

Final
Variant of RAN-R18-WS-eMBB-LG_Electronics Version 0.0.2
RAN

3GPP TSG-RAN Rel-18 Workshop

Electronic Meeting, June 28-July 2, 2021

RWS-210532

Agenda item: 4.1

Source: LG Electronics

Title: Email discussion summary for [RAN-R18-WS-eMBB-LG_Electronics]

1 Introduction

This paper summarizes pre- Rel-18 WS email discussion for LG's view on Rel-18 5G-Advanced regarding eMBB related proposals.

Discussion in this paper consists of 4 sub-sections as follows based on 4 LG papers.

1. RWS-210237, LG's View on Rel-18 5G-Advanced: eMBB related, LG Electronics
2. RWS-210226, TCP boosting, LG Electronics Inc.
3. RWS-210240, Motivation for new WI: Further MIMO enhancements for NR, LG Electronics
4. RWS-210227, Enhancement for mobility, LG Electronic

2 Discussion

2.1 Overall Rel-18 eMBB proposal (RWS-210237)

LG' overall proposals on Rel-18 eMBB related items are introduced in RWS-210237, where the following items are proposed

- a) TCP boosting (RWS-210226)
- b) Enhancement for MIMO (RWS-210240)
- c) Enhancement for mobility (RWS-210227)
- d) Enhancement for SON (no separate document)
- e) Enhancement for NR QoE (no separate document)

2.1.1 [First Round] Questions

Please share your comments or questions on LG's overall views on Rel-18 eMBB related items here. For items a), b), c) above, you may share your comments or questions based on more detailed LG contributions in the subsequent sections.

Feedback Form 1: [First Round] Questions on LG's overall proposal on Rel-18 eMBB related items

2.1.2 [First Round] Answers

No questions have been received during first found

2.1.3 [Second Round] Questions

Please share your comments or questions on LG's overall views on Rel-18 eMBB related items here. For items a), b), c) above, you may share your comments or questions based on more detailed LG contributions in the subsequent sections.

Feedback Form 2: [Second Round] Questions on LG's overall proposal on Rel-18 eMBB related items

2.1.4 [Second Round] Answers

No questions have been received during second found

2.2 TCP boosting (RWS-210226)

In RWS-210226, we share our view on the potential Rel-18 item for TCP boosting. And the proposed potential enhancements are as follows:

Prioritized TCP ACK processing in the transmitter side

- Head-of-line blocking problem of TCP ACK should be addressed.
- Mechanism can be considered in SDAP/PDCP/RLC/MAC depending on the targeted granularity for TCP ACK prioritization. (E.g. Radio Bearer level, RLC bearer level, Logical channel level, etc.)

Low latency TCP ACK transmission in the radio interface

- Scheduling and resource allocation enhancement for TCP ACK.

Prioritized TCP ACK processing in the receiver side

- Out-of-order delivery for TCP ACK.

2.2.1 [First Round] Questions

Please provide your comments/questions on TCP boosting here:

Feedback Form 3: [First Round] Questions on TCP boosting

1 – Xiaomi Communications

This is an interesting topic. We have the following questions for clarification:

Question 1: Should AS be aware of the TCP ACK? If yes, in which AS layer?

Question 2: Is it also possible that NAS is aware of the TCP ACK, and filter the TCP ACK to a specific QoS flow? It seems if the NAS can have such filter, many AS functions per QoS flow can be reused for the TCP boosting.

2 – vivo Mobile Communication Co.

Thank you for the contribution. Which layer do you assume is the suitable layer to aware of TCP ACK? For TCP ACK processing enhancement in receive side, do you assume it is GNB side or UE side?

3 – Intel Corporation (UK) Ltd

TCP ACK field is present in almost every TCP packet (except for the very initial SYN packet), no matter whether there is payload or not. So which TCP packets are prioritized?

2.2.2 [First Round] Answers

Answers for questions in section 2.2.1 are provided below:

Re Xiaomi's questions(#1):

A1: We think traffic awareness in AS layer is important to support XR. Thus, our answer is Yes. Regarding the AS layer, we think PDCP or SDAP is a candidate for traffic awareness.

A2: We think it is possible for the NAS to map the TCP and TCP ACK to different QoS flows. Then, AS layer does not need to be involved. However, it cannot be mandated, and we should consider the case when both TCP and TCP ACK is mapped to a single QoS flow. We believe this is typical configuration.

Re Vivo's question(#2):

A: Regarding first question, we think PDCP or SDAP is a candidate for traffic awareness. Regarding second question, we think it is gNB side for UL TCP ACK and UE side for DL TCP ACK.

Re Intel's question(#3):

A: We don't think TCP ACK is generated for each received TCP packet. The TCP layer can generate cumulative ACK for multiple received TCP packets, and transmits it via standalone packet or piggybacked into the TCP packet. Our initial focus is on the standalone TCP ACK packet, but the piggybacked TCP packet can also be considered.

2.2.3 [Second Round] Questions

Please provide your comments/questions on TCP boosting here:

Feedback Form 4: [Second Round] Questions on TCP boosting

1 – Fujitsu Limited

Thank you for the contribution.

We have interest in TCP ACK handling. This topic has been also discussed in the past meeting e.g. in RP-180346/RP-180347. We still think that excessive ACK and beam blockage are still non-negligible issues for TCP boosting. Do you have any views on those issues?

2 – HuaWei Technologies Co.

We understand TCP ACK prioritization can be considered as one use case of differentiation of the streams, which is consistent with our thoughts of E2E QoS for XR to some extent. Do you think this can be considered jointly in XR discussion?

2.2.4 [Second Round] Answers

Re Fujitsu's question(#1):

A: Though we focus on the TCP ACK prioritization in our paper, we are also interested in suppressing excessive TCP ACK. We are supportive of any enhancement on TCP ACK.

Re Huawei's question(#2):

A: Yes, we also think that TCP boosting can be considered as part of XR. Traffic awareness and dynamic QoS handling is common part between two.

2.3 Enhancement for MIMO (RWS-210240)

In RWS-210240, we share our view on the Rel-18 work item for Enhancement for MIMO, including some initial evaluation/analysis. And the proposed WI objective is as follows

Enhancements on multi-beam operation

- Identify and specify features to support simultaneous UL transmission across multiple UE panels to improve reliability, robustness and throughput
- Identify and specify features to support per-panel UL synchronization mainly targeting multi-TRP reception scenario

Enhancements on multi-TRP operation

- Identify and specify features to improve reliability and robustness for multi-DCI based MTRP transmission
- Evaluate, and if needed, specify extended multi-TRP transmission (e.g. more than 2 TRPs, combined

multi-TRP schemes)

Cross-link interference mitigation in FR2

- Identify and specify features to mitigate cross-link interference in FR2

Enhancements for vehicular Distributed Antenna System (DAS) UE

- Study, and if needed, specify necessary DL/UL enhancements for vehicular DAS UE transmission and reception

2.3.1 [First Round] Questions

Please provide your comments/questions on MIMO enhancement here:

Feedback Form 5: [First Round] Questions on MIMO enhancement

1 – Beijing Xiaomi Mobile Software
- Q1: We think Cross-link interference mitigation in FR2 is an important issue and enh. is needed. The scenarios for enhancement need be clarified first.
- Q2: To support more than 2 TRPs needs great spec change, more discussion is needed.
2 – Samsung Research America Re vehicular DAS, could you provide some examples on FR2 BM features extended to FR1 to aid this scenario?
3 – China Telecommunications We have some question on the simulation results for simultaneous transmission across multiple panels: 1) For cell-edge UEs, what is the average rank of the UL transmission for different schemes? 2) For cell-edge UEs, what is the gain comes from, does it come from antenna array gain?
4 – Guangdong OPPO Mobile Telecom. Thanks for the contribution. Some questions for clarification: Q1: Is reliability enhancement for m-DCI based on ideal backhaul? Q2: Does enhancement for DAS UE also include higher order MIMO for uplink, e.g. higher layer?
5 – Apple GmbH For cross link interference mitigation, 3GPP had CLI agenda in the past, that is additional we can consider in your proposal for FR2?

<p>6 – MediaTek Inc.</p> <p>1. What would be the spec impact for supporting SFN transmission using multiple panels?</p> <p>2. L1-SINR was introduced in R16. What more is needed to support cross-link interference mitigation in FR2?</p>
<p>7 – Intel Corporation (UK) Ltd</p> <p>Why evaluation results on slide 3 show negligible improvement for average SE considering that peak throughput at the UE should be doubled with simultaneous UL transmission?</p>
<p>8 – Qualcomm communications-France</p> <p>Regarding “enhancements for vehicular DAS”, can you explain a bit more on the enhanced RRM part or other specific enhancements (for DL / UL) in mind?</p>
<p>9 – HuaWei Technologies Co.</p> <p>Thanks for the contribution. One question: For the mentioned extended multi-TRP transmission, does coherent joint transmission included?</p>
<p>10 – NTT DOCOMO INC.</p> <p>In P7, for ‘e.g. more than 2 TRPs, combined multi-TRP schemes’, do you mean DL NCJT or CJT? single-DCI based or multi-DCI based DL MTRP schemes?</p>
<p>11 – Beijing Lenovo Software Ltd.</p> <p>What additional change do you have in mind for mDCI mTRP for URLLC?</p>

2.3.2 [First Round] Answers

Answers for questions in section 2.3.1 are provided below:

Re Xiaomi’s questions(#1):

A1: Thanks for the comment and support. Since current BM functionality is only about gNB-to-UE beam, we think that it would be beneficial to extent BM functionality to control UE-to-UE beam and gNB-to-gNB beam.

A2: Currently, we think that supporting 3 or more TRPs can be helpful in some scenarios (e.g. stadium, indoor hotspot). But Yes, we agree that we should evaluate performance gain from 3 or more TRPs before starting specification work.

Re Samsung’s question(#2):

A: Thanks for the question. Currently, UL beam management features are applicable only to FR2. We think that this should be enabled in FR1 for vehicular DAS UE, including possible further optimization. It is also related to features being discussed for multi-panel UE in Rel-17, which is currently focused on FR2 application. This can be further extended/enhanced for vehicular DAS UE primarily for FR1 operation.

Re China Telecommunications’s questions(#3):

A1: The average rank of 5-percentile cell-edge UEs is 1.07 and 1.08 for one panel selection scheme and SFN-like STxMP scheme, respectively.

A2: For STxMP UE, two beams are simultaneously used from two panels. So, the gain comes from both beam diversity gain and power gain. We expect higher gain if we consider a sudden beam/panel blockage scenario including possible power back-off due to MPE issue, which is not reflected in the simulation.

Re OPPO's questions(#4):

A1: We think that it can be also used for backhaul with some delay in addition to ideal backhaul cases. Although there is some delay, both PDSCHs from two TRPs can be partially/fully overlapped or non-overlapped if independent scheduling of each TRP is assumed.

A2: We are supportive on higher order UL MIMO for DAS UE as well as other enhancements mentioned in the document.

Re Apple's question(#5):

A: We consider extending BM framework to support crosslink beam control functionality, which can be fit into a MIMO enhancement. Of course, solutions discussed but not specified in CLI agenda for FR2 can be considered as candidate solutions.

Re MediaTek's question(#6):

A1: Thanks for the question. One exemplary spec impact is that we need to support multiple spatial relations, SRIs, or UL TCIs for the SFNed signal.

A2: L1-SINR was for DL-to-DL interference handling in FR2. What we propose is for DL-to-UL or UL-to-DL interference handling in FR2.

Re Intel's question(#7):

A: We evaluated SFN-like transmission (i.e. same layer transmission from multiple panels) so it gives more gain for cell-edge UE. We expect more average SE gain if we observe performance of different layer transmission from different panels.

Re Qualcomm's question(#8):

A: Thanks for the question. For DL part, each antenna group (or panel) can be separated by more than 10 meters in large size vehicles. So, we are not convinced that existing measurement/reporting procedures are well operational in this situation. So, we suggest studying this aspect, which have not been considered in 3GPP. For UL part, one thing we found is that UL beam management features are applicable only to FR2 currently. We think that this feature will be useful for vehicle DAS UE in FR1. In addition, enhancements being discussed for UE panel selection in Rel-17 FeMIMO are more focused on co-located panels for FR2 devices. Depending on the outcome of the WI, we think that some further enhancements or extension would be needed for vehicle DAS UE in FR1.

Re Huawei's question(#9):

A: We didn't consider coherent JT for mTRP enhancement. We are open for it, but it is low priority for us compared to others.

Re DOCOMO's question(#10):

A: Our intention was to extend existing NCJT and reliability mTRP schemes (e.g. support of sDCI mTRP operation for a BWP with two CORESET pools).

Re Lenovo's question(#11):

A: One impact would be to indicate same TB transmission across two PDSCHs scheduled by individual DCIs, where exact signaling can be discussed during WI phase.

2.3.3 [Second Round] Questions

Please provide your comments/questions on MIMO enhancement here:

Feedback Form 6: [Second Round] Questions on MIMO enhancement

<p>1 – Samsung Research America</p> <p>(p6) For Vehicular DAS, what do you see as a reasonable number of panels per car, how are these panels mounted and oriented on the vehicle?</p>
<p>2 – Intel Corporation (UK) Ltd</p> <p>Thank you for the responses. We have an additional question below:</p> <p>Q1. Could you please clarify how SFN-like transmission was implemented in your UL evaluations for FR2? Is it just fixed precoder [1 1] applied across the panels or something else?</p>
<p>3 – China Telecommunications</p> <p>Thanks for your replies. We have one more question:</p> <p>Q1. As you mentioned, the gain comes from beam diversity gain and power gain. For the power gain part, do you mean, for example, for panel-selection scheme, the transmission power of UE is 23dbm, but for STXMP scheme, the transmission power is 26dbm?</p>
<p>4 – NTT DOCOMO INC.</p> <p>Thanks for the response. We have one more question.</p> <p>For extending more than 2 TRPs (e.g., 4) for NCJT, what're the main spec. impacts in your mind? Did you intent to have more CORESETPoolIndex, CSI measurement/reporting for 4 TRPs, etc.?</p>

2.3.4 [Second Round] Answers

Re Samsung's question(#1):

A: Thanks for the question. Exact number of panels and their locations are highly dependent on target vehicle's shape/size, and they can be different per vehicle OEM even for vehicles with similar shapes/sizes. For example, a rooftop panel can be preferred for some vehicle types for wide spatial coverage but it may not for some other vehicle types (e.g. car with ski rack). Some candidate positions would be rooftop, bumper, glass and mirror. We prefer to provide implementation flexibility as much as possible. As a starting point, we

can consider 2 5 panels. For two panels, we can start from panel models in V2X as specified in TR37.885. One example for 5 distributed panels would be one at rooftop, two at front/rear bumpers, and two at right/left sides.

Re Intel's question(#2):

A: Thanks for the question. In our evaluation, UL beam was selected per panel and CB SRS was transmitted in SFNed manner using the selected beam per panel for simplifying evaluation. So one TPMI is selected and applied across both panels. We expect that higher gain can be achieved if SRS is transmitted per panel and TPMI is selected per panel accordingly.

Re China Telecommunications' question(#3):

A: Thanks for the question. In our evaluation for STxMP, UL beam was firstly selected per panel, and then, Tx power was set based on a pathloss measurement received across both panels. Thus, Tx power is not exactly doubled compared to single panel scheme but it is true that STxMP generally uses higher power since it is based on doubled number of Tx antennas. Please note that power control part can be further improved if power control is performed independently for each panel, which has not been applied to our simulation yet.

Re DOCOMO's question(#4):

First of all, extending to more than 2 TRPs was only one example to consider for Rel-18. We consider this enhancement mainly for URLLC use cases (i.e. SFN, single DCI based) for improved reliability performance. We don't have strong preference for enhancing m-DCI based eMBB. But we are supportive on that direction for m-DCI based URLLC, if it is supported in Rel-18 as we proposed.

2.4 Enhancement for mobility (RWS-210227)

In RWS-210227, we share our view on the Rel-18 work item for enhancement for mobility. And the proposed objective is as follows

Enhancement for fast recovery

- Fast recovery with CHO/CPAC capabilities in DC
- Fast recovery via non-serving cell or SCell with inter-cell mTRP capabilities

Extension of Dual Connectivity

- Support of multi-connectivity beyond dual connectivity
- Enhancement of CG deactivation/activation scheme

Support of CA/DC for Dual Active Protocol Stack

2.4.1 [First Round] Questions

Please provide your comments/questions on mobility enhancement here:

Feedback Form 7: [First Round] Questions on mobility enhancement

1 – China Telecommunications

Thanks for the proposals, we are also interested in mobility enhancement in R18, especially for fast recovery and support of CA/DC during DAPS. Besides, we also support the proposals on enhancement of MR-DC in Slide 6. Multi-connectivity and fast SCG activation/ deactivation are also our interests for Rel-18.

2 – InterDigital Germany GmbH

-

How is fast recovery to a CHO candidate different than the current re-establishment rule when we select a CHO candidate during re-establishment?

3 – InterDigital Germany GmbH

One more question do you see having two work items handling DCCA and Mobility or just one combined WID?

4 – Nokia Corporation

Q1: Do you see any priorities among the objectives? I.e. are some objectives more important than others?

Q2: What would be the RLM enhancement for mTRP: Would it only mean allowing RLM for TRP2, or something else?

2.4.2 [First Round] Answers

Answers for questions in section 2.4.1 are provided below:

Re China Telecomm's question(#1):

A: We appreciate your support. Hopefully, we can make some progress together with the common views.

Re InterDigital's questions(#2,#3):

A1: We are considering discussing the left-over scenarios from R16 and R17. For example, the UE may be allowed to keep and use candidates of conditional reconfiguration, even after conditional mobility, which are received by the source cell or potential target cell on top of the current PCell.

A2: Practically, we think having two work items is better for handling DCCA and mobility but we are also open to having one combined one.

Re Nokia's questions(#4):

A1: Our priority is on fast recovery mechanism. Among others, we are open to discuss based on preference of other companies.

A2: The RLM enhancement would be to further consider RLM for TRP2 associated with non-serving cell under dynamic TRP selection/transmissions.

2.4.3 [Second Round] Questions

Please provide your comments/questions on mobility enhancement here:

Feedback Form 8: [Second Round] Questions on mobility enhancement

1 – China Telecommunications

Thanks for the response, beside the common views such as fast recovery and support of CA/DC during DAPS, we think there are some other aspects that can be studied in R18 (detailed in our paper RWS-210151), such as reduce data interruption in FR2, support coexistence of DAPS and CHO, support NG-based CHO, etc..., would you prefer to study the above features in R18? And what do you think are the most critical issues that need to be addressed in R18 mobility enhancement?

2.4.4 [Second Round] Answers

Re China Telecomm's question(#1):

A: Thank you for further comments. Among the listed items/issues in the question, we think reduction of data interruption in FR2 is in particular one of important objective, given that FR2-rollout is increasingly available to support use cases with stringent QoS requirements, and this is why we think fast recovery or prevention of failure is important. For other items, we need more time to understand if they are important and urgent.