3GPP TSG RAN Rel-18 workshop **RWS-210572**

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.2

Source: **FUTUREWEI**

Title: **Email discussion summary for RAN-R18-WS-non-eMBB-FUTUREWEI**

1 Introduction

For AI 4.2 “Non-eMBB-driven Functional Evolution”, FUTUREWEI submitted two contributions:

- RWS-210037, “Non-eMBB enhancements for Rel-18”

- RWS-210039, “Enhancements for advanced sidelink features for Rel-18”

This document briefly describes both contributions and provides fields for questions/discussion points.

1.1 General Comments and Answers

Please provide your general comments on our contributions below.

Feedback Form 1: 1-1 General Comments

Answers by moderator

2 RWS-210037 “Non-eMBB enhancements for Rel-18”

Slide 3 discusses the concept of basic feature groups and how they were used in Rel-16 for many work items.

Slide 4 discusses the capability framework used in RedCap. One observation is the difficultly of finding consensus on making any optional feature mandatory for this work item, even for power savings and performance compensation. In addition, making unexpected “mandatory” decisions at the end of a WI (even for relevant prior-release features) is not compatible with company product roadmaps.

2.1 Comments and Answers for 2-1 on the Two Proposals on Slide 5

On slide 5, we provide two proposals:

P2-1: Rel-18 studies should include an objective to identify relevant potential "basic" feature groups from earlier NR releases

P2-2: Rel-18 work items should include an objective to specify as "basic" these relevant feature groups from earlier NR releases

Feedback Form 2: 2-1 Questions and Comments on the Two Proposals

1 – Sony Europe B.V.

On the format of this NWM, we would have found it easier if there had been one feedback form per Futurewei document, rather than there being multiple questions per Futurewei document. This would have suited the workflow we have used for RWS better. Thanks for your contributions, we have tried to provide questions / comments to relevant sections.

Answers to 2-1 by Moderator

Thank you for your feedback and comments.

Feedback Form 3: 2-1 Round 2 Questions and Comments on the Two Proposals

Answers to 2-1 Round 2 by Moderator

2.2 Comments and Answers for 2-2 on Various Topics for Rel-18 on Slide 6

Slide 6 captures FUTUREWEI's views on several topics [sidelink positioning / positioning enhancements, sidelink enhancements (as in Section 3), NTN/NTN-IoT, XR (at least increased capacity)].

RedCap again for Rel-18 is a bit unclear. Ideally no follow-on WI is required, Rel-17 RedCap can develop in the market. The decision to avoiding fragmentation still applies (i.e., no 40MHz, no low-end wearables). Issues of feature compatibility could be addressed if needed (similar to unlicensed URLLC in Rel-17).

Feedback Form 4: 2-2 Questions and Comments on Various Topics for Rel-18 on Slide 6

1 – Qualcomm Incorporated

[On RedCap] What is exactly the feature compatibility issue for R17 URLLC in unlicensed band ? How does it relate to R18 eRedCap ?

2 – Sony Europe B.V.

We agree that NR should not replace eMTC for LPWA. We have the same conclusion that NR should not replace NB-IoT for LPWA either. Is it the bandwidth of a device that makes classifies it as LPWA or the power consumption and coverage?

3 – Apple GmbH

Is Futurewei's view to split RedCap into multiple sub-category of devices?

Answers to 2-2 by Moderator

To Qualcomm #1:

We do not think that we need an "unlicensed RedCap" objective in a Rel-18 RedCap SI or WI, as a Rel-17 RedCap device should be able to indicate unlicensed support. However, if some feature compatibility issue is identified, it could be handled in a similar way in Rel-18 as Rel-16 URLLC and NR-U incompatibility was handled in Rel-17 URLLC/IIoT.

To Sony #2:

Thanks to clarify that we share similar thinking. eMTC and NB-IoT are LPWA systems and have those three characteristics. If we reduce NR bandwidth to 5MHz (or lower) and also include some coverage extension/compensation, it surely encroaches on eMTC. Reducing BW alone is debatable.

To Apple #3:

No, we do not want to introduce UE categories into NR. So far we do not see the need to consider sub-20MHz for (at least) the ultra-low end wearables use case.

Feedback Form 5: 2-2 Round 2 Questions and Comments on Various Topics for Rel-18 on Slide 6

Answers to 2-2 Round 2 by Moderator

3 RWS-210039 "Enhancements for advanced sidelink features for Rel-18"

For RWS-210039, "Enhancements for advanced sidelink features for Rel-18", our study of the use cases and verticals (slides 2-5) show a need for increased throughput. We focus on three aspects: **sidelink MIMO enhancements, sidelink enhancements for FR2, and use of sidelink in unlicensed spectrum.**

3.1 Comments and Answers for 3-1 on Sidelink MIMO Enhancements

On slide 6, we discuss the current MIMO features in the sidelink and propose enhancements to the current MIMO features on slide 7, improvements to CSI signaling on slide 8, and improvements to CSI reporting on slide 9. Slide 10 discusses how channel reciprocity can be explored for SL-MIMO while slide 11 discusses how to extend MIMO for groupcast and multicast.

Feedback Form 6: 3-1 Questions and Comments on Sidelink MIMO Enhancements

1 – LG Electronics Inc.

I have a question on ”hybrid broadcast/groupcast and unicast transmissions” in slide 11. In mt understanding, the cast type is determined by the application and thus cannot be changed during the retransmissions of a TB. Does this propose to apply the mechanisms defined for unicast for the retransmission of a TB that needs to be delivered to multiple receivers?

2 – Huawei Tech.(UK) Co.. Ltd

To use PSFCH for flexible (periodic and aperiodic) CSI RS configurations, given that PSFCH is associated with PSSCH, is it intended to introduce new PSFCH which does not map to PSSCH; otherwise, how to use current PSFCH ?

3 – Intel Corporation (UK) Ltd

Q1: Please clarify the main use case for sidelink evolution in R18 and priority of MIMO/FR2 enhancements vs sidelink support in unlicensed spectrum

4 – Guangdong OPPO Mobile Telecom.

We are very much inline in supporting sidelink operation in unlicensed spectrum and MIMO/CSI enhancement. Would you consider other existing unlicensed bands (already supported by 3GPP) in 5GHz and 6GHz?

5 – SHARP Corporation

Regarding MIMO enhancement for broadcast/groupcast, is it intended to be applied only when TX UE is sure about no RX UE being Rel-16/Rel-17 UE?

6 – Qualcomm Incorporated

1. Is MU-MIMO with 8 Tx for commercial applications or is it also intended for V2X?
2. Are there limitations of the RF phase calibration approach when the transmitter is communicating with different UEs?

7 – CATT

Can you explain exactly what you mean by ” Flexible CSI-RS configurations” ?

8 – DOCOMO Communications Lab.

Motivation of SL MIMO seems better throughput performance, right? If correct, could I ask why you choice MIMO for this purpose? There are other mechanisms like SL-CA. The reason is, we are not sure how much gain SL-MIMO can achieve while spec efforts might be not so small.

Answers to 3-1 by Moderator

To LGE #1:

Yes, we proposed to have the unicast option to retransmit a TB of the initial groupcast/broadcast transmission.

To Huawei #2:

By exploring channel reciprocity, a Tx UE can measure the channel from CSI (and SRS) transmitted from an Rx UE. The current PSFCH design has this nice Tx-Rx UE transmission association, and we would like to explore this structure or this design concept for CSI-RS transmissions.

To Intel #3

We think the objective of SL enhancement in R18 is to improve V2X performance and better support vertical applications including IIoT, NCIS, cyber-physical application (e.g. indoor factory). Prioritization is FFS, we prefer to do both.

To Oppo #4:

Yes we consider any 3GPP defined unlicensed spectrum.

To Sharp #5:

Good question, the intent is for Rel-18 but flexibility to include legacy UEs could be studied.

To Qualcomm #6:

1) The MU-MIMO design/specification can be generic. MU-MIMO with 8Tx is more promising for vertical applications including commercial applications where the channel is more stable.

2) The calibration is similar to that for TDD BS, which works with different UEs.

To CATT #7:

We would like to study channel reciprocity for SL, where a Tx UE can estimate the channel from CSI-RS (and SRS) transmitted from a Rx UE. Then CSI-RS can be configured and allocated at the Tx and/or Rx UE with a certain flexibility.

To DOCOMO #8:

Better throughput performance is the main motivation for SL MIMO. CSI design for MIMO is a fundamental feature enhancement which can be applied (or designed together) to other items too, e.g., SL FR2 and SL on unlicensed spectrum, and also CA. More spectrum may be available with unlicensed and FR2, compared to CA and FR1. We appreciate the view from the DOCOMO.

Feedback Form 7: 3-1 Round 2 Questions and Comments on Sidelink MIMO Enhancements

1 – Huawei Tech.(UK) Co.. Ltd Q1: Thanks for the response. We assume this will require some new considerations around PSFCH format and/or structure.
2 – LG Electronics Inc. Q1: In the hybrid broadcast/groupcast and unicast transmissions, do you assume that the initial transmission will use ACK/NACK based groupcast HARQ feedback? If not, can you explain how the TX UE can identify which UEs require the unicast-based retransmissions?
3 – Intel Corporation (UK) Ltd Q1: Thanks for clarifying on FFS for prioritization and for intention to support both. Do you consider support of unlicensed spectrum for URLLC/IIOT or targeting other use cases?

Answers to 3-1 Round 2 by Moderator

To Huawei #1:

Yes, you are correct.

To LGE #2:

Yes, we assume the initial transmission will use ACK/NACK based groupcast HARQ feedback. We are anticipating that there can be some reuse of concepts from the MBS WI, which is in progress.

To Intel #3:

Unlicensed SL can support several use cases, which include URLLC/IIoT, NCIS, etc. However we think that Rel.18 should first focus on enabling/optimizing SL unlicensed operation, and specific additional optimizations for URLLC/IIoT (licensed or unlicensed) may be considered after that.

3.2 Comments and Answers for 3-2 on Sidelink Enhancements for FR2

On slide 12, we present aspects to enhance sidelink for FR2, including beamforming management, multiple beam panels, enhanced sidelink sensing, assistance from sidelink FR1, and sidelink power control in FR2.

Feedback Form 8: 3-2 Questions and Comments on Sidelink Enhancements for FR2

1 – ROBERT BOSCH GmbH Q1: do you support SL for IIoT in FR2? if yes, do we need specific low latency / reliability enhancements ?
2 – SHARP Corporation Could you elaborate a bit on motivation behind ”enhanced sidelink sensing”?

Answers to 3-2 by Moderator

To Bosch #1:

We support SL FR2 enhancements as stated on slide 12 in our contribution, which are mainly beam management centric. There may be latency and reliability improvement overall for proximal SL transmissions, but no specific URLLC/IIoT enhancements.

To Sharp #2:

Since enhanced FR2 is beam centric (beam training, beam management, beam discovery/recovery etc), sidelink sensing should consider or incorporate beam steering from its own and other SL links.

Feedback Form 9: 3-2 Round 2 Questions and Comments on Sidelink Enhancements for FR2

Answers to 3-2 Round 2 by Moderator

3.3 Comments and Answers for 3-3 on Sidelink in Unlicensed Spectrum

On slide 13, we propose extending sidelink to the unlicensed spectrum with some possible use cases on shown on slide 14. Slide 15 discusses some of the potential technical directions (unlicensed sidelink design and unlicensed coexistence).

Note: “-P” is a typographical error on slide 15.

Feedback Form 10: 3-3 Questions and Comments on Sidelink in Unlicensed Spectrum

1 – ROBERT BOSCH GmbH

Q1: Same as above: do you support SL for IIoT in Unlic. bands? if yes, do we need specific low latency / reliability enhancements ?

Q2: Do you support SL in IIoT in FR1 bands (i.e., including dedicated industrial bands) ?

Answers to 3-3 by Moderator

To Bosch #1:

1) and 2): We think that Rel.18 should first focus on enabling/optimizing SL unlicensed operation. Specific additional optimizations and requirements for URLLC/IIoT (licensed or unlicensed) may be considered after that.

Feedback Form 11: 3-3 Round 2 Questions and Comments on Sidelink in Unlicensed Spectrum

Answers to 3-3 Round 2 by Moderator