3GPP TSG RAN WG1 #106-e R1-210XXXX

e-Meeting, August 16th – 27th, 2021

**Agenda item: 7.2.5**

**Source: Moderator (Nokia)**

**Title:** **Summary of [106-e-NR-L1enh-URLLC-04]**

**Document for: Discussion and Decision**

# Introduction

This document is created to facilitate the email discussion of

* [106-e-NR-L1enh-URLLC-04] Issue#8: Conflict between the first PUCCH repetition and semi-static configuration in Rel-15/16 - Klaus (Nokia)

Although not mentioned for this email thread by Mr. chairman, the intention is to have this completed by Aug 20th.

This email thread is triggered by the following discussion document.

[R1-2107555](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_106-e/Docs/R1-2107555.zip) UCI enhancements maintenance: Conflict between the first PUCCH repetition and semi-static configuration in Rel-15/16 Nokia/Nokia Shanghai Bell

The issue of the conflict of the first PUCCH repetition and semi-static configuration in Rel-15/16 had been discussed now for three meetings in a row, without conclusion. Reference is hereby made to the following documents from previous RAN1 meetings:

* [104-e-NR-L1enh-URLLC-02] in R1-2101841, see Sec. 2.3
* [104b-e-NR-L1enh-URLLC-02] in R1-2103867, see Sec. 2.2
* [105-e-NR-L1enh-URLLC-02] in R1-2106050, see Sec. 2.2

# Email discussions

**The following is discussed by Nokia/NSB in R1-210755:**

The group discussed during RAN1#105-e postponing of a PUCCH repetition that collides with SSB symbols or symbols indicated as DL. A consensus was reached how this should be handled in Rel-16, but it was noted that the same question was discussed for Rel-15 and then different implementation choices were allowed. A proposal was to include in the meeting minutes a note that concerns only Rel-16. Because the problem was discussed for Rel-15 and one approach was agreed then, it seems not possible to change that decision if there are objections. Therefore, we support adding the note in the form proposed in RAN1 #105-e. An objection was based on thinking that, as specifications are identical for Rel-15 and Rel-16, we should not make a note only for Rel-16. However, without a note, ambiguity would remain also with Rel-16 which seems unfortunate.”

**Proposal: Include in the Chairman’s Notes the clarification
“It is clarified that, according to the running R16 specification, a PUCCH repetition in case**$N\_{PUCCH}^{repeat}>1$ **(including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated*.”**

In addition, CATT proposed to specifically mentioning that different interpretations are allowed in Rel-15:

“ **There may be different understandings/implementations for Rel-15 if the first PUCCH repetition collides with SSB symbols or symbols indicated as DL by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated.”***

## 2.1 Round 1

As this had been discussed earlier, the moderator brings forward directly the proposals based on the latest status from RAN1#105-e. **Please add your companies name directly to the line below the proposals and further comments in the table below.**

**Proposal 1: Include in the Chairman’s Notes the clarification
“It is clarified that, according to the running R16 specification, a PUCCH repetition in case**$N\_{PUCCH}^{repeat}>1$ **(including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated*.”**

* + **Support:** Nokia/NSB, CATT, vivo, HW/HiSi, DOCOMO, OPPO, ZTE
	+ **Object:** Samsung

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| *Company* | *Further comments*  |
| Apple | We are fine with Proposal 1 in general, but we think the interpretation of R15 (either following Proposal 1 or leave it to UE implementation) should also be clarified to achieve common understanding. Therefore, we do not think Proposal 1 should be agreed without any clarification for R15. |
| Samsung | Fine with the proposal but without the “according to the running R16 specification”. For this value of $N\_{this topic}^{times discussed}>1$, the reasons again are that there is no difference in the Rel-16 text from the Rel-15 text and there was no Rel-16 WI that was related to that text. Without the removal of the above statement, there is no justification for the proposal to be agreeable.>>Moderator reply: I fully understand, that in case the specs hasn’t changed it is a bit illogical to have different interpretations in different release for the same specs text. But without any clarification (as pointed out by HW/HiSi and DoCoMo below, and Nokia in the input document), such ambiguity in future releases cannot be prevented. Specifically, as PUCCH repetition due to the introduction of coverage enhancements may become more important & useful, from network vendor and network operation perspective it would be crucial and help already if R16+ UEs would adopt the same understanding.[Samsung follow up]: It is surprising that companies (including ones with products) are OK with having undefined specifications and UE behaviour for Rel-15, especially as the specifications have not changed and as a Rel-16 UE/gNB modem will not implement anything different than a Rel-15 UE/gNB modem. While it is true that one company suggested a Release-dependent understanding of the exact same text (that was completely unaffected in Rel-16), that event is unfortunate but it cannot possibly become a RAN1 endorsement for undefined Rel-15 specifications (and RAN1 did not previously agree to a different interpretation). If the specifications were left undefined every time someone claimed to have misinterpreted something, there would be no functioning deployments.In any case, there is no ambiguity in the specifications that would require a clarification. Also, the present discussion topic is not even relevant to Rel-16 URLLC (there is nothing in 9.2.6 of 213 that relates to Rel-16 URLLC). |
| HW/HiSi | Support. We should avoid having the same ambiguity as for Rel-15. |
| DOCOMO | Support. UE behavior in Rel-16 should be clarified, which is also essential for the discussion in future releases. |
| Qualcomm  | Fine with the proposal.  |
| Intel | Fine with the proposal. |
| ZTE | Fine with the proposal. |

**Proposal 2: Include in the Chairman’s Notes the additional further clarification as a sub-bullet to Proposal 1:**“ **There may be different understandings/implementations for Rel-15 if the first PUCCH repetition collides with SSB symbols or symbols indicated as DL by *tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated.”***

* + **Support:** Nokia/NSB, CATT, OPPO
	+ **Object:** Samsung

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| *Company* | *Further comments*  |
| CATT | The sub-bullet was proposed to address Apple’s concern. We are also fine with Proposal 1 only without the sub-bullet.  |
| vivo | We are also fine with Proposal 1 only without the sub-bullet. |
| Apple | We support Proposal 2, i.e., further clarification on R15 behavior.The concern we have is that we do not know how to interpret R15 without any notes. As mentioned above, we are fine with either leaving to UE implementation or adopting the same understanding as R16, as long as it is clarified.>>Moderator reply: clearly this would be the cleanest solution, but did not work out earlier. Maybe we could try this in the next round (to address Samsung concern on Proposal 1) as a last try to have this clarified. A question for CATT/vivo: without the sub-bullet, what is your understanding of R15? If the common understanding is to leave it to UE implementation, we could also be fine. But then I do not quite understand why we cannot explicitly have the notes to clarify it. |
| Samsung | There may be different understandings with everything in the specifications. That is not a RAN1 issue. If someone has a different understanding, a Rel-15 CR is the proper venue together with an explanation of what in the text creates the different understanding or what needs to be explained.This issue has been discussed for way too long already and we should not be wasting time going in circles.  |
| HW/HiSi | We are fine with proposal 1 without agreeing on Proposal 2. One clarification on proposal 2, is it really that there are different understandings? Or is the common understanding that it is up to the UE implementation? |
| DOCOMO | No strong view as long as Proposal 1 is concluded. |
| Qualcomm | We share similar view as HW/HiSi. In our understanding, the Rel-15 behaviour is up to the UE implementation.  |
| Intel | Agree with HW-HiSi and others that Proposal 2 is not necessary and Rel-15 behavior is just left up to implementation. |
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## 2.2 Round 2 (incl. Round 1 summary)

It seems, we are at the same situation with regarding the proposals as in the previous meeting – namely, one company objecting with the argument, that based on the same specification text (i.e. unchanged specification), there should not be different interpretations in different releases on the operation of the same specification text.

Looking a bit on how the Rel-15 discussions were going on this issue (thanks to Wei / QC for providing some input here), reference hereby is made to the email discussion during RAN1#102-e, namely “*[102-e-NR-7.1CRs-17] Review of draft CRs not discussed under any of the emails threads”*. The following final email from Mr. chairman in this thread is available, with the applicable parts for our discussion are marked in yellow:

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| **From:** 3gpp\_tsg\_ran\_wg1: tsg ran working group 1 <3GPP\_TSG\_RAN\_WG1@LIST.ETSI.ORG> **On Behalf Of** Younsun Kim**Sent:** Monday, August 24, 2020 1:48 AM**To:** 3GPP\_TSG\_RAN\_WG1@LIST.ETSI.ORG**Subject:** [EXT] Re: [102-e-NR-7.1CRs-17] Review of draft CRs not discussed under any of the emails threadsDear all,As discussed earlier, the plan I had for this email thread was to decide which draft CRs we carry over to future meetings and which draft CRs we reject. To this end, I do not plan on taking conclusions on any of the draft CRs. And reading through the email discussion and the summary from Youngbum, I recommend that we take the following:**Draft CRs for Rel-15*** Rejected for Rel-15
	+ Issue#4 (Apple, R1-2006479, R1-2006480)
	+ Issue#7 (ZTE, R1-2005445)
	+ Issue#9 (CATT, R1-2005658)
	+ Issue#12 (CATT, R1-2005663)
	+ Issue#13 (ZTE, R1-2006330)
	+ Issue#17 (Nokia/NSB, R1-2006852)
	+ Issue#19 (Huawei/HiSi, R1-2006941)
	+ Issue#20 (Huawei/HiSi, R1-2006942)
	+ Issue#31 (MediaTek, R1-2005631)
* Further consider for Rel-15 (in RAN1#103-e)
	+ Issue#5 (Qualcomm, R1-2006761, R1-2006762)
	+ Issue#15 (NTT DOCOMO, R1-2006691)
	+ Issue#30 (MediaTek, R1-2005618)
* Rejected for Rel-15 but further consider for Rel-16 (in RAN1#103-e)
	+ Issue#2 (ZTE, R1-2005493, R1-2005494)
	+ Issue#11 (CATT, R1-2005661)

**Draft CRs for Rel-16*** Rejected for Rel-16
	+ Issue#25 (Samsung, R1-2006089)
* Further consider for Rel-16 (in RAN1#103-e)
	+ Issue#24 (Samsung, R1-2006088)
	+ Issue#27 (Nokia/NSB, R1-2006467, R1-2006872)

**Please note that all the issues are for maintenance.** My understanding is that Youngbum has set the bar high for continuing discussions considering this aspect. This is in line with my thinking as well. Also, I would like to point out again is that even if the draft CR is to be further discussed, it does not mean that we will make the proposed specification changes. Conclusion of the discussion could be to reject the draft CR after all.Best regards,Younsun. |

**Moderator analysis**

*Looking at the rejected CR of CATT in R1-2005663 from RAN1#102-e, there had been a different handling proposed for PUCCH repetition without corresponding to be captured in the specifications, which seems to be not directly what we are discussing. What we are discussing here, is that the specification describes the same handling for PUCCH repetition with and without corresponding PDCCH, and just try to clarify the interpretation of the specification text for PUCCH repetition with and without corresponding PDCCH.*

*Therefore, there seems to be earlier agreement that actually tells that the specification text can be interpretated as ‘up to UE implementation’ as actually only a different handling for PUCCH repetition with and without corresponding PUCCH has been precluded.*

**Question 1: Do you agree with the moderator analysis above, that the rejected CR from RAN1#102-e suggesting a different handling for PUCCH repetition with and without corresponding PDCCH actually does not mean that the same handling could be clarified for Rel-15 and Rel-16?**

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| Agree | Nokia/NSB, … |
| Disagree | … |

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| *Company* | *Further comments*  |
| CATT | As the proponent of R1-2005663, during the email discussion, we proposed the following proposal below, which is the same as the current proposal for Rel-16 if I am not mistaken. But it was not agreed due to potential NBC issue. Proposed conclusion:For unpaired spectrum, for repetitions of a PUCCH transmission which is not in response to a DCI format detection, if the PUCCH transmission in the first slot indicated to the UE as described in TS38.213 Clause 9.2.3 for HARQ-ACK reporting, or a slot determined as described in TS38.213 Clause 9.2.4 for SR reporting, or in TS38.214 Clause 5.2.1.4 for CSI reporting, overlaps in time with at least one semi-static DL symbol or SSB symbol, the UE defers the first PUCCH repetition to the next available slot.Moderator comment: Thanks for noting this. I may have missed this. If this is the case, then we may not find any way to solve this then… |
| **Moderator** | **Please check CATT input above, with this it seems that the moderator analysis (and as a consequence also the updated proposal), seem to not make sense? Please comment below****In case you have still any suggestions on what I could try from moderator side, please let me know (… the moderator ran out of ideas otherwise):**  |
| Samsung | Agree with the “proposed conclusion” from CATT – don’t remember and did not check the previous RAN1 discussions, but the proposal is according to Rel-15 specifications and there is no NBC issue.  |
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If the above analysis applies, there should be actually for us no show-stopper to clarify the Rel-15/Rel-16 specification text for PUCCH repetition with and without corresponding PUCCH, by drawing the conclusion from Proposal 1 not just for Rel-16, but in general (for Rel-15 and Rel-16). Therefore, the following is proposed:

**Modified Proposal 1: Include in the Chairman’s Notes the clarification
“It is clarified that, according to the running R15 and R16 specification, a PUCCH repetition in case**$N\_{PUCCH}^{repeat}>1$ **(including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated*.”**

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| Support | Nokia/NSB, CATT, Samsung … |
| Object | Qualcomm, HW/HiSi |

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| *Company* | *Further comments and reasons for objection*  |
| CATT | We are fine to clarify that the same UE behaviour applies to both Rel-15 and Rel-16. |
| Qualcomm | Thanks for the FL’s effort to move forward. As repeated multiple times since RAN1 104e, we do not agree to the proposal. We are only fine if the proposal is restricted to Rel-16.For the Rel-15 discussion triggered by the CATT CR R1-2005663, no consensus can be made in 102e with respect to the corresponding UE beahvior for PUCCH repetition with and without PDCCH, since there were already different UE/gNB implementations for Rel-15. Do not see how/why this situation changed in ~1 year since the previous discussion.  |
| Apple | We are also fine with the modified proposal 1. |
| ZTE | Fine with the modified proposal 1. Also can accept the original proposal 1 as the minimum progress of this meeting. |
| Vivo | We have sympathy with QC’s comments. We would be fine with this proposal for Rel-16. For Rel-15, it is left up to UE implementation.  |
| OPPO | Fine with both modified proposal 1 and the original proposal 1. |
| HW/HiSi | Similar to QC and vivo, we also think this proposal should only apply to Rel-16. For Rel-15 it is up to UE implementation |

## 2.3 Round 3

Thanks for the 2nd round. As it seems, we cannot go for the modified proposal 1 (QC, vivo, HW/HiSi) and seem we are clearly going in circles. Sorry about that.

As we seem to be running out of time this week (and I guess the situation may not be that much changing), **I would like to bring back the original proposal 1 without the addition of proposal 2, to have at least one less point to object for Samsung.**

**I guess the only thing we could do is to check, if Samsung would be willing to withdraw its objection actively. If this would not be the case, I guess we should close this email thread. But let’s have one last try.**

Below I copy the list of companies from Round 1, but removed the Round 1 comments here to focus on comments in terms of objections (please just add your company names if not there yet, no need to provide comments if not objecting).

**Proposal 1: Include in the Chairman’s Notes the clarification
“It is clarified that, according to the running R16 specification, a PUCCH repetition in case**$N\_{PUCCH}^{repeat}>1$ **(including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated*.”**

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| Supporting companies | Nokia/NSB, CATT, vivo, HW/HiSi, DOCOMO, Qualcomm, Intel, OPPO, ZTE |
| Objecting companies | Samsung |

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| *Company* | *Comments*  |
| Samsung | Our understanding is that, for a PUCCH transmission with repetitions that is triggered by a DCI format, Qualcomm considers the case that the first repetition includes RRC DL or SSB symbols to be an error case in Rel-15. We can agree to proposal 1 without the “R16” and with a sub-bullet capturing that there is no consensus in RAN1 for whether or not the above case is an error case in Rel-15. Otherwise, we cannot agree to proposal 1.  |
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## 2.4 Round 4

Thanks Samsung for making some constructive proposal and how we could move this forward. Based on the comments by Samsung (see above), I update the proposal here (track changes on top of original Proposal 1, but let’s use a new proposal number:

**Modified Proposed RAN1 conclusion: It is clarified that~~, according to the running R16 specification,~~ a PUCCH repetition in case**$N\_{PUCCH}^{repeat}>1$ **(including the first PUCCH repetition) is postponed to the next available slot if the PUCCH repetition collides with SSB symbols or symbols indicated as DL by*tdd-UL-DL-ConfigurationCommon* or *tdd-UL-DL-ConfigurationDedicated*.**

* **There is no consensus in RAN1 for whether or not the above case is supported in Rel-15 for the first PUCCH repetition when the PUCCH is triggered by DCI ~~an error case in Rel-15~~.**

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| Supporting companies | Nokia/NSB (fine with the Qualcomm rewording), Qualcomm (with slight rewording below), ZTE |
| Objecting companies |  |

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| *Company* | *Comments*  |
| Qualcomm | We can accept Samsung’s proposal for progress. We would suggest to slightly update the subbullet in the proposed RAN1 conclusion as follows to reflect that the undetermined case is only when the PUCCH that collides with semi-static DL/SSB symbols is the first repetition of PUCCH triggered by a DCI. * **There is no consensus in RAN1 for whether or not the above case is supported in Rel-15 for the first PUCCH repetition when the PUCCH is triggered by DCI.**

**Moderator: Update brought forward as Modified Proposed RAN1 conclusion.**  |
| HW/HiSi | We would like to ask for a clarification on the sub-bullet describing the Rel-15 understanding in the modified conclusion: Why is only the case when PUCCH triggered by DCI added in the new bullet? What is the understanding for configured PUCCH?Moderator: The intention is, that for configured PUCCH, the Rel-16 interpretation of the first sentence applies. The sub-bullet is to clarify, that only for scheduled PUCCH there is the ‘up to UE interpretation’So the main sentence applies to R15 & R16 configured PUCCH and R16 scheduled PUCCH, but for R15 scheduled PUCCH this is ‘up to UE’ If the PUCCH transmission is scheduled dynamically, then it is easy to regard this as an error case, because there is no reason for the gNB to schedule colliding with a DL symbol. But for configured UL, it might be hard for the gNB to always avoid the collision. This could result in unwanted configuration restrictions. It would be better to leave the handling up to the UE implementation (i.e. either to drop the PUCCH or to post-pone it).Moderator: agree. So the R15 scheduled PUCCH being not defined in detail should not call that much of an issue.  |
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