**3GPP TSG RAN#89e RP-20xxxx**

**e-Meeting, September 14th – 18th, 2020**

**Agenda item:**

**Source:** 3GPP TSG RAN1 Chairman

**Title:** Handling overlapped objectives in Rel-17 RAN1 items

**Document for:** Discussion/Decision

# Introduction

In this document, we will provide a summary on how to handle overlapped objectives in Rel-17 RAN1 items based on the following two contributions:

* RP-201658 Handling of overlapping discussion across WI/Sis vivo
* RP-201760 On overlapping focus of PUCCH repetition enhancements across Rel-17 SI/WIs Nokia, Nokia SB

# Proposals

In total, there are three proposals presented in RP-201658 and RP-201760, which are discussed below.

## HARQ-ACK on PUCCH

As proposed in RP-201658:

* ***Proposal 1:*** *To treat the following enhancements for HARQ-ACK on PUCCH in URLLC/IIOT\_enh WI and do not consider them further in Cov\_enh item.* 
  + *UCI size reduction for HARQ-ACK on PUCCH*
  + *Rel-16 PUSCH-repetition-Type-B like PUCCH repetition*
  + *Short/mini-slot/sub-slot based PUCCH repetition*
  + *Dynamic PUCCH repetition factor indication*
  + *Power control enhancements for PUCCH carrying HARQ-ACK*

In RP-201760, it was observed that:

* *Observation: Discussions & studies on PUCCH repetition enhancements are, besides in the Rel-17 IIoT & URLLC Enhancements WI, also taking place in the Rel-17 SI on Coverage Enhancements and in the M-TRP enhancements in the Rel-17 MIMO WI with the same proposed enhancements. Overlapping discussions and potentially the specification of competing solutions in more than one Rel-17 WI is clearly inefficient and should be prevented.*

Conseqeuently, it was proposed that:

* ***Proposal 2:*** *Studies on TDMed PUCCH (i.e. PUCCH repetition) to be continued for the multi-TRP case based on RAN1#102-e agreements in the Rel-17 feMIMO WI, with the aim that if specified to also support the special case of having only a single TRP.* 
  + *Related studies and discussions in the Rel-17 IIoT & URLLC WI including sub-slot or sub-slot type of PUCCH repetition, PUCCH TPC enhancements as well as support of dynamic repetition indication and repetition of all (incl. short) PUCCH formats are to be minimized.*
  + *Studies on the same techniques in the ongoing Rel-17 Coverage Enhancements SI are to be minimized for the rest of the SI phase or at least RAN should take this into account when defining the objectives of the follow-up Coverage Enhancements WI in one of the next RAN meetings.*

Questions:

* Do you agree with proposal 1 and proposal 2?
  + Please elaborate the detailed thoughts
* Any other thoughts?

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| **Company** | **Views** |
| Nokia, NSB | We support proposal 2 for the reasons described in RP-201670 (Nokia). |
| FUTUREWEI | Between proposal 1 and 2, we prefer proposal 1. Furthermore, in FeMIMO WI, the related work should be on mTRP perspective and not on generic PUCCH repetition work. |
| Intel | <On Proposal 1>  We don’t support proposal 1 for the following reason.  There should be no issue with keeping the potential overlap between URLLC and CovEnh since the overlaps happen in the study phase and it may be important to look into the potential enhancements in the appropriate assumptions of a given WI/SI.  <On Proposal 2>  We are fine with main bullet of proposal 2 for the following reason, but think a single sub-bullet is sufficient stating “*Studies involving the same solutions in Rel-17 IIoT & URLLC WI and Coverage Enhancements SI should take this into account*”.  We tend to agree with the analyses in RP-201670. Basically, it is identified that the agreements on TDMed PUCCH (i.e. PUCCH repetitions) are already in normative state, and also that MIMO is better positioned to generalize single-TRP and multi-TRP operation. On the other hand, we think a single sub-bullet is sufficient stating “*Studies involving the same solutions in Rel-17 IIoT & URLLC WI and Coverage Enhancements SI should take this into account*”. In this way, it does not preclude having other solutions or enhanced solutions in the other SI/WIs while clarifying the discussions in MIMO WI on the solutions based on agreements in RAN1 #102e will continue without expanding scope in MIMO WID. |
| Panasonic | On proposal 1, we support it as to improve the reliability of short PUCCH and to increase the coverage of short PUCCH are quite same technique. Note that to increase the coverage/reliability of long PUCCH is not so related to URLLC/IIOT\_enh WI because of the latency and it should be covered by Coverage Enhancements SI.  On proposal 2, following discussion points would be more suitable in URLLC/IIOT\_enh WI.  - the interaction with PUSCH related to processing time and the processing order  - the priority handling  Therefore, single TRP handling should be handled in URLLC/IIOT\_enh WI and its extension to multpile TRP operation should be carried out in feMIMO WI. |
| ZTE | **On Proposal 1:**  Moving all these potential enhancements into URLLC/IIoT WI would significantly increase the workload there and may impact the overall progress of the normative work. It would be more appropriate to discuss this when NR CE SI moving to WI phase. At that time, a more prudent decision could be made based on further evaluations and a better workload balance.  **On Proposal 2:**  The focus in FeMIMO WI should be on enhancements for multiple TRP rather than single TRP. This should not only apply to PUCCH repetition but also other enhancements for PUCCH and also enhancements to PUSCH/PDCCH as in FeMIMO WI scope.  **Other:**  In case we plan to make some decisions on detailed work split in this RAN meeting, how to handling A-CSI on PUCCH should also be considered. It was discussed in both URLLC/IIoT WI and CE SI in RAN1#102-e meeting. |
| Samsung | We do not support either proposal 1 or proposal 2.  Proposal 1 focuses only on HARQ-ACK and includes aspects that seem irrelevant to the URLLC WI.  Proposal 2 intends to include in multi-TRP aspects related to PUCCH coverage enhancements when there is no such correlation or relevant WI objective.  CovEnh should remain the WI dealing with coverage enhancements, including for PUCCH. There is no reason to modify WIDs. Some overlapping of issues among WIs is not without precedent and can be handled in RAN1 as in past cases.  MIMO should handle only TDM aspects related to M-TRP. URLCC should handle only ‘sub-slot’ related aspects or they can also be handled in CovEnh. |
| vivo | First of all, we think the most important thing is to find a solution to avoid duplicated discussion in different WI/SIs or email threads as much as possible. Indeed we had past experience that some overlapping discussion across different items, but now the overlapping has became too much as discussed in both 1658 and 1760 especially considering the e-meeting efficiency, so some management action is required.  URLLC is work item and coverage enhancement is now still study item. To evaluating PUCCH coverage problem is importantt for coverage study, however, if we are going to discuss the details of each proposed enhanced schemes (as feature leads had already trying to discuss), it would be good to have a single place to talk about a particular enhancement to avoid duplicated design.  We support proposal 1 as the resolution of overlapping between coverage enh and URLLC/IIOT regarding PUCCH related enhancements. 1760 made good point about overlapping discussion on PUCCH repetitions for single and multiple TRPs, our preference would be to develop a basic single TRP solutions in URLLC/IIOT WI and based on which the multiple TRP solutions can be further developed in FeMIMO WI. |
| CATT | Between proposal 1 and proposal 2, we prefer proposal 2. Both IIoT/URLLC and FeMIMO are Rel-17 WIs. It is desirable to maximize the commonality between the solutions for single-TRP and multi-TRPs cases. |
| OPPO | For PUCCH repetition enhancement and power control enhancement, mentioned by two proposals, we are fine with main bullet of proposal 2 and agree with sub-bullet updated by Intel to include requirements or solutions from Rel-17 IIoT & URLLC WI and Coverage Enhancements SI.  ***Updated Proposal 2:*** *Studies on TDMed PUCCH (i.e. PUCCH repetition) to be continued for the multi-TRP case based on RAN1#102-e agreements in the Rel-17 feMIMO WI, with the aim that if specified to also support the special case of having only a single TRP.*   * *Studies involving the same solutions in Rel-17 IIoT & URLLC WI and Coverage Enhancements SI should take this into account*   For UCI size reduction, mentioned by proposal 1 only, we are fine to leave it in Rel-17 IIoT & URLLC WI and prefer to continue discussion in Intra-UE multiplexing/prioritization .The justification is as below:   * UCI size reduction,i.e. HARQ-ACK compression/compaction, has been discussed in Intra-UE multiplexing/prioritization and captured in agreement in RAN1 102e. * It could cover both UCI size reduction with the same priority and UCI size reduction with different priorities. The later can not be covered in coverage enhancement, but it is important to ensure URLLC reliability.   ***Updated Proposal 1:*** *To treat the following enhancements in Intra-UE multiplexing/prioritization in Rel-17 URLLC/IIOT\_enh WI and do not consider them further in Cov\_enh item.*   * *UCI size reduction for HARQ-ACK on PUCCH, including UCIs with the same priority and UCIs with different priorities.* |
| NEC | We don’t support proposal 1 or 2.  For proposal 1, if the conclusion in URLLC/IIOT\_enh WI can be used in coverage enhancement, this will be reflected in the coverage WID preparation. Theres is no need to make the proposal 1 right now.  For proposal 2, the overlapping issue for feMIMO and IIoT & URLLC is different. If there is contradiction in the futhre meetings, RAN1 can handle it. So no RAN conclusion is needed. |
| Qulcomm | We support Proposal 2.  Choosing PUCCH repetition over using a longer PUCCH duration should be motivated by attaining some diversity (changing beams, changing QCL, changing frequency), which aligns well with the mTRP design objectives. |

Propoals:

* TBD

## Coverage enhancement features involving Rel-17 RedCap and CovEnh SIs

As proposed in RP-201658:

* ***Proposal 3****: we suggest the following work split between Cov\_enh and RedCap item for coverage enhancement features*
  + *During “coverage problem” identification process, to carry on coverage study for bottleneck channel identification for normal UE and RedCap UE individually together with the target for improvement*
  + *During the “technical enhancement” process*
    - *To discuss UL channel relate enhancement techniques (if any) in Cov\_enh for both normal UE and RedCap UEs*
    - *To discuss DL channel related enhancement techniques (if any) in RedCap for both normal UE (if applicable) and RedCap UEs.*

Questions:

* Do you agree with proposal 3?
  + Please elaborate the detailed thoughts
* Any other thoughts?

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| **Company** | **Views** |
| Nokia, NSB | Given that those are both SIs with a similar timeline, we do not see significant concern on the related coverage studies, as to our understanding the underlying assumptions for those UEs are different enough to justify separate studies. Potential sinergies can be further considered when moving to a WID phase. |
| FUTUREWEI | The proposal is not needed at this point. We can discuss how to align the normative work when converting them to WIs. |
| Intel | Such work-split is not necessary at this stage. Evaluation methodology and assumptions in RedCap SI for studies on coverage performance for RedCap UEs are already being maximally aligned with CE SI approaches. Thus, we may not need to decide on any scoping now. We also agree with Nokia that potential overlaps on normative work can be avoided with proper scoping of the WIs. |
| Panasonic | Although work item split can be proposed direction depending on the outcome of study item, at this momemnt of SI, it is not required to agree proposal 3 for now. |
| ZTE | We agree that a proper handling on the scope can be considered further to avoid potential overlapping. While, it may be a bit premature as commented by other companies, and it could be discussed when moving to WIs. |
| Samsung | There is no need for proposal 3. The scope of each SI is clear. The handling on potential overlapping can be discussed during WID drafting later. |
| China Telecom | Since both CovEnh and RedCap are SIs and the scenarios/targets are different, we do not see the necessity of work-split at this stage. But we do agree that overlapping should be avoided during WI phase. This can be done during the scoping of the WIs based on the outcome of SIs. |
| vivo | As mentioned in proposal 3 above, during the study item phase, i.e. the “*“coverage problem” identification process*”, we can continue current evaluation in both coverage SI and Redcap SI (no need to adjust the scope now) and keep in mind that proper split of objectives should be done when converting the two SIs into WIs at RAN#90/91. |
| CATT | We agree with the comments above that proposal 3 is not needed for now. We can further discuss how to split the work across different items when moving to WIs. |
| OPPO | The proposed change is to reduced the possible duplicated work further. If we can agree how to differenciate the works, we can do it. For simply divding the task by UL and DL, we are hesitate in this stage as the evalutation assumption and enhancement target are different in 2 SI. Then, this means we should take 2 approachs in each SI.  Thus, we prefer to solve the problem until sufficient study is done. |
| Spreadtrum | We agree the Proposal 3.  As mentioned by vivo, it is related to “coverage problem” idinfication process. If it is agreed to compensate the bottleneck channel **for the reference NR UE** within the same deployment scenario in RedCap, we do not see the difference b/w RedCap and CE in term of coverage compensation both for normal UE. As well known, the bottleneck channel is always the UL channel which is seldom affected by the currently proposed device complexity reduction. So, if we do not split the boundary properly, we may not reach the RedCap SID objective “Coverage recovery to compensate for potential coverage reduction due to the device complexity reduction” finally. |
| NEC | We don’t agree with proposal 3. The work split can be handled in WID preparation. |
| Qualcomm | Regarding the first part of the proposal on the “coverage problem” identification process: Although some ongoing coordination is needed to avoid duplication of work, the current SIDs reflect already what is being proposed.  Regarding the second part of the proposal on the the “technical enhancement” process: We don’t think that an agreement is needed now. The concrete way of avoiding duplication of work should be decided as part of the WID drafting discussion. |

Propoals:

* TBD

## Other Aspects

Questions:

* Any other thoughts?

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| **Company** | **Views** |
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Propoals:

* TBD

# Conclusion

Based on the email discussion, the following are proposed:

* TBD

# References

RP-201658 Handling of overlapping discussion across WI/Sis vivo

RP-201760 On overlapping focus of PUCCH repetition enhancements across Rel-17 SI/WIs Nokia, Nokia SB