

3GPP TSG RAN Rel-18 workshop

RWS-210611

Electronic Meeting, June 28 - July 2, 2021

Agenda Item: 4.3

Source: CEWiT

Title: Email discussion summary for [RAN-R18-WS-crossFunc-CEWiT]

Document for: Discussion

1 Introduction

This email discussion summary covers the following document:

RWS-210488 "Views on study of in-band full duplex (IBFD) operation in Rel. 18"

2 General Comments

Companies are encouraged to provide general comments.

Feedback Form 1: General comments

3 [Round 1] Questions

Companies are encouraged to ask questions if any.

Feedback Form 2: Specific questions or comments if any along with extending support or no support (with reason if possible)

1 – Intel Corporation (UK) Ltd

<Intel>

On RWS-210489

Q1. what does it mean by variations in backhaul links?

Q2. NR in backhaul and multi-RAT in access, does it mean the access link as NR-U and licensed band?
Or it represents to support IAB in LTE?

Q3. what is referred as extending development in sidelink and V2X development for IAB? Does it mean having IAB as relay node between sidelink UE and gNB?

2 – LG Electronics Inc.

Thanks for the contribution.

We have question on RWS-210488.

We think the study objective in page 16 is reasonable. We have one question for our clarification regarding flexibility of IBFD for different NR channels e.g., data channel , control channel and RS.

Q1) Could you elaborate more the intention of study of flexibility of IBFD depending on different NR channel?

3 – Intel Corporation (UK) Ltd

Please ignore my previous questions which are supposed to be under eMBB. Sorry for the confusion.

<RWS-210488>

Q1. Given that basic feasibility of FD at gNB needs to be determined by RAN4 as a first step, what is your view on managing the studies across RAN1 and RAN4? Specifically, under what assumptions should RAN1 proceed with their study w/o information on isolation and self-, adjacent channel, intermodulation interference effects that would need RAN4 expertise?

Q2. Thanks for the evaluation results. However, are these evaluations considering practical limitations and feasibility for self- and adjacent channel-interference, IMD effects and echoes, inter-cell/inter-operator misalignments, etc?

Q3. What kind of isolation and interference handling schemes do you envision and the corresponding isolation levels to help realize the gains evaluated?

Q4. Have you considered feasibility (or lack thereof) in relying/exploiting channel reciprocity when isolation and self-interference cancelation is achieved by spatial separation?

4 – Nokia Corporation

What kind of performance impacts especially in DL performance do you foresee if UEs do not support full duplex? Have you studied handling and DL performance of legacy UEs?

5 – Fraunhofer HHI

Thank you very much for the paper and proposed scope.

We'd appreciate if you could elaborate further /clarify on the following aspects:

Q1: What is the relationship of IBFD and schemes like XDD, spectrum-sharing FD and subband-wise FD?

Q2: Are you having any preferences to differentiate scenarios / use cases between FD@gNB only or FD@gNB&UE within study and normative phase.

Q3: Are you envisioning FD to be applied onto channels for data and control?

4 [Round 1] Answers by moderator

Moderator and/or co-sourcing/supporting companies will provide answers to the questions/comments raised in section 3.

Thank you for the questions. Please find the answers below.

Reply to LG's question:

We can explain this by providing an example. In UL, self-interference (SI) and gNB to gNB interference mitigation plays an important role to get good performance in UL. In a scenario where these requirements cannot be fully satisfied, more robust channel like control/RS can be preferred to be transmitted in the UL. For instance, when the UL SINR is low, the control channel can be heavily coded or UL RS can be repeated to make it more robust in a low SINR scenarios. Similar robustness might not be possible to be achieved in case of a data channel. Thus, the full duplex UL channel can be used only to transmit control/RS where we can still exploit the additional full duplex UL channel available to get gains in terms of overhead reduction or latency reduction. The details of the advantages for different schemes are described in the contribution.

Reply to Intel's questions:

1. We agree that the feasibility of FD at gNB with respect to self interference (SI) cancellation and possible SI cancellation methods should be studied in RAN4. However, we believe RAN 1 can start work towards evaluating the scenarios where full duplex is beneficial with basic simulation assumption of certain range of SI cancellation in different scenarios like Urban Micro, macro and/or indoor. We believe work should start parallelly in RAN 1 and RAN 4 and required information can be shared between RAN 1 and RAN 4 with LS at appropriate time.
2. The evaluation results consider co-channel interference and self-interference (SI). We have not considered inter-operator scenario, hence there is no adjacent channel interference. However, in our understanding, the scenario is very similar to a flexible duplexing scenario with SI and intra-cell UE to UE interference as additional factors which are considered in the evaluation.
3. An SI cancellation of total 118 dB (including passive isolation and, analog and digital cancellation) has been considered which is practically possible. Cross-link interference handling is very similar to flexible duplexing scenarios wrt inter-cell UE to UE interference and gNB to gNB interference. Further, intra-cell UE to UE interference can be handled by appropriate scheduling.
4. In case of spatial separation for SI cancellation, application of channel reciprocity might be limited. However, in case of single panel co-located transmitter and receiver, channel reciprocity is quite feasible. We are expecting that the possible scenarios for such reciprocity application will be studied.

Reply to Nokia's question:

If we consider only gNB as full duplex capable, then this capability can be transparent to the UEs in the network. Thus, it does not matter even if the UEs are legacy half duplex UEs. In our evaluation as well, we have considered only half duplex UEs and full duplex capable gNB. Further, the intra-cell UE-to-UE interference can be managed using scheduling, thus we expect legacy UEs to be working fine under a full duplex capable gNB. If the UEs are also full duplex capable, we need to study if any impacts are there which we have not considered in our evaluations provided in the contribution.

Reply to Fraunhofer HHI's questions:

1. IBFD (in-band full duplex) is transmission and reception in the same overlapped time-frequency resources which is same as spectrum sharing FD. XDD and subband-wise FD use same time resources but different(orthogonal) frequency resources for reception and transmission.
2. From the Rel. 18 perspective, we prefer to study gNB only full duplex in Uu/backhaul link and UE full

duplex for sidelink scenarios. However, we are open to study full duplex UEs for other scenarios as well.

3. Please refer to the answer given to LG's question.

5 [Round 2] Questions

Feedback Form 3: Questions from companies for round 2

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6 [Round 2] Answers by moderator

7 Summary

In [RAN-R18-WS-crossFunc-CEWiT], two rounds of Q&A were carried out regarding the contribution RWS-210488 "Views on study of in-band full duplex (IBFD) operation in Rel. 18". 4 companies asked questions and CEWiT responded. Based on the discussion, following observations can be made regarding the interest of companies:

Observation 1: It is important to define the appropriate simulation scenarios to justify the FD gain under practical assumptions.

Observation 2: The scoping of work among the different RAN working groups need to be discussed while defining the scope of study.

Observation 3: The application of FD onto different channels like control/RS etc. need to be studied.