RAN-R18-WS-eMBB-Fujitsu - Version 0.0.1
RAN

3GPP TSG RAN Rel-18 workshop **RWS-210524**

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: **4.1**

Source: **Fujitsu**

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

1 Introduction

This email discussion summary covers the following document:

RWS-210289 Views on Rel-18 Uplink MIMO

In this contribution, we have following proposal for Rel-18 uplink MIMO,

Proposal: For Rel-18 MIMO enhancement, specify the following aspects:

#1: Multi-panel joint transmission for UL

#2: Sub-band precoding for UL

#3: UL SU-MIMO with rank > 4

2 [First Round] Comments and Questions to the Tdocs

Please provide your comments and questions in the following form:

Feedback Form 1: 1st round of questions and comments to RWS-210289

1 – Samsung Research America For UL FS precoding, do you propose to use the Rel-15 CB or design a new two-stage (W1xW2) codebook for minimizing DL control signaling overhead?
2 – Beijing Xiaomi Mobile Software As for 'Multi-panel joint transmission for UL', we want to clarify that it is focus on coherent joint transmission or non-coherent joint transmission. We think further discussion on if it is feasible/necessary to enhance the coherent joint transmission is needed.

3 – MediaTek Inc. MIMO: Why is Simultaneous Tx Multi-Panel needed for reliability, given that we have R17 TDM schemes? Is it to reduce latency while improving reliability?
4 – HuaWei Technologies Co. We share similar view that SRS enhancement for coherent joint transmission is valuable, since the interference is an issuein such cases. Then, for ”SRS enhancement for sub-band precoding”, could you clarify a little bit more?
5 – Beijing Lenovo Software Ltd. For UL codebook design, do codewords for antenna selection or panel selection still consider in the enhanced UL codebook design for multi-panel joint transmission?
6 – Ericsson LM · On UL MIMO, what is the underlying antenna array assumption for the 8 TX for UL? · You mention that subband precoding is beneficial, can you quantify this, how large is the benefit?
7 – Intel Corporation (UK) Ltd 1. RAN4 doesn’t have performance requirement for 4Tx UE in UL even for 1 MIMO layer. What is importance to start RAN1 work on > 4 MIMO layers for UL considering status in RAN4? Does it make sense to first address 4Tx case in RAN4? 2. Is there any gains of JT for UL in FR2 considering different panel orientations? Is it feasible to achieve phase coherence between two panels in UL considering wideband operation?

3 [First Round] Answers

Answers for questions in section 2 are provided below:

#1. Samsung Research America

Reply:

In our opinion, Rel-15 CB could be regarded as a starting point for UL FS precoding. Also, we do not object to introduce a new two-stage codebook if the benefit of the new codebook is well justified.

#2. Beijing Xiaomi Mobile Software

Reply:

In our opinion, both coherent joint transmission and non-coherent joint transmission should be considered. And we share the similar view that the feasibility of coherent joint transmission need to be discussed especially for FR2.

#3. MediaTek Inc.

Reply:

Our original intention is to compare simultaneous multi-panel transmission with single panel transmission in term of reliability. Your point is valid that if we take Rel-17 TDM scheme as a baseline, the advantage of simultaneous multi-panel transmission is latency reduction while improving reliability.

#4. Huawei Technologies Co., Ltd

Reply:

For SRS enhancement for sub-band precoding, one of the directions could be precoded SRS. Similar to the design of precoded CSI-RS for DL, the precoding of SRS could be determined using channel reciprocity. With the transmission of precoded SRS, beam selection/combination is possible at each sub-band.

#5. Beijing Lenovo Software Ltd.

Reply:

We are open to both options.

#6. Ericsson LM

Reply:

1. For FR1, one antenna array assumption in our mind is, for example, (M, N, P, Mg, Ng; Mp, Np) = (1, 2, 2, 1, 1; 1, 2) for 8 Rx (consider joint panel transmission); another one is, for example, (M, N, P, Mg, Ng; Mp, Np) = (2, 2, 2, 1, 1; 1, 2) for 8 Rx (consider panel selection). For FR2, the feasibility of rank > 4 needs to be discussed.

2. Currently, we do not have numerical result to quantify this. We do see the benefit of sub-band precoding for DL, and this is one of the motivations for us to propose the same mechanism for UL. If necessary, a study phase could be added for the justification of sub-band precoding for UL.

#7. Intel Corporation (UK) Ltd

Reply:

1. Thanks for providing the information from RAN4. We do sympathize situation in RAN4. However, considering the strong request of UL enhancement from operator (e.g. Vodafone RWS-210459), it is reasonable from RAN1 perspective to consider the work on > 4 MIMO layer, which in turn, may help to accelerate the progress in RAN4.

2. We agree that the gain of JT for UL in FR2 may not be as well as in FR1. The feasibility of coherent joint transmission in FR2 need to be discussed.

4 [Second Round] Comments and Question

Please provide your comments and questions in the following form:

Feedback Form 2: