**3GPP TSG RAN WG1 #102-e R1-2007295**

**e-Meeting, August 17th – 28th, 2020**

**Agenda item:** 6.2.1 Maintenance of Additional MTC Enhancements

**Source:** Moderator **(**Sierra Wireless)

**Title:** Feature lead email summary [102-e-LTE-eMTC5-01]

**Document for**: Discussion

# Introduction

This contribution includes the summary for email discussion:

[102-e-LTE-eMTC5-01] PUR changes related to RAN2 LS – Gus (Sierra Wireless)

#1 Collision handling ([R1-2005555](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005555.zip), [R1-2005815](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005815.zip), [R1-2006187](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006187.zip), [R1-2005469](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005469.zip))

#2 Repetition adjustment from ACK ([R1-2005555](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005555.zip), [R1-2005815](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005815.zip), [R1-2006187](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006187.zip))

Discussions/Agreements by 8/21, TPs by 8/28

# Issue #1 Collision handling

## Issue Description

In RAN1 #100b-e, an LS was sent to RAN2 in order to confirm the feasibility of the following Working Assumption (WA):

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| --- |
| **Working Assumption**   * #1: When PUR transmission overlaps with WUS, PUR transmission is prioritized   + For eMTC, this applies only to HD-FDD UEs * #2: When PUR SS monitoring overlaps with Paging CSS, PUR SS monitoring is prioritized * #3: When PUR SS monitoring overlaps with WUS, PUR SS monitoring is prioritized   If it is concluded by RAN2 that the working assumption is feasible, the working assumption will be automatically confirmed. |

RAN2 responded: “RAN2 would like to inform RAN1 that the working assumption is feasible from RAN2 point of view and can be confirmed.”

## Text proposals

**<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* START TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**

9.1.5 MPDCCH assignment procedure

**<Unchanged parts are omitted>**

The BL/CE UE is not required to simultaneously monitor MPDCCH UE-specific search space and Type1-MPDCCH common search space.

The BL/CE UE is not required to simultaneously monitor MPDCCH UE-specific search space and Type2-MPDCCH common search space.

The BL/CE UE is not required to monitor Type1A-MPDCCH common search space or Type2A-MPDCCH common search space if the set of subframes comprising the search space include any subframes in which it monitors Type1-MPDCCH common search space or any subframes in which the UE receives PDSCH assigned by PDCCH with DCI CRC scrambled by P-RNTI.

The BL/CE UE is not required to monitor Type2A-MPDCCH common search space if the set of subframes comprising the search space include any subframes in which it monitors Type1A-MPDCCH common search space or any subframes in which the UE receives PDSCH assigned by MPDCCH with DCI CRC scrambled by SC-RNTI.

A BL/CE UE is not required to monitor Type1-MPDCCH common search space or in case of half-duplex FDD operation MWUS if the set of subframes comprising the search space or the set of subframes where MWUS may be received include any subframes in which the UE has initiated a PUSCH transmission using preconfigured uplink resource on a given serving cell.

A BL/CE UE is not required to monitor Type1-MPDCCH common search space or MWUS in subframes in which the UE monitors a UE-specific MPDCCH search space given by PUR C-RNTI

**<Unchanged parts are omitted>**

**<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* END TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**

## Company Views

Please indicate your comments to the text proposal:

|  |  |
| --- | --- |
| **Company** | **Comments on Proposal** |
| Sony | Support the TP |
| Ericsson | In the TP above, the wording “operating in half-duplex FDD operation” applies to both Type1-MPDCCH common search space and MWUS, however according with the Working Assumption it should only apply to WUS. Thus, we have the following suggestion to reflect the above, plus one suggestion to align the wording with respect to NB-IoT:  **<\*\*\*\*\*\*\*\*\*\*\*\*\*\* START TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**  9.1.5 MPDCCH assignment procedure  **<Unchanged parts are omitted>**  A BL/CE UE is not required to monitor Type1-MPDCCH common search space or in case of half-duplex FDD operation MWUS if the set of subframes comprising the search space or the set of subframes where MWUS may be received include any subframes in which the UE has initiated a PUSCH transmission using preconfigured uplink resource on a given serving cell.  A BL/CE UE is not required to monitor Type1-MPDCCH common search space or MWUS in subframes in which the UE monitors a UE-specific MPDCCH search space given by PUR C-RNTI.  **<Unchanged parts are omitted>**  **<\*\*\*\*\*\*\*\*\*\*\*\*\*\* END TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>** |
| Qualcomm | With Ericsson’s modification, it is just a bit strange that the FD-FDD UE is required to monitor WUS but later on can drop the type-1 MPDCCH search space. Having said this, we hope that in realistic deployments none of these things happen too often. We are OK with Ericsson’s version, since it gives more freedom to the UE. |
| Lenovo&MotoM | Fine with Ericsson’s version |
| ZTE,Sanechips | Ericsson’s version is correct from technical point of view. However, we think the WUS related specification should be lump into chapter 17. |
| Huawei/HiSilicon | Ok with Ericsson’s version. |
| Nokia | Ok with Ericsson’s version. |
| LG | We are okay with Ericsson’s TP. That correctly captures the WA. |
| FL | Modified TP with Ericsson’s suggestion |
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# Issue #2 Repetition Adjustment

## Issue Description

In RAN1 #100b-e, an LS response was sent to RAN2 including the following answer:

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| * The L1 adjustment on the (N)PUSCH repetition number is intended to apply for future PUR UL transmissions until a new L1 adjustment or RRC reconfiguration is received, i.e. the UE uses the information from the most recently received L1 adjustment or RRC (re)configuration. * The decision on whether the L1 adjustment on the (N)PUSCH repetition number is intended to update the higher layer (i.e. RRC) configuration or to be used instead of the configuration provided by higher layers can be made in RAN2, and then RAN1 will update the RAN1 specifications in accordance with the RAN2 decision if needed. |

RAN2 provided the following response:

|  |
| --- |
| RAN2 would like to inform RAN1 that RAN2 will update their specifications so that the adjustment on the (N)PUSCH repetition number provided with L1 ACK / fallback indicator updates the repetition number configuration in PUR configuration in RRC layer.  RAN2 expects that PHY layer will provide a 3-bit repetition adjustment index to higher layers so that the value can be stored in the PUR configuration in RRC and expects that the format of the 3-bit information is same as RRC parameter *numRepetitions-r16* for eMTC CE Mode A and CE Mode B and *npusch-NumRepetitionsIndex-r16* for NB-IoT.  Furthermore, RAN2 expects PHY layer to provide L1 ACK / fallback indication to higher layers. |

In RAN1 #101-e, the following conclusion was reached considering two possible outcomes as to be ready to act on the RAN2 response:

|  |
| --- |
| **Conclusion**  Regarding L1 adjustment on the NPUSCH repetition number, one of the following TPs is the starting point for discussion for TS 36.213 based on the outcome of RAN2’s discussion   * If the L1 adjustment on the (N)PUSCH repetition number is intended to update the higher layer (i.e. RRC) configuration, then it is RAN1 understanding the text proposal in R1-2004897 will be endorsed * If the L1 adjustment on the (N)PUSCH repetition number is to be used instead of the configuration provided by higher layers, then it is RAN1 understanding the text proposal in R1-2004898 will be endorsed |

Based on the RAN2 LS response, the approach in the first bullet of the RAN1 conclusion will be adopted.

**Repetition Adjustment Misalignment**

The RAN2 LS response states “RAN2 expects that PHY layer will provide a 3-bit repetition adjustment index to higher layers”, “and expects that the format of the 3-bit information is same as RRC parameter *numRepetitions-r16* for eMTC CE Mode A and CE Mode B”. There are no issues with CE mode B but there are two related issues for CE mode A:

**ce-pdsch-puschEnhancement-config support**: If ce-pdsch-puschEnhancement-config feature is enabled, the repetition field in the DCI grows from 2 to 3 bits which is not support by the 2bit field of the L1-ACK/Fallback indication. In RAN1#99, the following Conclusion was made:

***Conclusion:***

*The following features cannot be enabled in the PUR configuration:*

* *Flexible starting PRB for PDSCH/PUSCH in CE mode A/B*
* *64QAM for non-repeated unicast PDSCH in CE mode A*
* *New numbers of repetitions for PUSCH and modulation restrictions for PDSCH/PUSCH in CE mode A Feature*
* *5 or 20 MHz max PDSCH/PUSCH channel bandwidths in CE mode A/B:*
* *Dynamic HARQ-ACK delay for HD-FDD in CE mode A*
* *HARQ-ACK bundling in HD-FDD in CE mode A*
* *10 downlink HARQ processes in FDD in CE mode A*
* *Early PUSCH termination*

Given this feature is not support with PUR, this issue should not occur.

**Field size misalignment**: The “PUSCH repetition adjustment” field in the is L1-ACK/Fallback indication is 2 bits where RAN2 is asking for 3 bits.

The proposed solution for this issue is for the UE to prepend a Zero (1 bit) to the 2 bit CE mode A “PUSCH repetition adjustment” field from L1-ACK/Fallback indication to create a 3 bit field to pass to upper layers.

## Text proposal

**<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* START TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**

8.0 UE procedure for transmitting the physical uplink shared channel

**<Unchanged parts are omitted>**

For a PUSCH transmission using preconfigured uplink resource, the UE shall use the repetition number configured by higher layers.

**<Unchanged parts are omitted>**

9.1.5.3 Preconfigured Uplink Resource ACK/fallback procedure

If a UE has initiated a PUSCH transmission using preconfigured uplink resource on a given serving cell, and upon detection of a MPDCCH with DCI format 6-0A/6-0B with CRC scrambled by PUR C-RNTI intended for the UE within the PUR search space window as defined in Subclause 9.1.5, and the corresponding DCI is for PUR ACK/fallback indication (as defined in [4]):

- the UE shall deliver the PUR ACK/fallback indication, as signalled on the MPDCCH, to the higher layers, and

- the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment according to Table 8-2b for CEModeA or Table 8-2c for CEModeB as signalled on the MPDCCH, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits.

**<Unchanged parts are omitted>**

**<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* END TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**

## Company Views

Please indicate your comments to the text proposal:

|  |  |
| --- | --- |
| **Company** | **Comments on Proposal** |
| Sony | For clarification does the UE applies the updated repetition after updating the higher layer and if yes, is it for the next PUR transmission? |
| Ericsson | The first change is in line with the conclusion from RAN1 #101-e, so we are fine with it.  For the second change, given the background provided by the FL on “*ce-pdsch-puschEnhancement-config*,” we are ok with what has been proposed by the FL.  We are ok with the TP in section 3.2 of this Feature Lead Summary, as a minor comment the “comma sign” after “(as defined in [4]),“ should be removed. |
| Qualcomm | We are OK with Ericsson’s proposed editorial change. |
| Lenovo &MotoM | I am fine with the TP. Some minor updates if FL think it is necessary (1 bit of value 0 is prepended to the higher layer signalling *PUSCH repetition adjustment* not in the DCI field)  the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment as signalled on the MPDCCH, where a bit with a value of 0 shall be prepended ~~to the DCI field~~ if the DCI field has a size of 2 bits. |
| ZTE,Sanechips | For Sony’s question, our understanding is before each PUR transmission, the UE will get repetition number from higher layer. The UE will not store the repetition number after updating the higher layer (as specified in this TP).  For the TP itself, we prefer the FL version ( remove the comma sign as QC suggested) |
| Huawei/HiSilicon | Ok with the TP plus Ericsson’s editorial change. |
| Nokia | Ok with the FL TP with the comma sign removed. |
| LG | We are okay with either the proposed TP with Ericsson’s editorial change or the proposed TP with the removal of the “:” instead of the “,” after “as defined in [4]”. |
| FL | Modified TP to remove comma |
| ZTE,Sanechips | On a second thought, there seems to be another issue here: clause 8.0 says UE shall use the repetition number from higher layer, while in clause 9.1.5.3 , what the UE delivers to the higher layer is the 3 bits PUSCH repetition adjustment. It seems there’s need to clarify the mapping between these 3 bits and the repetition number.  - the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment as signalled on the MPDCCH, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits. The corresponding PUSCH repetition number is determined by the 3-bit PUSCH repetition adjustment according to Table 8-2b for CEModeA or Table 8-2c for CEModeB. |
| Ericsson | The “Repetition number” is used when the eNode schedules a retransmission and can use either 2-bits or 3-bits depending on whether ce-pdsch-puschEnhancement-config is configured by higher layers. This means that, when the “Repetition number” field is 2-bits it also has to be subject to a zero-bit padding as it was done for the “Repetition adjustment” field. This applies for CE Mode A (Table 8-2b), for CE Mode B both fields the “Repetition number” and the “Repetition adjustment” are already 3-bits (Table 8-2c).  One extra comment is that clause 9.1.5.3 is entitled “… ACK/fallback procedure”, however the “Repetition number” that also has to be zero-but padded is used in the retransmission case.  So, the TP below reflects our technical comment based on the FL’s version, using also the ZTE’s suggestion of referring to the Tables for CE Mode A and B.  **<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* START TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>**  8.0 UE procedure for transmitting the physical uplink shared channel  **<Unchanged parts are omitted>**  For a PUSCH transmission using preconfigured uplink resource, the UE shall use the repetition number configured by higher layers.  **<Unchanged parts are omitted>**  9.1.5.3 Preconfigured Uplink Resource ACK/fallback and retransmission procedure  If a UE has initiated a PUSCH transmission using preconfigured uplink resource on a given serving cell, and upon detection of a MPDCCH with DCI format 6-0A/6-0B with CRC scrambled by PUR C-RNTI intended for the UE within the PUR search space window as defined in Subclause 9.1.5, and the corresponding DCI is for PUR ACK/fallback indication or an uplink grant for retransmission (as defined in [4]):  - the UE shall deliver the PUR ACK/fallback indication or an uplink grant for retransmission, as signalled on the MPDCCH, to the higher layers, and  - the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment or a 3-bit repetition number according to Table 8-2b for CEModeA or Table 8-2c for CEModeB as signalled on the MPDCCH, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits.  **<Unchanged parts are omitted>**  **<\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* END TS 36.213\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*>** |
| FL | Based on ZTE’s concerns expressed in the email discussion, the highlighted text was added to the TP since no issue were raised:  -              the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment as signalled on the MPDCCH and according to Table 8-2b for CEModeA or Table 8-2c for CEModeB, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits.  Ericsson’s concerns in the above comment were discussed in the email thread but were not agreeable in this meeting. The discussion can continue next meeting. |
| FL | Based on a suggestion by Ericsson, the location of the insert highlighted text is change to improve readability   * the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment according to Table 8-2b for CEModeA or Table 8-2c for CEModeB as signalled on the MPDCCH, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits. |
| Lenovo&MotoM | It seems our email response to the thread has been missed.  Reference of Table 8-2b and 8-2c should be in Section 8 not in Section 9.1.5.3.  UE deliver 3 bit PUSCH repetition adjustment to higher layer (e.g., 000, 001), and UE use the repetition number (e.g.,1,2,4,8) based on the following table mapping (e.g., 000-> repetition=1, 001-> repetition = 2)  Table 8-2b: PUSCH repetition levels (DCI Format 6-0A)   |  |  | | --- | --- | | Higher layer parameter  '*pusch-maxNumRepetitionCEmodeA*' |  | | Not configured | {1,2,4,8} | | 16 | {1,4,8,16} | | 32 | {1,4,16,32 } |   If we refer the Table 8-2b and 8-2c in section 9.1.5.3, it seems we will deliver 3 bit PUSCH repetition adjustment after the mapping to an exact repetition number (e.g., repetition = 1 or 2? ) to higher layer.  Please correct my understanding if I am wrong. Thanks  Our previous email response as follow:  Thanks for the discussion, please find our comments:   1. Based on the discussion above, two understanding of repetition number can work well. If we have to choose one, we think understanding from feature lead is more straightforward and easier. UE only delivers the repetition adjustment to higher layer and use the adjustment to next PUR, and UE will not deliver the retransmission repetition number to higher layer. 2. To address Shupeng’s concern, we can refer the Table 8-2b and 8-2c in Section 8 not in Section 9.1.5.3. 3. About specifying the discarding of the 1-bit, option 1 is enough.   Our CR proposal is as follow:  Section 8.0  For a PUSCH transmission using preconfigured uplink resource, the UE shall use the repetition number ~~determined by the repetition adjustment field according to Table 8-2b and Table 8-2c from the most recent MPDCCH DCI format 6-0A/6-0B with CRC scrambled by PUR C-RNTI for PUR ACK/fallback indication (as defined in [4]) if detected,~~ configured by higher layers ~~otherwise~~ according to Table 8-2b and Table 8-2c.  Section 9.1.5.3  9.1.5.3            Preconfigured Uplink Resource ACK/fallback procedure  If a UE has initiated a PUSCH transmission using preconfigured uplink resource on a given serving cell, and upon detection of a MPDCCH with DCI format 6-0A/6-0B with CRC scrambled by PUR C-RNTI intended for the UE within the PUR search space window as defined in Subclause 9.1.5, and the corresponding DCI is for PUR ACK/fallback indication (as defined in [4])~~, the UE shall~~:  -              the UE shall deliver the PUR ACK/fallback indication, as signalled on the MPDCCH, to the higher layers, and  -              the UE shall deliver to higher layers a 3-bit PUSCH repetition adjustment as signalled on the MPDCCH ~~and according to Table 8-2b for CEModeA or Table 8-2c for CEModeB~~, where a bit with a value of 0 shall be prepended to the DCI field if the DCI field has a size of 2 bits. |
|  |  |

# Summary

FL recommends endorsing TP in section 2.2. and section 3.2.

# References

1. R1-2005555 PUR maintenance issues for Rel-16 LTE-MTC Ericsson
2. R1-2005815 Corrections regarding RAN2 LS reply on PUR Huawei, HiSilicon
3. R1-2006187 Maintenance on PUR Qualcomm Incorporated
4. R1-2006417 Corrections on transmission in preconfigured UL resources for eMTC Huawei, HiSilicon
5. R1-2005469 Remaining issues for transmission in preconfigured UL resources for MTC ZTE