3GPP TSG-RAN WG1 Meeting #103-e R1-20xxxxx

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

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

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

**Title:** FL summary for PUR issues for Rel-16 LTE-MTC

**Document for**: Discussion

# Introduction

This contribution includes a summary for the email discussion:

[103-e-LTE-eMTC5-01] PUR issues – Gus (Sierra Wireless)

* Issue #1: TM1/TM2 configuration issue ([R1-2008800](https://protect2.fireeye.com/v1/url?k=414a0303-1c98140a-414b884c-0cc47a31cdf8-c78687a922ee16fa&q=1&e=31cac414-d755-4f05-8fc7-d03d4bb99eda&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FWG1_RL1%2FTSGR1_103-e%2FDocs%2FR1-2008800.zip))
* Issue #2: TM6/TM9 support issue ([R1-2008583](https://protect2.fireeye.com/v1/url?k=c40bed42-99d9fa4b-c40a660d-0cc47a31cdf8-8e662925567a5aee&q=1&e=31cac414-d755-4f05-8fc7-d03d4bb99eda&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FWG1_RL1%2FTSGR1_103-e%2FDocs%2FR1-2008583.zip), [R1-2008800](https://protect2.fireeye.com/v1/url?k=66896cba-3b5b7bb3-6688e7f5-0cc47a31cdf8-7bddb7075a541129&q=1&e=31cac414-d755-4f05-8fc7-d03d4bb99eda&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FWG1_RL1%2FTSGR1_103-e%2FDocs%2FR1-2008800.zip))
* Issue #3: Repetition number delivery to higher layers ([R1-2008583](https://protect2.fireeye.com/v1/url?k=9bddc1cd-c60fd6c4-9bdc4a82-0cc47a31cdf8-e3c0d20e4287dc83&q=1&e=31cac414-d755-4f05-8fc7-d03d4bb99eda&u=https%3A%2F%2Fwww.3gpp.org%2Fftp%2Ftsg_ran%2FWG1_RL1%2FTSGR1_103-e%2FDocs%2FR1-2008583.zip))
* Discussion and decision by 10/29, TPs by 11/5

# Issue #2: TM6/TM9 support issue

## Issue Description

Ericsson in [1] points out that there have been no agreements on which transmission modes PUR should support.

## Discussion

Possible options for consideration:

* Option 1: PUR Support only TM 1,2, 6 and 9 (current specification)
* Option 2: PUR supports only TM 1 and 2 (supported by [1] and [2])

## Company Views

Please indicate which option your company can supports:

|  |  |
| --- | --- |
| **Company** | **Comments on Proposal** |
| Ericsson | In principle we support Option 2, but as pointed out in [2] “since there is no RRC configuration of TM, it is unclear how the TM is configured for PUR”. For that reason, perhaps only “Single-antenna port, port 0 (see Subclause 7.1.1)” should be supported for PUR without referring to any Mode.  ------------------------- Text start (TS 36.213 Clause 7.1)---------------------------------  If a BL/CE UE is configured by higher layers to decode MPDCCH with CRC scrambled by the PUR-RNTI, the UE shall decode the MPDCCH and any corresponding PDSCH according to the respective combinations defined in Table 7.1-9. The scrambling initialization of PDSCH corresponding to these MPDCCHs is by PUR-RNTI.  Table 7.1-9: MPDCCH and PDSCH configured by PUR-RNTI   |  |  |  |  | | --- | --- | --- | --- | |  | DCI format | Search Space | Transmission scheme of PDSCH corresponding to MPDCCH | |  | 6-1A or 6-1B | UE specific by PUR-RNTI | Single-antenna port, port 0 (see Subclause 7.1.1) | |  |  |  |  | |  |  |  |  | |  |  |  |  | |  |  |  |   ------------------------- Text end (TS 36.213 Clause 7.1)---------------------------------- |
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# Issue #1: TM configuration issue

## Issue Description

Huawei [2] point out that since there is no RRC configuration of TM, it is unclear how the TM is configured for PUR. Note: this issue is linked to the choice for issue #2 on which TM are supported.

## Text Proposal

If option 1 (from above) is chosen where only TM 1 and 2 are supported, Huawei [2] recommends TM 1 or 2 is determined by the number of PBCH antenna ports. Huawei [2] provided the following TP:

-------------------------------------------------- Text start (TS 36.213 Clause 7.1) ----------------------------------------------

If a BL/CE UE is configured by higher layers to decode MPDCCH with CRC scrambled by the PUR C-RNTI, the UE shall decode the MPDCCH and any corresponding PDSCH according to the respective combinations defined in Table 7.1-9. The scrambling initialization of PDSCH corresponding to these MPDCCHs is by PUR C-RNTI.

**Table 7.1-9: MPDCCH and PDSCH configured by PUR C-RNTI**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **DCI format** | **Search Space** | **Transmission scheme of PDSCH corresponding to MPDCCH** |
|  | 6-1A or 6-1B | UE specific by PUR C-RNTI | If the number of PBCH antenna port is one, Single-antenna port, port 0 is used (see Subclause 7.1.1), otherwise Transmit diversity (see Subclause 7.1.2) |
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-------------------------------------------------- Text ends (TS 36.213 Clause 7.1) ---------------------------------------------

If option 2 (from above) is chosen where TM 1,2, 6 and 9 are supported, it is unclear how the TM would be determined. Companies may provide solutions.

## Company Views

Please indicate your company view on the above options, TP and provide other proposals if TM 6 and 9 are supported:

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| --- | --- |
| **Company** | **Comments on Proposal** |
| Ericsson | See our previous comment in section 2.3. |
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# Issue #3: Repetition number delivery to higher layers

## Issue Description

Ericsson in [1] points out that in the current specification, the UE only delivers the 3-bit *PUSCH repetition adjustment* from the PUR ACK/fallback indication to the higher layers and does not deliver the *Repetition Number* from the UL grant for retransmission.

## Discussion

At least, the following two options are possible:

**Option 1: Only the PUSCH repetition adjustment from the PUR ACK/fallback indication is delivered**

This is what is currently defined in the specification, so no TP is needed. A conclusion such as could be made:

Possible Conclusion:

* The UE does not deliver the *Repetition Number* from the UL grant for PUR retransmissions to the higher layers.

**Option 2: The *Repetition Number* field from the UL grant for PUR retransmission is delivered**

For this option, a TP is provided by Ericsson in [1]:

---------------------------------------------- Text start (TS 36.213 Clause 9.1.5.3)------------------------------------

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-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.

----------------------------------------------- Text end (TS 36.213 Clause 9.1.5.3)-------------------------------------

## Company Views

Please indicate your company views on the above options, conclusions, and TP:

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| --- | --- |
| **Company** | **Comments on Proposal** |
| Ericsson | Option 2 is expected to improve the feature’s performance for example in case the PUSCH transmission at the upcoming PUR transmission opportunity had been preceded by a retransmission that adjusted the number of repeats.  If Option 2 were not adopted, then it needs to be clarified why for the 2-bit “PUSCH repetition adjustment” field a zero-bit padding is applied, and why the same solution is not applied for 2-bit “Repetition number” field. The clarification will be needed to understand how the 2-bit “Repetition number” is handled in PUR. |
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# Summary

TBC

# References

1. R1-2008583, “PUR maintenance issues for Rel-16 LTE-MTC”, Ericsson
2. R1-2008800, “Corrections on transmission modes for PUR”, Huawei, HiSilicon