RAN-R18-WS-non-eMBB-EURECOM - Version 0.0.4
RAN

3GPP TSG RAN Rel-18 Workshop RWS-210566 Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2 **Source**: EURECOM **Title**: Email Discussion Summary for RAN-R18-WS-non-eMBB-EURECOM

1 Introduction

This email discussion covers the following documents:

RWS-210508: ”Considerations for Sporadic Random Access in Massive IoT Use Cases”

A revised version of **RWS-210508** is available as **RWS-210651.**

1.1 Summary of Proposals

In our contribution RWS-210651, we discuss low-latency UL for short packages. Current standardization efforts in RAN2 SDT built on the principles specified LTE (EDT) and NB-IoT. We believe that for massive RACH use-cases UE contention will be significant.

To reduce contention, we propose to consider joint Layer 1/Layer 2 approaches to guarantee minimal access time. Improved UE signaling techniques to select MCS/TBS for UL transmission should also be considered. According to SDT agreements, only two preamble groups are configurable for two different payloads.

In the massive-access scenario, interesting questions include: (a) how to handle many contending UEs with unknown channels? (b) In case of DMRS-based transmission, how to estimate channels for many overlapping UEs?

2 Round 1 Q&A

2.1 Questions and Comments

Questions and comments for the first round: June 14 08:00 UTC – June 17 8:00 UTC

Feedback Form 1: Round 1 QA for RWS-210508: Questions AND Comments

1 – Intel Corporation (UK) Ltd

Thanks for the contribution. We have a few questions as below:

Q1: Could you please share some references/background to establish the urgency for support of very high connection density, beyond solutions offered by LPWA and existing NR solutions?

Q2. Could you kindly elaborate on ”time/frequency channel uncertainty with relaxed frequency offset

requirements”? In particular, the ”frequency offset requirements” are for DL reception or UL transmission or both? And would you have some reference data on potential relaxations you envision and their associated impact (to UE and NW performance) and latency/power savings?

2.2 Answers

Answers will be provided June 17 8:00 UTC – June 18 23:59 UTC

2.2.1 Intel Corporation (UK) Ltd

Thank you for your feedback. Our primary use case is sporadic/low-latency/high-reliability UL transmission of small packets when the UE is RRC_IDLE or RRC_INACTIVE.

In those states, the UE is not monitoring/tracking the channel very often which results in the loss of time/frequency synchronization. To transmit data during the (2-step) RACH procedure, the UE is required to transmit data on PUSCH without being fully UL time aligned.

3 Round 2 Q&A

Questions and comments for the second round: June 21 08:00 UTC – June 23 8:00 UTC

3.1 Questions and Comments

Feedback Form 2: Round 2 QA for RWS-210508: Questions AND Comments

1 – VODAFONE Group Plc

Thank you for your contribution, we have a few question the Sporadic proposed method:

Q1- have you considered the Security implication of this method? what about rogue UEs wanting to join this network ?

Q2 Noma was not a successful venture, what other PRACH enhancements do you suggest ?

3.2 Answers

Answers will be provided June 23 8:00 UTC – June 24 18:00 UTC

3.2.1 VODAFONE Group Plc

Thank you for your feedback.

Q1: As you pointed out, ensuring a secure transmission is paramount. An authentication token must be included in the transmission to establish a secure connection. In 2-step RACH, the CCCH SDU (48 bits) is transmitted by the UE along with the payload (MsgA). The CCCH RRCResumeRequest contains the

necessary information for the UE authentication and context retrieval at the gNB. Problems arise in a RRC-less SDT where the CCCH is not included in order to reduce the payload size. In this case, other means to authenticate the UE must be found, e.g. only include the 16bit MAC-I.

Q2: In any case, we primarily considering the efficient use of UL resources to (securely) transmit small payloads. At the time when the UE has a packet to transmit, the UL channel is mostly unknown and the UE can only choose between at most 2 different PUSCH configurations (MCS, number of slots, DMRS config, etc). Those PUSCH configurations may not be well adapted to the current UL channel conditions. Moreover, for a large pool of SDT devices, there may be multiple UEs configured with the same PUSCH resources transmitting at the same time, which results in interference at the gNB. We are looking at means to reduce this contention and to more efficiently use the UL resources by better matching the transmission to the actual channel conditions. For instance, additional signaling can be provided by the UE to help the gNB decode the corresponding PUSCH.

4 Summary

In this contribution, we propose to enhance the physical layer for sporadic, low-latency, high-reliability UL transmission of small packages in massive random access scenarios.

We received feedback from two companies asking for clarifications including security implications and the types of potential enhancements.