

Agenda Item: 9.0.2
Source: Lenovo, Motorola Mobility
Title: Discussion on evolution of duplex operation

1 Introduction

In RAN Rel-18 workshop, we proposed study on full duplex cell operation for Rel-18 [1]. During RAN#93-e Rel-18 preparation email discussions, various aspects regarding evolution of duplex operation were discussed, and quite diverging views were identified.

This contribution provides our views on Rel-18 work plan for evolution of duplex operation and potential scenarios for study.

2 Discussion

2.1 Release-18 work plan

The following two approaches for Rel-18 SI/WI on evolution of duplex operation can be considered:

- Option 1: Conduct comprehensive feasibility study for various scenarios in Rel-18 SI, and down-select use cases/scenarios for normative work in Rel-19 WI.
 - The study includes both TDD and FDD bands and full duplex operation at gNB/UE with taking into account sub-band non-overlapping, sub-band overlapping, and full overlapping schemes.
 - The TDD bands, full duplex operation at gNB, and sub-band non-overlapping full duplex scheme are considered as mandatory study cases. The FDD bands, full duplex operation at UE, and sub-band overlapping and full overlapping full duplex schemes are considered as optional study cases, for which interested companies can provide evaluation results for feasibility study.
- Option 2: Conduct feasibility study for limited, prioritized scenarios in Rel-18 SI, and start normative work in Rel-18 WI.
 - The study in Rel-18 includes only TDD bands, full duplex operation at gNB, and a sub-band non-overlapping full duplex scheme.

The option 1 can provide more comprehensive insights regarding feasibility and scenarios potentially benefitted from full duplex operation, while the option 2 allows RAN to start normative work in Rel-18. The selection between two options may be dependent on how urgent the industry sees the need for duplex enhancement is.

Proposal 1: RAN selects one approach for the Rel-18 work plan from the following options:

- **Option 1: Conduct comprehensive feasibility study for various scenarios in Rel-18 SI, and down-select use cases/scenarios for normative work in Rel-19 WI.**
- **Option 2: Conduct feasibility study for limited, prioritized scenarios in Rel-18 SI, and start normative work in Rel-18 WI.**

2.2 Scenarios for study

During RAN93-e Rel-18 preparation email discussions, some companies showed preference to study enhanced cross-link interference (CLI) management in dynamic/flexible TDD operation. In our understanding, feasibility of dynamic/flexible TDD was studied during the NR study phase [2], and CLI related enhancement was specified in Rel-16 NR. Thus, we do not see the need to repeat the same study in Rel-18, and the study in Rel-18 should focus on full duplex cell operation.

Proposal 2: Avoid duplicated work that had already been studied in previous NR releases, and focus on studying full duplex cell operation.

Regarding deployment scenarios, in our view, urban macro, dense urban, and indoor hotspot in [3] should be studied. In particular, we think studying the indoor hotspot scenario at 4GHz carrier frequency is important, since DL/UL-heavy traffics and mix of eMBB and URLLC traffics in a cell are relevant in the indoor scenario. Considering that potential benefit of full duplex cell operation is latency reduction by providing some UEs with uplink/downlink transmission opportunities while DL/UL-heavy traffics being served in a cell, feasibility study of full duplex cell operation in the indoor hotspot should be prioritized.

Proposal 3: Prioritize studying on full duplex cell operation in an indoor hotspot scenario to verify potential benefit for latency reduction in unpaired spectrum.

For full duplex operation at gNB in FR2, many works in literature were based on spatial separation, and limited work was done regarding analog self-interference cancellation techniques. In addition, latency and capacity are less of issue in FR2 thanks to a very short symbol duration and a wide carrier bandwidth. Thus, Rel-18 study can prioritize full duplex cell operation in FR1.

Proposal 4: Rel-18 study prioritizes full duplex cell operation in FR1.

3 Conclusion

In summary, we propose the followings to further progress discussions on Rel-18 evolution of duplex operation:

Proposal 1: RAN selects one approach for the Rel-18 work plan from the following options:

- **Option 1: Conduct comprehensive feasibility study for various scenarios in Rel-18 SI, and down-select use cases/scenarios for normative work in Rel-19 WI.**

- **Option 2: Conduct feasibility study for limited, prioritized scenarios in Rel-18 SI, and start normative work in Rel-18 WI.**

Proposal 2: Avoid duplicated work that had already been studied in previous NR releases, and focus on studying full duplex cell operation.

Proposal 3: Prioritize studying on full duplex cell operation in an indoor hotspot scenario to verify potential benefit for latency reduction in unpaired spectrum.

Proposal 4: Rel-18 study prioritizes full duplex cell operation in FR1.

4 References

[1] RWS-210397, “Full duplex cell operation in NR”.

[2] 3GPP TR 38.802, “Study on New Radio Access Technology: Physical Layer Aspects (Release-14)”.

[3] 3GPP TR 38.913, “Study on Scenarios and Requirements for Next Generation Access Technologies (Release-16)”.