**3GPP TSG-RAN WG1 Meeting #106-eR1-210XXXX**

e-Meeting, August 16th – 27th, 2021

**Agenda item: 8.3**

**Source: Moderator (Nokia)**

**Title: [Post-106-e-Rel17-RRC-03] Enhanced IIoT and URLLC**

**Document for: Discussion and Decision**

# Introduction

As per chairman’s guidance, the email discussion

* [Post-106-e-Rel17-RRC-03] Enhanced IIoT and URLLC

is planned according to the following guidelines:

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| *As announced during RAN1#106-e, there will be a number of email threads on Rel-17 RRC parameters. For each Rel-17 work item, the work item rapporteur will kick off the email thread. The email discussions on RRC parameters will start from September 1 until September 10 (of course excluding the weekend). The purpose of these email discussions is to initiate our preparations to send the first LS to RAN2 on Rel-17 RRC parameters in October (e.g. tabulate agreed RRC parameters so far and identify ones that RAN1 should discuss whether or not to define).**Please note that RAN1 will NOT be making any decision with regards to the Rel-17 RRC parameters during the email discussions. Intention is to have the work item rapporteurs provide their initial assessment and collect company views if there are any. I am hoping that this discussion will help companies better prepare for RAN1#106bis-e. For each email thread, the rapporteur is to provide a tdoc collecting company views along with a draft list of RRC parameter at the end of the email discussion.* |

This document is there to support the RAN1 email discussion on the RRC parameter list for the Rel-17 URLLC/IIoT WI. Companies are encouraged to provide their comments on the latest version of the RRC parameter sheet in the respective AI specific drafts folder and the changes to the RRC parameter sheet will only be done by the AI moderator based on the received comments in each round or iteration of email discussions on this issue.

**This document is structured as follows:**

* Section 2 contains the email discussion for HARQ-ACK enhancements (AI 8.3.1.1)
* Section 3 contains the email discussion for CSI enhancements (AI 8.3.1.2)
* Section 4 contains the email discussion for NR-U enhancements (AI 8.3.2)
* Section 5 contains the email discussion for Intra-UE periodization enhancements (AI 8.3.3)
* Section 6 contains the email discussion for Other / Propagation delay compensation (AI 8.3.4)

# HARQ-ACK enhancements (AI 8.3.1.1)

* 1. Dropping of SPS HARQ-ACK feedback in TDD operation / SPS deferral

### 1st Round

The following need for RRC parameters has been identified by the moderator:

1. Enable the feature
2. Configure the maximum deferral per SPS configuration

On these and in case of having missed some aspect, please comment below as well:

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| --- | --- |
| *Company* | *Comments* |
| Samsung | We think that enabling/disabling the feature should be considered together with the maximum deferral per SPS configuration. That is, there is no need to make two separate RRC parameters. Just one RRC parameter is enough. * Instead of {1..15}, {0..15} should be considered. Here, 0 means disable the feature.
* Furthermore, there has been no explicit agreement to support new RRC parameter for enabling/disabling the feature
 |
| DOCOMO | Agree. |
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* 1. PUCCH repetition enhancements

### 1st Round

1. The moderator could only identify the need for the RRC parameter of nrofSlots for PUCCH format0 (but there could be some overlap with defining this in Cov. Enh. WI).

2. For PUCCH format 2, this is already supported from signaling perspective through PUCCH format config, just the restriction to configure would need to be removed in Rel-17:

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3. The configuration for the dynamic PUCCH repetition indication could be re-used from Cov. Enh. WI. So no need for us to define the related RRC parameters.

On these and in case of having missed some aspect, please comment below as well.

Please provide your input to the table below:

|  |  |
| --- | --- |
| *Company* | *Comments* |
| Samsung | OK  |
| DOCOMO | Agree. |
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* 1. Type-1 HARQ-ACK Codebook enhancements

### 1st Round

The moderator did not find any needed RRC parameter for this feature, as the current RRC signaling supports this already.

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| HARQ-ACK-CodebookList-r16 ::= SEQUENCE (SIZE (1..2)) OF ENUMERATED {semiStatic, dynamic} |

We just need to remove the Rel-16 restriction to now allow the configuration of sub-slot based PUCCH config and Type 1 CB.

Please provide your input to the table below:

|  |  |
| --- | --- |
| *Company* | *Comments* |
| Samsung | Agree |
| DOCOMO | Agree |
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* 1. Retransmissions of dropped HARQ-ACK

### Rel-16 Type-3 CB enhancements (DCI 1\_2 / PHY prioritization)

#### 1st Round

We agreed the PHY priority handling and the support for DCI format 1\_2 for the Rel-16 Type 3 CB.

The moderator identified the following needs:

1. Clearly we need an RRC parameter for the DCI 1\_2 operation
2. But it seems none for the PHY prioritization, as this is already supported by the signaling framework (just need to remove the restriction of not being able to configure PHY prioritization and Rel-16 Type 3 CB at the same time).

Please provide your input to the table below:

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| --- | --- |
| *Company* | *Comments* |
| Samsung | OK. We understand that “RRC parameter for the DCI 1\_2 operation” means the configuration for the presence of the priority indicator. |
| DOCOMO | We agree that no additional RRC parameter is needed to support PHY priority indication for DCI 1\_1 and 1\_2. However, regarding “just need to remove the restriction of not being able to configure PHY prioritization and Rel-16 Type 3 CB at the same time”, we don’t think such restriction exists in current specification. |
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### Enhanced Type-3 CB of ‘smaller size’

#### 1st Round

There are still some pending decisions, but the intention here is to discuss also potential RRC parameters already (as per Mr. Chairman’s guidance).

The moderator identified at least the following needed parameters:

1. List of enhanced Type-3 HARQ-ACK codebooks of smaller size
2. For each enhanced Type 3 HARQ-ACK codebook of smaller size
	1. Enhanced Type 3 HARQ-ACK codebook set / structure (two options for configuration agreed, per CC – or per HARQ process & CC)
	2. CBG configuration for the enh. Type 3 HARQ-ACK CB
	3. NDI configuration for the enh. Type 3 HARQ-ACK CB
3. Enabling of DCI format 1\_2 operation for enh. Type 3 HARQ-ACK codebook.

On these, and in case you think there is something missing, please provide your input to the table below:

|  |  |
| --- | --- |
| *Company* | *Comments* |
| Samsung | CBG and NDI should be removed for now – can discuss in RAN1#106b-e whether to support when targeting a codebook with small size. Also, DCI 1\_2 does not support CBGs while the need/motivation for NDI may not exist in URLLC.  |
| DOCOMO | Share similar view as Samsung that we haven’t discussed CBG and/or NDI for enhanced type 3 HARQ-ACK CB so far. Better to remove “pdsch-HARQ-ACK-enhType3NDI” and “pdsch-HARQ-ACK-enhType3CBG”. |
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### One-shot triggering (by a DL assignment) of HARQ-ACK re-transmission on a PUCCH resource

#### 1st Round

There are still some pending decisions, but the intention here is to discuss also potential RRC parameters already (as per Mr. Chairman’s guidance).

The moderator identified at least the following needed parameters:

1. Enabling of the new ‘one-shot triggering’
2. Enabling of DCI format 1\_2 triggering
3. Configure the ‘offset’ for the dynamic indication of the PUCCH occasions / CB to be re-transmitted

On these, and in case you think there is something missing, please provide your input to the table below:

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| --- | --- |
| *Company* | *Comments* |
| Samsung | It is not clear why RRC configuration for the “offset” of the PUCCH occasion is needed – may be discussed in RAN1#106b-e. |
| DOCOMO | We agree with the 1st and 2nd point for enabling. Regarding the third point, it’s better to be discussed after we have agreements on mechanisms to indicate the retransmitted HARQ-ACK CB. |
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* 1. PUCCH carrier switching

### 1st Round

There are still some pending decisions, but the intention here is to discuss also potential RRC parameters already (as per Mr. Chairman’s guidance).

The moderator identified at least the following needed parameters **common to semi-static and dynamic indication of PUCCH carrier switching**:

1. Configuration of list of candidate cells (used by both, semi-static & dynamic switching)
2. RRC parameter(s) for independent TPC for the PUCCH cells for DCI format 2\_2

The moderator identified at least the following needed parameters **for PUCCH carrier switching based on dynamic indication**:

1. Enable the feature of PUCCH carrier switching based on dynamic indication
2. Enable the PUCCH carrier switching based on dynamic indication using DCI format 1\_2 (in case we decide to have a dedicated DCI field for the carrier indication).

The moderator identified at least the following needed parameters **for semi-static PUCCH carrier switching**:

1. Pattern periodicity (in case we agree to support this)
2. Pattern definition (using list of candidate carriers)

On these, and in case you think there is something missing, please provide your input to the table below:

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| --- | --- |
| *Company* | *Comments* |
| Samsung | For “parameters **common to semi-static and dynamic indication”**1. There is no need to have a list of candidate carriers – one SCell/SUL is enough. Support of PUCCH carrier switching is also conditioned on minimum spec impact.

For “parameters **for PUCCH carrier switching based on dynamic indication”**1. OK - it is however unclear why DCI 1\_2 is explicitly mentioned but DCI 1\_1 is not.

For “parameters **for semi-static PUCCH carrier switching”**1. Having RRC configuration for the pattern periodicity needs justification – there is no apparent need or benefit. Support of PUCCH carrier switching is also conditioned on minimum spec impact.
2. The pattern definition is needed but there is no need to have a list of candidate carriers – one SCell/SUL is enough.
 |
| DOCOMO | 1. parameters **common to semi-static and dynamic indication of PUCCH carrier switching**:[Comment] One clarification question: Is the intention that “the index x” indicated by DCI or pucchCellPattern is commonly applied to both lists, and the PUCCH cell/carrier is determined by combination of the two lists with the index, is it correct understanding? Maybe single parameter “pucch-SCell-And-Carrier-List” is enough? For example, we can configured the list as “cell#1, cell#2, cell#3-UL, cell#3-SUL”.2. parameters **for PUCCH carrier switching based on dynamic indication**:[Comment] Agree. 3. parameters **for semi-static PUCCH carrier switching**:[Comment] Agree. |
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# CSI enhancements (AI 8.3.1.2)

VOID

1. NR-U Enhancements (AI 8.3.2)

VOID

1. Intra-UE multiplexing & priorization enh. (AI 8.3.3)

VOID

1. Propagation delay compensation (AI 8.3.4)

VOID