3GPP TSG-RAN WG1 Meeting #103-e R1-2009295

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

Agenda Item: 6.2.1

Source: Moderator (Ericsson)

Title: FL summary for Multi-TB issues 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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| [103-e-LTE-eMTC5-02] Multi-TB issues – Johan (Ericsson)* Issue #1: Feedback for early termination ([R1-2007713](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2007713.zip), [R1-2008340](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008340.zip), [R1-2008522](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008522.zip), [R1-2008692](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008692.zip))
* Issue #2: TPC command issue ([R1-2007713](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2007713.zip))
* Issue #3: Multicast procedure text indentation issue ([R1-2008692](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008692.zip))
* Discussion and decision by 10/29, TPs by 11/5
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# 2 Feedback for early termination

Contributions [1][2][3][4] discuss the aspects listed in the following conclusion made in RAN1#102-e:

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| RAN1 concludes that the current specification for early termination needs correcting. Continue discussion in RAN1#103-e based on the following points:* Whether explicit feedback should apply to all TBs or a subset of the TBs.
* Whether implicit feedback is supported for multi-TB and, if so, whether it applies to all TBs or a subset of the TBs.
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The contributions can be briefly summarized as follows. For detailed discussion and proposals, please refer to the contributions.

* Contribution [1] proposes that explicit feedback applies to individual TBs and that further discussion is needed regarding implicit feedback.
* Contribution [2] proposes that explicit feedback applies to a subset of the TBs and that implicit feedback applies to all TBs.
* Contribution [3] proposes that explicit feedback applies to all TBs and that implicit feedback is supported and to discuss further whether the implicit feedback applies to all TBs or a subset of the TBs.
* Contribution [4] proposes that explicit feedback applies to all TBs and that implicit feedback is not supported.

**Question: Companies are invited to comment below on the explicit and implicit feedback for early termination of uplink multi-TB transmission.**

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| **Company** | **Comments** |
| Ericsson | We can accept the introduction of more advanced solutions than the one we propose in our contribution (which is that explicit feedback applies to all TBs and that implicit feedback is not supported), but in that case we want to see a complete detailed proposal with TPs. We do not want to make agreements in principle without seeing the full proposal. If it is not possible to produce a complete detailed proposal with TPs, we prefer our own proposal (see TP in our contribution). |
| Qualcomm | In [3], we provide a TP for the case of implicit feedback + apply to all TBs, we think this is simple enough while offering the possibility to early terminate with another grant. If there is a complete solution (including TP) for the explicit one, we may be also OK with it. |
| Nokia, NSB | We have no strong view here. Our slight preference is to have explicit feedback for individual or group of TBs. For implicit feedback, we are OK to have it apply to all TBs. |
| Lenovo, Motorola Mobility | We do see the benefit of feedback for individual or a group of TBs regarding the explicit way or implicit way, so we are open to discuss either way or both of them. We don’t think it is wise to feedback all TBs especially for TB=6, 8, in this case the early termination does not make sense. |
| ZTE, Sanechips | From our understanding, individual feedback and implicit feedback may have different use cases. So we are OK with both of them.Further, a complete solution for the individual feedback is provided for reference. TP for 36.212 part can refer to TP2 in [1]. Based on the contributions [2][3][4], a referred TP for 26.213 part is shown as following:

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| 8.0 UE procedure for transmitting the physical uplink shared channel--------------------------------------------- Text omitted --------------------------------------A BL/CE UE configured with *mpdcch-UL-HARQ-ACK-FeedbackConfig* shall upon detection on a given serving cell of an MPDCCH with DCI format 6-0A/6-0B intended for the UE in the UE-specific search space indicating HARQ-ACK (s) corresponding to transport block(s) associated to HARQ process(es) in the most recent PUSCH transmission with *N>1*, drop the remaining PUSCH transmission(s) (if any) corresponding to the transport block(s) no later than subframe *n+k*, where-------------------------------------------- Text omitted -------------------------------------- |

 Also, we are open to discuss the TP details in the next phase. |
| Huawei, HiSilicon | For explicit feedback, it is beneficial in terms of power saving and scheduling efficiency to support individual feedback for different cases with interleaving and non-interleaving transmission. Therefore we support individual feedback or a subset of TBs in explicit feedback.For implicit feedback, we are open for further discussion. |
| Ericsson 2 | For the sake of progress, we can be fine with explicit individual feedback as well as implicit feedback for all TBs, but we want to see a complete set of detailed TPs before making any agreements.We assume that the feedback should only be supported by UEs supporting the early termination of UL multi-TB transmission, not by all UEs supporting UL multi-TB transmission.We also assume that there will be no attempt to change the timing of the transmission of the remaining UL TBs when the transmission of a subset of the UL TBs are terminated early.If a coherent set of TPs can be provided that is in line with our assumptions above, we will probably be able to agree to it in this meeting. |
| Moderator (Ericsson) | CRs are provided in [R1-2009613](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2009613.zip) for 36.212 and in [R1-2009612](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2009612.zip) for 36.213. |

# 3 TPC command issue

Contribution [1] notes that the following RAN1#95 agreement may not be captured in the specification.

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| For the UL unicast, when multiple TBs are scheduled by one DCI, the following parameter values are the same across all the TBs:* Frequency-hopping flag, TPC command
* FFS: MCS, RV, Resource assignment, Repetition number, Downlink assignment index (TDD-specific)
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**Question: Can the 36.213 TP on the TPC command issue below be adopted?**

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| **Company** | **Comments** |
| Ericsson | Considering that it was agreed in previous meetings to not update “PUSCH” to “one or more PUSCH codewords” or similar in the first paragraph in 36.212 clauses 5.3.3.1.10/11, perhaps there is no need to make this update either? |
| Qualcomm | We do not have a strong view, we think it is probably not essential, but maybe worth clarifying. |
| Nokia, NSB | We think the specification is clear enough and this change is not needed. |
| Lenovo, Motorola Mobility | We do not have a strong view and OK to do the clarification. If we update text for CEmode A, do we still need to update text for CEmode B? |
| ZTE, Sanechips | According to the current spec, the PUSCH transmit power is the same for several subframes in a TB and may be different for different TBs for legacy UE. However, for the UE configured with multi-TBs, the PUSCH transmit power for all the TBs scheduled by one DCI should be the same. Therefore, we think a clarification can be considered to differentiate the 2 cases and avoid the confusion. As for the TP details, we are open to discuss it.For CE mode B, the PUSCH transmit power is fixed to the maximum. TPC command is not applied for CE mode B. Therefore, there is no confusion to be clarified. |
| Huawei, HiSilicon | Considering the other parts of the spec as below, it is still one PUSCH transmission, even including multiple TBs scheduled by one DCI.A BL/CE UE shall upon detection on a given serving cell of an MPDCCH with DCI format 6-0A/6-0B scheduling PUSCH intended for the UE, perform a corresponding PUSCH transmission in subframe(s) *ni* = *n+ki* if a transport block(s) corresponding to the HARQ process(es) of the PUSCH transmission is generated as described in [8] with *i = 0, 1, …, NTBN-1* according to the MPDCCH, whereSo it’s clear combined with other parts of the spec, and may not be essential. If finally a clarification is needed, it is preferred to be aligned in the spec as below:For a BL/CE UE configured with CEModeA, if the PUSCH transmission, scheduled by one DCI, is transmitted in more than one subframe *i0*, *i1*, …, *iN-1* where *i0*< *i1*< …< *iN-1*, the PUSCH transmit power in subframe *ik* , *k*=0, 1, …, *N*-1, is determined by |
| Ericsson 2 | We are fine with the TP in Huawei’s response above. |
| ZTE, Sanechips 2 | We are fined with the modification from Huawei. |
| Moderator (Ericsson) | A 36.213 CR is provided in [R1-2009614](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2009614.zip). |

**TP for 36.213:**

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| 5.1.1.1 UE behaviour------------------------------------------------- Text omitted -----------------------------------------For a BL/CE UE configured with CEModeA, if the PUSCH transmission(s), scheduled by one DCI, is transmitted in more than one subframe *i0*, *i1*, …, *iN-1* where *i0*< *i1*< …< *iN-1*, the PUSCH transmit power in subframe *ik* , *k*=0, 1, …, *N*-1, is determined byFor a BL/CE UE configured with CEModeB, the PUSCH transmit power in subframe *ik* is determined by ------------------------------------------------- Text omitted ----------------------------------------- |

# 4 Multicast procedure text indentation issue

Contribution [4] notes that there seems to be an indentation error in the multicast procedure text in 36.213.

**Question: Can the 36.213 TP on the multicast procedure text indentation issue below be adopted?**

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| **Company** | **Comments** |
| Ericsson | Yes |
| Qualcomm | Yes |
| Nokia, NSB | Yes |
| Lenovo, Motorola Mobility | For case *multiTB-Gap* is configured and PDSCH corresponding to an MPDCCH with DCI CRC scrambled by G-RNTI,do we need to first insert the scheduling gap and then map the TB(s) to BL/CE DL subframes?(scheduling gap is assumed not to be BL/CE DL subframes)legacy text as follow- 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. |
| ZTE, Sanechips | Yes |
| Huawei, HiSilicon | OK |
| Ericsson2 | Regarding Lenovo’s comment above, it seems a bit unclear from earlier RAN1 agreements whether the gap should be in subframes or BL/CE DL subframes. We have for example the following RAN1#99 agreement:**Agreement**For multicast, a scheduling gap can be inserted after each TB, where the gap length is configurable between {0, 2, 4, 8, 16, 32, 64, 128} subframes. The configuration is per cell.It seems reasonable to us that the gap should be in terms of BL/CE DL subframes, but we are interested in hearing views from other companies. |
| ZTE, Sanechips 2 | We are fine with the BL/CE DL subframes and a TP may be needed. |
| Moderator (Ericsson) | It is proposed to postpone both the original indentation issue and the scheduling gap issue to the next RAN1 meeting. |

**TP for 36.213:**

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| 7.1.11 PDSCH subframe assignment for BL/CE UEA 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.For BL/CE UEs, and for a PDSCH transmission starting in subframe *n+k0* without a corresponding MPDCCH, the UE shall decode the PDSCH transmission in subframe(s) *n+ki* with *i = 0, 1, …, N-1,* where - subframe(s) *n+ki* with *i=0,1,…,N-1* are *N* consecutive BL/CE DL subframe(s), where *0≤k0<k1<…,kN-1* and the value of  is determined by the repetition number field in the activation DCI, where  are given in Table 7.1.11-1, Table 7.1.11-2 and Table 7.1.11-3, respectively.------------------------------------------------- Text omitted -----------------------------------------  |

# References

1. [R1-2007713](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2007713.zip), “Remaining issues on scheduling enhancement for MTC”, ZTE

1. [R1-2008340](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008340.zip), “Corrections on multi-TB scheduling for eMTC”, Huawei, HiSilicon

1. [R1-2008522](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008522.zip), “Maintenance on multi-TB scheduling”, Qualcomm Incorporated

1. [R1-2008692](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008692.zip), “Multi-TB and resource reservation maintenance issues for Rel-16 LTE-MTC”, Ericsson