**3GPP TSG RAN Meeting #92-e RP-21XXXX**

e-Meeting, June 14th – 18th, 2021

Agenda Item: 9.7.2.1

Title: Summary of email discussion [92-e-15-IIoT-URLLC-Scope]

Source: Samsung (RAN1 Chairman)

Document for: Discussion and Decision

# Introduction

As part of Rel-17 NR, there is an ongoing work item on *Enhanced Industrial Internet of Things (IoT) and ultra-reliable and low latency communication (URLLC) support for NR*. The work item is due for stage-3 completion by Q4 of 2021 in RAN1 and Q1 of 2022 in other working groups. For RAN1, there are only three WG meetings until the deadline of the stage-3 completion.

A number of companies have submitted contributions [1] ~ [10] discussing the potential downscoping of the work item considering the limited time until the completion deadline and the level of progress in the relevant working groups. The status report [11] on the work item also indicates that progress is behind schedule and RAN plenary intervention may be needed. In particular, all companies who submitted on this issue suggest downscoping of some sort on the RAN1-led objectives. One company [1], [2] discusses downscoping of RAN2-led objectives as well.

The purpose of the email thread [92-e-15-IIoT-URLLC-Scope] is to collect company views and if possible, converge on a way forward on how to downscope the Rel-17 work item on *Enhanced Industrial Internet of Things (IoT) and ultra-reliable and low latency communication (URLLC) support for NR*.

# Initial phase

To kick off the initial discussion, the following sub-sections provide general questions for collecting views on the downscoping of the Rel-17 work item on Enhanced IIoT and URLLC. The views collected will be used to come up with moderator recommendations to focus the follow up discussions in the next phase to more specific issues.

For your reference, the detailed objectives in the WID [12] are provided below:

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| 1. Study, identify and specify if needed, required Physical Layer feedback enhancements for meeting URLLC requirements covering
	* + UE feedback enhancements for HARQ-ACK [RAN1]
		+ CSI feedback enhancements to allow for more accurate MCS selection [RAN1]

Note: DMRS-based CSI feedback is not in scope of this WI 1. Uplink enhancements for URLLC in unlicensed controlled environments [RAN1, RAN2]:
	1. Specify support for UE-initiated COT for FBE with minimum specification effort
	2. Harmonizing UL configured-grant enhancements in NR-U and URLLC introduced in Rel-16 to be applicable for unlicensed spectrum
2. Intra-UE multiplexing and prioritization of traffic with different priority based on work done in Rel.16 [RAN1]:
3. Specify multiplexing behavior among HARQ-ACK/SR/CSI and PUSCH for traffic with different priorities, including the cases with UCI on PUCCH and UCI on PUSCH.
4. Specify PHY prioritization of overlapping dynamic grant PUSCH and configured grant PUSCH of different PHY priorities on a BWP of a serving cell including the related cancelation behavior for the PUSCH of lower PHY priority, taking the solution developed during Rel-16 as the baseline
5. Enhancements for support of time synchronization:
6. RAN impacts of SA2 work on uplink time synchronization for TSN, if any. [RAN2]
7. Propagation delay compensation enhancements (including mobility issues, if any). [RAN2, RAN1, RAN3, RAN4]
8. RAN enhancements based on new QoS related parameters if any, e.g. survival time, burst spread, decided in SA2. [RAN2, RAN3]
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## Company views on whether downscoping on Enhanced IIoT and URLLC is necessary in RAN#92-e

**Question1: Considering the latest progress in working groups, is it necessary for RAN to provide guidance, including possible downscoping, for the Rel-17 work item on Enhanced IIoT and URLLC in RAN#92-e? It should be assumed that Rel-17 schedule will be maintained as previously endorsed (stage-3 completion for RAN1 by Q4 of 2021 and other working groups by Q1 of 2022).**

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| **Company** | **Views** |
| Nokia, NSB | **Yes, necessary**As detailed in our contribution in RP-211112 (also presented during the early topics GTW call), from rapporteurs’ perspective we think some action need to be taken during RAN#92 to guarantee the timely completion of the WI.  |
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## Company views on potential areas for downscoping

For those companies who have indicated that downscoping of the Rel-17 work item on Enhanced IIoT and URLLC in RAN#92-e is necessary, please provide additional details by answering the following question.

**Question2: Which objectives in the Rel-17 work item on Enhanced IIoT and URLLC would need to be downscoped in RAN#92-e? And how?**

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| **Company** | **Views** |
| Nokia, NSB | 1. **CSI feedback enhancements (High need):** As pointed out in our contribution in RP-211112 and also pointed out by other companies – there is a need for down-scoping to guarantee some enhancement to be specified in Rel-17. We propose to focus on case-1 reporting – and (i) exclude the case-2 reporting (as this is also not in line with the WI objective) and exclude the study area of new triggering methods for A-CSI and/or SRS
2. **Intra-UE multiplexing & prioritization enhancements (High need):** We are now 1 year into the WI, this objective was clearly spelled out in the WID and still there had only be very minor progress. Therefore, we think there is little to no chance of completing the 3 different features of this objectives in Rel-17. As explained in RP-211112, we suggest excluding ‘*Specify multiplexing behavior among HARQ-ACK/SR/CSI and PUSCH for traffic with different priorities, including the cases with UCI on PUCCH and UCI on PUSCH*’ from the WID and RAN1 to stop the related work. RAN1 to instead focus its future work as part of RAN1 AI 8.3.3 on the two remaining items of simultaneous PUCCH/PUSCH of different PHY priorities (at least for inter-band CA) and overlapping CG and DG PUSCH enhancements.
3. **Propagation delay compensation enhancements (High need):** All companies agree that at least some enhancements will be needed to fulfil the requirements of the targeted Rel-17 use cases. Two different methods (TA-based and Rx-TX based PDC) are discussed which hampers the progress due to the different opinions of the two camps on which seem is to be selected in the end. From rapporteur perspective, we therefore think RAN should take some action to sort out the current deadlock and thereby enabling the support of such TSN services based on Rel-17 specifications.

As discussed in Sec. 3.1 of RP-211112, we therefore suggest as a compromise to support baseline TA-based propagation delay compensation based on the Rel-15 / 16 timing advance procedure (i.e. Alt. 1) in Rel-17 without changes on existing TA requirements as well as Rx-Tx measurement based propagation delay compensation in Rel-17. Moreover, it is suggested to focus the further work on propagation delay compensation performed at the UE side (i.e. UE-based propagation delay compensation).1. **UE feedback enhancements for HARQ-ACK (Medium need):** First, there is definitely much less need for RAN down-scoping of this objective (especially compared to the three others above). So, this could maybe be left to RAN#93 based on the RAN1#106 progress.
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# Intermediate phase

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# Fine tuning phase

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# Conclusion

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# References

[1] RP-211112 Rapporteur views on Rel-17 URLLC/IIoT WI focus Nokia, Nokia Shanghai Bell

[2] RP-211113 Revised WID: Enhanced Industrial Internet of Things (IoT) and ultra-reliable and low latency communication (URLLC) support for NR Nokia, Nokia Shanghai Bell

[3] RP-211154 Discussion on Rel-17 enhanced NR IIoT/URLLC progress and WID scope revision vivo

[4] RP-211210 Discussion on scope of Rel-17 enhanced IIoT and URLLC CATT

[5] RP-211257 On CSI Feedback Enhancements for Enhanced URLLC/IIoT Ericsson

[6] RP-211297 Way forward on CSI feedback enhancements for enhanced URLLC/IIoT InterDigital, Inc., Ericsson, Motorola Mobility, OPPO, Qualcomm, Samsung, SONY, Spreadtrum

[7] RP-211430 On CSI feedback enhancements for URLLC/ IIoT Futurewei

[8] RP-211436 Views on WI scope of Rel-17 Enhanced IIoT and URLLC ZTE, Sanechips

[9] RP-211462 Discussion on CSI feedback enhancements for URLLC/IIoT MediaTek Inc.

[10] RP-211187 Discussion on status of Rel 17 work Samsung

[11] RP-211111 Status report for WI: Enhanced Industrial Internet of Things (IoT) and ultra-reliable and low latency communication (URLLC) support for NR RAN2

[12] RP-210854 Revised WID: Enhanced Industrial Internet of Things (IoT) and ultra-reliable and low latency communication (URLLC) support for NR Nokia, Nokia Shanghai Bell