3GPP TSG-RAN WG1 Meeting #105-e R1-21xxxxx

e-Meeting, 19th – 27th May 2021

Agenda Item: 6.2.1

Source: Moderator (Ericsson)

Title: FL summary on clarification of UE procedure for UL multi-TB scheduling in TDD for Rel-16 LTE-MTC

Document for: Discussion, Decision

# 1 Introduction

This document provides a summary of the following RAN1 email discussion.

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| [105-e-LTE-eMTC5-02] Clarification of UE procedure for UL multi-TB scheduling in TDD for LTE-MTC – Johan (Ericsson)   * Discuss and decide on the potential clarification in 36.213 discussed in these contributions:   + [R1-2105267](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105267.zip), “Clarification on UE procedure for uplink MTB scheduling in TDD”, ZTE   + [R1-2105268](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105268.zip), “Discussion on UE procedure for uplink MTB scheduling in TDD”, ZTE * Discussion and decision by May 24, TPs by May 27 |

# 2 Discussion

Contribution [2] discusses a potential need to clarify the UE procedure for UL multi-TB scheduling in CE mode A in TDD UL/DL configuration 0. In this TDD UL/DL configuration, the ‘UL index’ field in the DCI achieves dual-TB scheduling already since Rel-13. Section 2.1 in [2] makes the following observations and proposal:

*Observation 1: For TDD configuration 0, when repetition number N = 1 and UL index = ‘11’, the corresponding HARQ process number for the two scheduled TBs are consecutive.*

*Observation 2: When 2 TBs are scheduled, the HARQ process number determined by ‘UL index’ and ‘Scheduling TBs for Unicast’ field are conflicted.*

*Observation 3: When more than 2 TBs are scheduled, the 2 HARQ process number determined by UL index is conflicted with the HARQ process number indicated by ‘Scheduling TBs for Unicast’ field if multi-TB scheduling feature is configured.*

*Proposal 1: When ce-PUSCH-MultiTB-Config is configured and ‘UL index’ in DCI format 6-0A is set as ‘11’, if multiple TBs are scheduled, further clarification is needed on how to determine the HARQ process number for each TB.*

**Question 1: Companies are invited to comment on the observations and proposal listed above.**

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| **Company** | **Comments** |
| Lenovo, MotoM | We agree the observation 1-3  For the proposal part:  When *ce-PUSCH-MultiTB-Config* is configured, no matter how many TBs are scheduled, even only one TB is scheduled, the UL index in DCI format 6-0A should not set as “11”.  If one TB is scheduled by ‘Scheduling TBs for Unicast’ field, and we use “UL index = ‘11’” to schedule 2 TB, this is another confliction. |
| Qualcomm | We agree with the analysis. We think the simplest way would be to disallow ‘11’ when multiple TBs are scheduled. |
| FL (Ericsson) | Companies are invited to comment on the statement in Lenovo’s response above that even scheduling of a single TB will be problematic when *ce-PUSCH-MultiTB-Config* is configured and ‘UL index’ is set to ‘11’. |
| Lenovo, MotoM | Let me clarify more  If *ce-PUSCH-MultiTB-Config* is configured, eNB can use ‘Scheduling TBs for Unicast’ field to schedule 2TB without HARQ process number restriction, do we still need to use legacy Rel.13 method to use UL index=11 to schedule 2TB in subframe n+k and n+7 with HARQ process number restriction?  If ‘Scheduling TBs for Unicast’ field indicate one TB is scheduled, and UL index=11, 2TB in subframe n+k and n+7 are scheduled. Although this can work well, and all procedure should follow N\_TB=1 case (e.g., uplink power control, adopted to 1 TB or 2 TB), which seems not a good understanding.  If so, we hope to remove “*if multiple TBs are scheduled,*” in the proposal. |
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Section 2.2 in [2] lists the following potential solutions and proposes to adopt Option 1. A draft 36.213 CR corresponding to Option 1 has been provided in [1].

* *Option 1: UE is not expected to receive DCI format 6-0A with both the MSB and LSB of ‘UL index’ set to 1 if multiple TBs are scheduled when ce-PUSCH-MultiTB-Config is configured.*
* *Option 2: When ce-PUSCH-MultiTB-Config is configured, the ‘UL index’ field is ignored.*
* *Option 3: The multi-TB scheduling feature is not supported for TDD configuration 0.*
* *Option 4: When UL index = 11 and ce-PUSCH-MultiTB-Config is configured, only single TB scheduling is supported.*

**Question 2: Please comment on the options listed above and express your preference, if any.**

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| **Company** | **Comments** |
| Lenovo, MotoM | Based on the observation, if we want to down select from the 4 options above, we prefer option 1 in general. |
| Qualcomm | We think Option 1 is preferred (it is not clear to us what is the difference with Option 4, though). We think the CR can be simplified as follows:  with both the MSB and LSB of the UL index set to 1 when *N>1* or . |
| FL (Ericsson) | Companies are invited to comment on the options listed above in the light of the statement in Lenovo’s response to Question 1 above that even scheduling of a single TB will be problematic when *ce-PUSCH-MultiTB-Config* is configured and ‘UL index’ is set to ‘11’. |
| Lenovo, MotoM | We agree with the CR by [1] removing the following part.  The UE is not expected to receive DCI format 6-0A with both the MSB and LSB of the UL index set to 1 when *N>1* or ~~multiple TBs are scheduled when~~ *ce-PUSCH-MultiTB-Config* isconfigured. |
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# References

1. [R1-2105267](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105267.zip), “Clarification on UE procedure for uplink MTB scheduling in TDD”, ZTE

1. [R1-2105268](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_105-e/Docs/R1-2105268.zip), “Discussion on UE procedure for uplink MTB scheduling in TDD”, ZTE