1-2004617](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2004617.zip)) by 5/29 – Xiaohang (vivo)

# Email discussion summary

# Discussions

In RAN1 #100-e meeting, there were discussions on the issue by RAN2 LS R1-2000163 regarding dynamic UL skipping. Following two cases related to dynamic PUSCH skipping and the handling of overlapping CSI/HARQ-ACK on PUCCH were discussed in the RAN1#100-e email discussion thread [100e-5LS-02].

* Case 1: dynamic PUSCH skipping without overlapping CSI/HARQ-ACK on PUCCH
* Case 2: dynamic PUSCH skipping with overlapping CSI/HARQ-ACK on PUCCH

For case 1, RAN1 reached the following conclusion

* When a UL grant without UL-SCH field or UL-SCH =1 (if present) is detected by a UE configured with *skipUplinkTxDynamic*, the corresponding PUSCH transmission is skipped by the UE if no transport block for the PUSCH transmission is generated by MAC and there is no CSI/HARQ-ACK on PUCCH overlapping with the PUSCH.
* Current RAN1 spec should be corrected, the CR is to be discussed/decided after the conclusion of case 2 is reached.

For case 2, there were a majority of companies in RAN1 that agree with the RAN2 common understanding on the desired UE behavior for UCI handling, as described in the LS R1-2000163. However, no consensus could be made in RAN1#100-e, due to implementation concerns raised from both gNB (increased gNB blind detection) and UE side (change of UCI multiplexing behavior).

## **Issue 1: What is the UE behaviour in case of dynamic PUSCH skipping with overlapping CSI/HARQ-ACK on PUCCH, i.e. Case 2?**

RAN1 sent an LS (R1-2001376) to RAN2 in RAN1#100-e requesting RAN2 input to resolve this issue. In the RAN2#109bis-e meeting, RAN2 made the following conclusion in response to this LS. According to RAN2’s conclusion, RAN1 needs to discuss what is the behavior for case 2.

|  |
| --- |
| **For Case 2 in the LS R2-2002515 (i.e. dynamic PUSCH skipping with overlapping CSI/HARQ-ACK on PUCCH), RAN2 assumes MAC does not generate a MAC PDU as in the current MAC specification: no changes to MAC are needed.**  **RAN2 waits for further input from RAN1.** |

In RAN1#100-e, for case 2, two options were proposed for the UE behaviors for UCI handling. Based on the inputs from the companies in RAN1#100-e and RAN1#101-e, companies’ positions are summarized as below:

* Option 1: for case 2, the PUSCH is skipped and CSI/HARQ-ACK are transmitted in the corresponding PUCCH
  + Option 1 is supported by: CATT, DOCOMO, vivo, Ericsson, Nokia, ASUSTeK, Intel, MediaTek, Samsung, LG
  + Arguments:
    - This is the same as LTE behaviour, and aligned with RAN2 common understanding for NR as in LS R1-2000163
    - Concern on option 1
      * Change of UCI multiplexing behaviour
  + If option 1 is adopted, spec change as provided by draft 38.214 CR on Case 2 in R1-2003364 [2] can be considered.

|  |
| --- |
| A UE shall upon detection of a PDCCH with a configured DCI format 0\_0 or 0\_1 transmit the corresponding PUSCH as indicated by that DCI, if a transport block for the corresponding PUSCH transmission is generated as described in [10, TS38.321]. Upon detection of a DCI format 0\_1 with "UL-SCH indicator" set to "0" and with a non-zero "CSI request" where the associated "reportQuantity" in *CSI-ReportConfig* set to "none" for all CSI report(s) triggered by "CSI request" in this DCI format 0\_1, the UE ignores all fields in this DCI except the "CSI request" and the UE shall not transmit the corresponding PUSCH as indicated by this DCI format 0\_1. For any HARQ process ID(s) in a given scheduled cell, the UE is not expected to transmit a PUSCH that overlaps in time with another PUSCH. For any two HARQ process IDs in a given scheduled cell, if the UE is scheduled to start a first PUSCH transmission starting in symbol *j* by a PDCCH ending in symbol *i*, the UE is not expected to be scheduled to transmit a PUSCH starting earlier than the end of the first PUSCH by a PDCCH that ends later than symbol *i*. The UE is not expected to be scheduled to transmit another PUSCH by DCI format 0\_0 or 0\_1 scrambled by C-RNTI or MCS-C-RNTI for a given HARQ process until after the end of the expected transmission of the last PUSCH for that HARQ process. |

* Option 2: for case 2, the PUSCH shall not be skipped and CSI/HARQ-ACK are multiplexed with the PUSCH
  + Option 2 is supported by: ZTE, Huawei, Qualcomm
  + Arguments:
    - No change for UCI multiplexing behaivor
    - Concern on option 2
      * This is different from LTE behaviour, and not aligned with RAN2 common understanding for NR as in LS R1-2000163
      * Since RAN2 has concluded no changes to MAC in Rel.15 are needed for case 2, behaviors for transmitting CSI/HARQ-ACK multiplexed with PUSCH without UL-SCH need to specify in RAN1. This is not supported in current RAN1 spec and would require significant change for spec or implementation.
  + If option 2 is adopted, spec change as provided Draft 38.213 CR on Case 2 in R1-2004616 [4] can be considered.

|  |
| --- |
| If a UE  - would multiplex UCI in a PUCCH transmission that overlaps with a PUSCH transmission, and  - the PUSCH and PUCCH transmissions fulfill the conditions in Subclause 9.2.5 for UCI multiplexing, and  Regardless of whether a transport block corresponding to the HARQ process of the corresponding PUSCH transmission is generated or not, the UE  - multiplexes only HARQ-ACK information, if any, from the UCI in the PUSCH transmission and does not transmit the PUCCH if the UE multiplexes aperiodic or semi-persistent CSI reports in the PUSCH;  - multiplexes only HARQ-ACK information and CSI reports, if any, from the UCI in the PUSCH transmission and does not transmit the PUCCH if the UE does not multiplex aperiodic or semi-persistent CSI reports in the PUSCH. |

**Please share your views on the following aspects for Case 2 using the table format**

**Q1-1: Please share your view regarding option 1 and the corresponding draft 38.214 CR for Case 2.**

* Whether to support this option and the key justification/reason for that
* Any other comments?

|  |  |
| --- | --- |
| **Company** | **view/comments** |
|  |  |
|  |  |
|  |  |
|  |  |

**Q1-2: Please share your view regarding option 2 and the corresponding draft 38.213 CR for Case 2.**

* Whether to support this option and the key justification/reason for that
* Any other comments?

|  |  |
| --- | --- |
| **Company** | **view/comments** |
|  |  |
|  |  |
|  |  |
|  |  |

# List of contributions

1. [R1-2003363](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_101\Docs\R1-2003363.zip) Disucssion on PUSCH skipping with overlapping UCI on PUCCH vivo

1. [R1-2003364](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_101\\Docs\\R1-2003364.zip) Correction on PUSCH skipping with overlapping UCI on PUCCH vivo

1. [R1-2003705](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_101\\Docs\\R1-2003705.zip) Clarification on dynamic PUSCH skipping with overlapping CSI HARQ-ACK on PUCCH ZTE

1. [R1-2004616](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_101\\Docs\\R1-2004616.zip) Corrections on dynamic PUSCH skipping with overlapping with PUCCH Huawei, HiSilicon

1. [R1-2004617](file:///C:\\Users\\wanshic\\OneDrive%20-%20Qualcomm\\Documents\\Standards\\3GPP%20Standards\\Meeting%20Documents\\TSGR1_101\\Docs\\R1-2004617.zip) Corrections on dynamic PUSCH skipping without overlapping with PUCCH Huawei, HiSilicon