3GPP TSG-RAN WG1 Meeting #102-e R1- 20xxxxx

e-Meeting, August 17th – 28th, 2020

Agenda Item: 6.2.1

Source: Moderator (Ericsson)

Title: FL summary #1 for Multi-TB minor corrections for LTE-MTC

Document for: Discussion, Decision

# Introduction

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

|  |
| --- |
| * [102-e-LTE-eMTC5-04] Email discussion #4: Multi-TB minor corrections – Johan (Ericsson)   + Correction of number of HARQ processes in TDD CE mode B ([R1-2005470](https://protect2.fireeye.com/v1/url?k=aead44cc-f37e1843-aeaccf83-0cc47a31ce52-30bf37a20506996d&q=1&e=35232f27-e789-49d1-b99b-5a16147b2dfd&u=http%3A%2F%2Fwww.3gpp.org%2Fftp%2FTSG_RAN%2FWG1_RL1%2FTSGR1_102-e%2FDocs%2FR1-2005470.zip) section 2.2)   + Editorial changes ([R1-2005470](https://protect2.fireeye.com/v1/url?k=ac0a7b72-f1d927fd-ac0bf03d-0cc47a31ce52-dddfc8c4b8127179&q=1&e=35232f27-e789-49d1-b99b-5a16147b2dfd&u=http%3A%2F%2Fwww.3gpp.org%2Fftp%2FTSG_RAN%2FWG1_RL1%2FTSGR1_102-e%2FDocs%2FR1-2005470.zip) section 2.3, not the TDD grouping related changes)   + Omission of multi-TB and PUR for spanning of PUSCH transmission ([R1-2006418](https://protect2.fireeye.com/v1/url?k=af1b444a-f2c818c5-af1acf05-0cc47a31ce52-18db3963eb1d79f9&q=1&e=35232f27-e789-49d1-b99b-5a16147b2dfd&u=http%3A%2F%2Fwww.3gpp.org%2Fftp%2FTSG_RAN%2FWG1_RL1%2FTSGR1_102-e%2FDocs%2FR1-2006418.zip) section 2)   + Editorial changes ([R1-2006418](https://protect2.fireeye.com/v1/url?k=0fdbeb3d-5208b7b2-0fda6072-0cc47a31ce52-aa3981c450f3c3ef&q=1&e=35232f27-e789-49d1-b99b-5a16147b2dfd&u=http%3A%2F%2Fwww.3gpp.org%2Fftp%2FTSG_RAN%2FWG1_RL1%2FTSGR1_102-e%2FDocs%2FR1-2006418.zip) section 3)   + Missing ‘else’ ([R1-2006471](https://protect2.fireeye.com/v1/url?k=1e379664-43e4caeb-1e361d2b-0cc47a31ce52-88781f51bbe10e1d&q=1&e=35232f27-e789-49d1-b99b-5a16147b2dfd&u=http%3A%2F%2Fwww.3gpp.org%2Fftp%2FTSG_RAN%2FWG1_RL1%2FTSGR1_102-e%2FDocs%2FR1-2006471.zip) issue #2)   + Discussions/Agreements by 8/19, TPs by 8/24 |

# Issue #1: Number of HARQ processes in TDD CE mode B

According to earlier RAN1 agreements [4], the maximum number of TBs that can be scheduled with a single DCI is 4 for CE mode B. Contribution [1] proposes that the specification text in 36.213 for the TDD case is updated to reflect this.

|  |
| --- |
| 8.0 UE procedure for transmitting the physical uplink shared channel **<Unchanged parts are omitted>**  For a BL/CE UE configured with CEModeA and for TDD, the maximum number of HARQ processes per serving cell shall be determined by the UL/DL configuration (Table 4.2-2 of [3]) according to the normal HARQ operation in Table 8-1. For TDD a BL/CE UE configured with CEModeB is not expected to support more than 4 uplink HARQ processes per serving cell if the UE is configured with higher layer parameter *multi-TB-UL-config,* 2 uplink HARQ processes per serving cell otherwise.  **<Unchanged parts are omitted>** |

Companies are invited to provide their comments on the text proposal.

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Issue #3: Editorial changes in DL TBS determination

Contribution [1] proposes some corrections of the specification text in 36.213 for the DL TBS determination.

|  |
| --- |
| 7.1.7.2 Transport block size determination **<Unchanged parts are omitted>**  For a BL/CE UE, if the UE is configured with higher layer parameter *multi-TB-DL-config* and multiple TB, , are scheduled in the corresponding DCI with CRC scrambled by C-RNTI, the HARQ process ID for each of the scheduled  TBs are determined from the value of the HARQ index field in the corresponding DCI which is a combinatorial index *r* defined as , where  **<Unchanged parts are omitted>** |

Companies are invited to provide their comments on the text proposal.

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Issue #4: Multi-TB and PUR spanning PUSCH transmission

Contribution [2] proposes to correct an omission of multi-TB and PUR for spanning of PUSCH transmission in the specification text in 36.211 for the mapping to physical resources for PUSCH.

|  |
| --- |
| 5.3.4 Mapping to physical resources **<Unchanged parts are omitted>**  - In case the UE is a BL/CE UE configured with higher layer parameter *ce-PUSCH-SubPRB-Config-r15* or *subPRB-Allocation* in *PUR-PUSCH-Config*, the PUSCH transmission spans consecutive subframes including subframes that are not BL/CE UL subframes where the UE postpones the PUSCH transmission.  **<Unchanged parts are omitted>** |

Companies are invited to provide their comments on the text proposal.

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Issue #4: More editorial changes in DL TBS determination

Contribution [2] proposes some further corrections of the specification text in 36.213 for the DL TBS determination and PDSCH subframe assignment.

|  |
| --- |
| 7.1.7.2 Transport block size determination **<Unchanged parts are omitted>**  For a BL/CE UE, if the UE is configured with higher layer parameter *ce-PDSCH-MultiTB-Config* and multiple TB, , are scheduled in the corresponding DCI with CRC scrambled by C-RNTI, the HARQ process ID for each of the scheduled  TBs are determined from the value of the ‘HARQ index with offset’ in the ‘Scheduling TBs for Unicast’ field for CEmodeA or the HARQ index in the ‘Scheduling TBs for Unicast’ field for CEmodeB in the corresponding DCI which is a combinatorial index *r* defined as , where  - the set , () contains the sorted HARQ process IDs and  is the extended binomial coefficient, resulting in unique label ,  - is the offset value as defined in 5.3.3.1.12 of [4] for CE mode A, and for CEmodeB,  -  is the number of scheduled TB, and  -  if UE is configured with CEModeA, and  if UE is configured with CEModeB,  -  if UE is configured with CEModeA, and ‘Multi-TB HARQ processes group’ field is present and set to '1' in the corresponding DCI,  otherwise.  The NDI and HARQ process ID, as signalled on PDCCH/EPDCCH/MPDCCH/SPDCCH, and the TBS, as determined above, shall be delivered to higher layers.  **<Unchanged parts are omitted>** 7.1.11 PDSCH subframe assignment for BL/CE UE A BL/CE UE shall upon detection of a MPDCCH with DCI format 6-1A/6-1B/6-2 intended for the UE, decode the corresponding PDSCH in subframe(s) *n+ki* with *i = 0, 1, …, NTBN-1* according to the MPDCCH, where  - subframe *n* is the last subframe in which the MPDCCH is transmitted and is determined from the starting subframe of MPDCCH transmission and the DCI subframe repetition number field in the corresponding DCI;  - the value of is the number of scheduled TB determined in the corresponding DCI if present, otherwise;  - subframe(s) *ni* = *n+ki* with *i=0,1,…, NTBN-1* are *NTBN* consecutive BL/CE DL subframe(s) where,  , the value of  is determined by the repetition number field in the corresponding DCI, where  are given in Table 7.1.11-1, Table 7.1.11-2 and Table 7.1.11-3, respectively and subframe *n+x* is the second BL/CE DL subframe after subframe *n*.  - for ,  - if the UE is configured with higher layer parameter *interleaving* in *ce-PDSCH-MultiTB-Config*, and PDSCH corresponding to a MPDCCH with DCI CRC scrambled by C-RNTI and where  for BL/CE UE configured with CEModeA,  for BL/CE UE configured with CEModeB,  - BL/CE DL subframes  with  are associated with TB*r+*1 ,  - otherwise,  - BL/CE DL subframes  with  are associated with TB*r+*1 ,,  - for  and PDSCH corresponding to an MPDCCH with DCI CRC scrambled by G-RNTI,  - if higher layer parameter *multiTB-Gap* is configured*,* a scheduling gap with a length equal to the indicated value of *multiTB-Gap* is inserted between TB*r* and TB*r+*1, *r=*0,1,2.*..,NTB*-2.  **<Unchanged parts are omitted>** |

Companies are invited to provide their comments on the text proposal.

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Issue #5: Missing ‘else’ in UL RV determination

Contribution [3] proposes to insert a missing ‘else’ in the specification text in 36.213 for the UL RV determination.

|  |
| --- |
| 8.6.1 Modulation order and redundancy version determination **<Unchanged parts are omitted>**  - if is indicated by the corresponding DCI,  for the TB is determined by the 'Redundancy version' in the ‘Scheduling TBs for Unicast’ field in DCI format 6-0A  - else if is indicated by the corresponding DCI, and the HARQ process IDs for each of the scheduled TBs are h1 and h2 (h1<h2),  of the scheduled TB with HARQ process ID h1 is determined by the ‘Redundancy version for TB 1’ in the ‘Scheduling TBs for Unicast’ field in DCI format 6-0A, and  of the scheduled TB with HARQ process ID h2 is determined by  - if the UE is configured with higher layer parameter *pusch-HoppingConfig* set to’on’ and the repetition number field in the DCI indicates PUSCH repetition, the ‘Redundancy version for TB 1’ in the ‘Scheduling TBs for Unicast’ field in DCI format 6-0A  - otherwise the ‘Redundancy version for TB 2’ in the ‘Scheduling TBs for Unicast’ field in DCI format 6-0A  - else if = 4 or 6,  for all schedueld TBs  - else  - if the UE is configured with higher layer parameter *pusch-HoppingConfig* set to 'on' and the repetition number field in the DCI indicates PUSCH repetition,  for all TBs  - otherwise  of all TBs is determined by the ‘Redundancy version for all TBs’ in the ‘Scheduling TBs for Unicast’ field in DCI format 6-0A.  **<Unchanged parts are omitted>** |

Companies are invited to provide their comments on the text proposal.

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# References

1. [R1-2005470](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Docs/R1-2005470.zip), “Remaining issues on scheduling enhancement for MTC”, ZTE

1. [R1-2006418](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Docs/R1-2006418.zip), “Corrections on multi-TB scheduling for eMTC”, Huawei, HiSilicon

1. [R1-2006471](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Docs/R1-2006471.zip), “Multi-TB maintenance issues for LTE-MTC”, Ericsson

1. [R1-1913594](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_99/Docs/R1-1913594.zip), “RAN1 agreements for Rel-16 Additional MTC Enhancements for LTE”