3GPP TSG-RAN WG1 Meeting #108-e R1-2xxxxxx

e-Meeting, February 21st – March 3rd, 2022

Agenda Item: 8.9.2

Source: Moderator (Ericsson)

Title: Moderator Summary [108-e-R17-NB-IoT-eMTC-02]

Document for: Discussion and Decision

# 1 Introduction

As part of the Work Item (WI) on “Additional enhancements for NB-IoT and LTE-MTC” [1] the following enhancement for LTE-MTC was specified in Rel-17:

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| * Support additional PDSCH scheduling delay for introduction of 14-HARQ processes in DL, for HD-FDD Cat M1 UEs. [LTE-MTC] [RAN1]
 |

This document summarizes remaining issues on the introduction of 14 HARQ processes in DL for HD-FDD Cat M1 UEs according with [2-5].

# 2 Moderator summary on 14 HARQ processes in DL in LTE-MTC

## 2.1 Usability of the “Repetition number” field

During RAN1# 107-e, the following agreement on the “Repetition number” field was reached [2]:

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| **Agreement****In Rel-17, for the 14 HARQ processes feature the “Repetition number” field is:**         **Opt-3: 2-bits as in legacy****Note: Further optimization for using Repetition number” field is not pursued** |

Towards the end of RAN1# 107-e, the following potential conclusion was drafted as to be resolved during the maintenance phase [3]:

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| **Potential Conclusion:*** **Alt-A:**

**In Rel-17 for the 14 HARQ processes feature, the usage of the “Repetition Number” field follows the legacy behavior where if the “HARQ-ACK bundling flag” field is set to 1 the UE shall assume that the PDSCH repetitions equal 1.*** + **Note 1: There is no impact on TS 36.212.**
	+ **Note 2: TS 36.213 to capture that the above legacy behavior also applies for the 14 HARQ processes feature.**

* **Alt-B:**

**In Rel-17 for the 14 HARQ processes feature, the usage of the “Repetition Number” field is left up to the eNodeB to handle.** |

Table 1 summarizes the observations and proposals as in [2-6]:

**Table 1: HARQ-ACK delay sets for Alt-2e according with [2-6]**

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| **Company** | **Compendium of views on the usability of the “Repetition number” field [2], [4-5].** |
| Huawei, Hi-silicon | Proposal 1: For the 14 HARQ processes feature, the usage of the “Repetition Number” field is left up to the eNodeB to handle. |
| Nokia, Nokia Shanghai Bell | Conclusion: In Rel-17 for the 14 HARQ processes feature, the usage of the “Repetition Number” field follows the legacy behavior where if the “HARQ-ACK bundling flag” field is set to 1 the UE shall assume that the PDSCH repetitions equal 1.• Note 1: There is no impact on TS 36.212.• Note 2: TS 36.213 to capture that the above legacy behavior also applies for the 14 HARQ processes feature. |
| Ericsson | Proposal 1 RAN1 needs to ponder the importance of the extra “mixed” scenarios that would be possible to address with Alt-B, versus the benefits that Alt-A brings in terms of certainty to all entities (e.g., importance for the IODT phase). |

Companies are encouraged to consider the pros and cons on Alt-A and Alt-B as to provide their views towards selecting one of the two alternatives.

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| **Company** | **Please state your views/arguments on which option you prefer: Alt-A or Alt-B** | **Comments** |
| Qualcomm | Alt-A | There is unclear need to modify the legacy behavior. |
| Lenovo, MotoM | Alt-A | We slightly prefer to follow the legacy behavior that if the “HARQ-ACK bundling flag” field is set to 1 the UE shall assume that the PDSCH repetitions equal 1, and “Repetition Number” field is pending as legacy. |
| Nokia, NSB | Alt-A | Same reason as Qualcomm |
| Huawei, HiSilicon | Alt-B | There is no need to limit the usage of “repetition number” field since the 2-bits field cannot be removed for 14-HARQ processes feature. The eNB scheduler can determine the repetition number based on the channel condition, delay of HARQ-ACK feedback and the overhead of PUCCH resources. |
| ZTE, Sanechips | Alt-B | We do not see any benefits to follow the legacy behavior. Moreover, we also can not figure out why repetition should be always set to 1 and the 2bits DCI field are wasted when bundling is configured. |

## 2.2 TP on TS 36.211: Editorial on a HL parameter name

The TP on TS 36.211 as presented in [3], basically aims at performing an editorial change to write “ce” instead of “CE” in the higher layer parameter name “*ce-PDSCH-14HARQ-Config*”.

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| **~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ Start of text proposal to 36.211 ~~~~~~~~~~~~~~~~~~~~~~~~~~~*****-----------------------------< Start of the 1st Change >------------------------------***5.4.3 Mapping to physical resources< Unchanged parts are omitted >For BL/CE UEs, PUCCH is transmitted with  repetitions. - The BL/CE UE is not expected to transmit with $N\_{rep}^{PUCCH}>1$ when *ce-PDSCH-14HARQ-Config* is configured. < Unchanged parts are omitted >**~~~~~~~~~~~~~~~~~~~~~~~~~~~~~End of text proposal to 36.211 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~** |

Companies are encouraged to provide their views.

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| **Company** | **OK with the Editorial TP on TS 36.211?** | **Comments** |
| Qualcomm |  | We would suggest to wait till RAN2 has finalized the ASN.1 before making editorial changes. |
| Lenovo, MotoM | OK |  |
| Nokia, NSB | OK |  |
| Ericsson |  | To our best knowledge the HL parameter under discussion has been stable in RAN2. We are fine either way, correcting this minor editorial typo now or until ASN.1 has been finalized. |
| Huawei, HiSilicon | OK |  |
| ZTE, Sanechips | OK | We can further confirm it if RAN2 has the conclusion. |

## 2.3 TP on TS 36.213: More specific description on the PDSCH scheduling delay value

The TP on TS 36.213 as presented in [3], intends to add a more specific description on clause 7.1.11 for the cited PDSCH scheduling delay value.

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| **~~~~~~~~~~~~~~~~~~~~~~~~~~~ Start of text proposal to 36.213 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~*****-----------------------------< Start of the 1st Change >------------------------------***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< Unchanged parts are omitted >- otherwise,- subframe(s) *ni* = *n+ki* with *i=0,1,…, NTBN-1* are *NTBN* consecutive BL/CE DL subframe(s), where , and subframe *n+x* is the *j*th BL/CE DL subframe after subframe *n*, and *j* is given by the value of the PDSCH scheduling delay options as defined in [4] if the UE is configured with CEModeA and 'PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ' field is present in the corresponding DCI, *j*=2 otherwise.< Unchanged parts are omitted >**~~~~~~~~~~~~~~~~~~~~~~~~~~~~End of text proposal to 36.213 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~** |

Companies are encouraged to provide their views.

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| **Company** | **OK with the TP on TS 36.213?** | **Comments** |
| Lenovo, MotoM | OK |  |
| Ericsson | See comment | A similar comment was brought up during the Editor’s CR phase and the Editor argued it was clear enough. If now companies see the need of being more specific, we can be ok with it, but I think that the word that is intended to be added should be written in singular (i.e., “option”) rather than in plural since only one option is used at a time. |
| Huawei, HiSilicon | OK |  |
| ZTE, Sanechips | OK | Using ‘PDSCH scheduling delay’ is not aligned with the spe description as following, which may cause misunderstandingTable 5.3.3.1.12-1: Content of "PDSCH scheduling delay and HARQ-ACK delay for 14 HARQ" for *ce-HARQ-AckDelay* = Alt-2e

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| --- | --- | --- |
| **Bit field mapped to index** | **PDSCH scheduling delay option****(Table 5.3.3.1.12-3)** | **HARQ-ACK delay****(subframes)** |
| 0 | 0 | 4 |
| 1 | 0 | 5 |
| 2 | 0 | 6 |

|  |  |
| --- | --- |
| **Option** | **Description** |
| 0 | 2 BL/CE DL subframes |
| 1 | 1 BL/CE DL subframe + 1 subframe + 3 BL/CE UL subframes + 1 subframe + 1 BL/CE DL subframe |
| 2 | 1 subframe + 3 BL/CE UL subframes + 1 subframe + 2 BL/CE DL subframes |

As for the wording, we are fine with both ‘option’ and ‘options’ |

# 5 References

1. [RP-201306](http://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_88e/Docs/RP-201306.zip), “WID revision: Additional enhancements for NB-IoT and LTE-MTC”, RAN #88e, Electronic Meeting, June 29th – July 3rd, 2020.
2. [R1-2200977](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2200977.zip), “Support of 14-HARQ processes in DL for HD-FDD MTC UEs,” Huawei, Hisilicon, RAN1# 108-e, e-Meeting, February 21st – March 3rd, 2022.
3. [R1-2201894](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2201894.zip), “Remaining issues for introduction of 14-HARQ processes in DL for eMTC,” ZTE, Sanechips, RAN1# 108-e, e-Meeting, February 21st – March 3rd, 2022.
4. [R1-2202278](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202278.zip), “Support of 14 HARQ processes in DL in LTE-MTC,” Ericsson, RAN1# 108-e, e-Meeting, February 21st – March 3rd, 2022.
5. [R1-2202369](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_108-e/Docs/R1-2202369.zip), “Support of 14-HARQ processes in DL for eMTC,” Nokia, Nokia Shanghai Bell, RAN1# 108-e, e-Meeting, February 21st – March 3rd, 2022.