[99-e][220]NR_RF_FR1_enh_RRM_NWM - Version 0.0.4
RAN4

3GPP TSG-RAN WG4 Meeting # 99-e **R4-2108392**

Electronic Meeting, May. 19-27, 2021

Agenda item: 9.3.3

Source: Moderator (Huawei, HiSilicon)

Title: Email discussion summary for [99-e][220] NR_RF_FR1_enh_RRM_NWM

Document for: Information

1 Introduction

This email thread discusses the RRM part of NR FR1 RF enhancement in Rel-17[RP-202088] in agenda 9.3.3. Three objectives are included in the WI.

1) Enable UL MIMO configuration for SUL band configurations

2) Specify UE requirements to enable Tx switching between different cases across carriers based on SUL and NR inter-band uplink CA for UE supporting maximum two concurrent transmissions

3) HPUE for TDD intra-band contiguous and non-contiguous UL CA

This email discussion aims to discuss the following.

-Sub-topic 1: Work plan

-Sub-topic 2: RRM impact

List of candidate target of email discussion for 1st round and 2nd round:

1st round: Invite companies to review the recommended WF in each sub-topic, and provide comments.

2nd round: TBA

2 RF enhancement in Rel-17-RRM

2.1 Companies' contributions summary

Table 1: Contribution List

T-doc number	Company	Proposals / Observations

R4-2109478	CMCC	Proposal 1: For Rel-17 2Tx-2Tx switching between two carriers, 1Tx-2Tx and 2Tx-2Tx between band A and band B, reuse Rel-16 values for length of DL interruption. Proposal 2: it is proposed to create new subclauses for Rel-17 DL interruptions at UE switching for CA and SUL respectively, including: -DL Interruptions at UE switching between two uplink carriers with two transmit antenna connectors -DL Interruptions at UE switching between one uplink band with one transmit antenna connector and one uplink band with two transmit antenna connectors -DL Interruptions at UE switching between two uplink bands with two transmit antenna connectors
R4-2110384	Huawei, HiSilicon	Work plan is provided. Proposal 1: Only interruption requirements are needed to be specified for Rel-17 Tx switching enhancements. The following cases are needed to be considered: 2Tx-2Tx switching between two uplink carriers for SUL and UL CA 1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA Note: For SUL+TDD and TDD+TDD CA with the same UL-DL pattern, DL interruption is not required. For other duplex mode combination, whether DL interruption exists depends on DL capability. Proposal 2: DL interruption requirements for Rel-17 Tx switching enhancements are only specified for SA.

2.2 Open issues summary

2.2.1 Sub-topic 1: Work plan

According to the WID [RP-202088], the core part of RRM shall be finalized by March 2022 (RAN #95), the performance part of RRM shall be finalized by September 2022 (RAN #97). The work plan is proposed as blow.

RAN4#99-e

Discuss and approve the work plan for RRM part.

Discuss and identify which RRM requirements need to be specified for

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

RAN4#100-e

Discuss the identified RRM requirements on

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

RAN4#100-e-Bis

Continue to discuss the identified RRM requirements on

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

Provide draft CR on TS38.133

RAN4#101-e

Further discuss the RRM requirements on

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

Provide and refine the draft CR

RAN4#102-e

Approve the CR on TS38.133

RAN4#102-e-Bis (RRM performance part only)

Discuss and decide test case lists and related parameters

RAN4#103-e (RRM performance part only)

Provide draft test cases for RRM

RAN4#104-e (RRM performance part only)

Approve test cases for RRM

Recommended WF

Could the above work plan be agreed?

Feedback Form 1: 1st round Comment collection for work plan

1 – Nokia Korea The work plan is agreeable to us.

2.2.2 Sub-topic 2: RRM impact

Issue 2-1: What RRM requirements are to be specified for Rel-17 Tx switching enhancements?

Proposals

Option 1 (CMCC, Huawei): DL interruption requirements

Recommended WF

Is Option 1 agreeable?

Feedback Form 2: 1st round Comment collection for Issue 2-1

1 – MediaTek Inc. Option 1 is agreeable.
2 – China Telecommunications Option 1 is agreeable.
3 – Huawei Technologies France Option 1 is agreeable.

4 – China Mobile Com. Corporation Option 1
5 – Nokia Korea Option 1 is agreeable.
6 – QUALCOMM JAPAN LLC. Option 1 is agreeable

Issue 2-2: The Tx switching scenarios need to be considered

Proposals

Option 1(Huawei, CMCC):

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

Recommended WF

Is Option 1 agreeable?

Feedback Form 3: 1st round Comment collection for Issue 2-2

1 – MediaTek Inc. Option 1 is agreeable.
2 – China Telecommunications Option 1 is agreeable.
3 – Huawei Technologies France Option 1 is agreeable.
4 – China Mobile Com. Corporation Option 1
5 – Nokia Korea Option 1 is agreeable.
6 – QUALCOMM JAPAN LLC. Option 1 is agreeable

Issue 2-3: DL interruption length

Proposals

Option 1(CMCC): Reuse Rel-16 values for length of DL interruption

Recommended WF

Is Option 1 agreeable?

Feedback Form 4: 1st round Comment collection for Issue 2-3

1 – MediaTek Inc. OK with Option 1 as long as the RF conclusions are followed.
2 – China Telecommunications Option 1 is agreeable. In RF session, it has been agreed to use the set of values for UL switching period.
3 – Huawei Technologies France Option 1 is agreeable.
4 – China Mobile Com. Corporation Option 1
5 – Nokia Korea Fine with Option 1.
6 – QUALCOMM JAPAN LLC. Our understanding was that in this meeting we were only supposed to discuss work plan and asses impact, not already the requirements. we would like to come back to this after fully understanding the RF agreements

Issue 2-4: Applicable scenarios

Proposals

Option 1(Huawei): DL interruption requirements for Rel-17 Tx switching enhancements are only specified for SA

Recommended WF

Is Option 1 agreeable?

Feedback Form 5: 1st round Comment collection for Issue 2-4

1 – MediaTek Inc. Option 1 is fine
2 – China Telecommunications Option 1 is agreeable according to the WI scope.
3 – Huawei Technologies France Option 1 is agreeable.
4 – China Mobile Com. Corporation Option 1
5 – Nokia Korea Fine with Option 1.

Issue 2-5: Whether to create new subclauses for Rel-17 DL interruptions at UE switching for CA and SUL respectively?

Proposals

Option 1(CMCC): Create new subclauses for Rel-17 DL interruptions at UE switching for CA and SUL respectively, including:

DL Interruptions at UE switching between two uplink carriers with two transmit antenna connectors

DL Interruptions at UE switching between one uplink band with one transmit antenna connector and one uplink band with two transmit antenna connectors

DL Interruptions at UE switching between two uplink bands with two transmit antenna connectors

Recommended WF

Needs discussion

Feedback Form 6: 1st round Comment collection for Issue 2-5

1 – MediaTek Inc. FFS. How to capture the requirement in spec can be FFS. We do not have a very strong view. Just thinking that if all requirements are the same, perhaps we can also consider to merge it in the same clause in the Rel-16 requirement.
2 – China Telecommunications Option 1 is agreeable, to follow the structure in RF spec. But we are also ok to make final decision later,

if companies need to more time to check.

3 – Huawei Technologies France

Need further discussion.

According to the agreed WF made in RF session, there is no DL interruption for SUL scenario.

– Reuse the Rel-16 agreement:

o For SUL+TDD and TDD+TDD CA with the same UL-DL pattern, DL interruption is not required.

o For the other duplex mode combinations, define different capabilities for UEs with and without DL interruption.

UE capability is defined as per band per band combination for each band pair supporting UL Tx switching.

In addition, if considerable requirements in the above three cases are the same, maybe creating a new subclause to include the three cases is an alternative.

4 – China Mobile Com. Corporation

Our proposal is to align with RF spec structure. We are open to further discuss.

5 – Nokia Korea

We think this depends on if there is any difference on the DL interruption in these scenarios. As it was agreed to reuse Rel16 switching period for Rel17, we may apply the same interruption to all the scenarios. It seems unnecessary to separate into multiple subclauses just for illustrating the respective scenarios.

· *Length of switching period*

Reuse Rel-16 values for UL CA and SUL, i.e., report {35us, 140 us, or 210us} per pair of UL bands per band combination, and apply the same set of values for switching between different cases in the WID

2.3 Summary for 1st round

2.3.1 Open issues

2.3.1.1 Sub-topic 1: Work plan

No objection on the work plan in the 1st round.

Tentative agreements:

The work plan is approved.

Recommendations for 2nd round: Consensus is reached and no need to discuss in the 2nd round.

2.3.1.2 Sub-topic 2: RRM impact

Issue 2-1: What RRM requirements are to be specified for Rel-17 Tx switching enhancements?

6 companies all support option 1.

Tentative agreements:

In RRM, DL interruption requirements are to be specified for Rel-17 Tx switching enhancements.

Recommendations for 2nd round: Consensus is reached and no need to discuss in the 2nd round.

Issue 2-2: The Tx switching scenarios need to be considered

6 companies all support option 1.

Tentative agreements:

The following Tx switching scenarios need to be considered for specify DL interruption requirements.

2Tx-2Tx switching between two uplink carriers for SUL and UL CA

1Tx-2Tx and 2Tx-2Tx switching between 1 carrier on band A and 2 contiguous aggregated carriers on band B for SUL and UL CA

Recommendations for 2nd round: Consensus is reached and no need to discuss in the 2nd round.

Issue 2-3: DL interruption length

6 companies provided views on this issue. 5 companies support option 1, and 1 company think we shall focus on work plan and RRM impact in this meeting.

Moderator suggest to capture this issue in WF and discuss this issue in the next meeting

Recommendations for 2nd round: No need for 2nd round. The open issue will be discussed in the next meeting

Issue 2-4: Applicable scenarios

All companies support option 1.

Tentative agreements:

DL interruption requirements for Rel-17 Tx switching enhancements are only specified for SA.

Recommendations for 2nd round: Consensus is reached and no need to discuss in the 2nd round.

Issue 2-5: Whether to create new subclauses for Rel-17 DL interruptions at UE switching for CA and SUL respectively?

Multiple companies expressed their views. Some companies suggest to think more and make decision later. As this is the first meeting, we can further discuss in the next meeting.

No tentative agreements.

Recommendations for 2nd round: Moderator suggest to capture this issue in WF. No need for 2nd round. The open issue will be discussed in the next meeting

2.3.2 CRs/TPs

2.4 Discussion on 2nd round (if applicable)

3 Recommendations for Tdocs

3.1 1st round

New tdocs

Table 2:

Title	Source	Comments
WF on Rel-17 Tx switching enhancements	Huawei, HiSilicon	

3.2 2nd round

Table 3:

Tdoc number	**Title**	**Source**	**Recommendation**
R4-2108339	WF on Rel-17 FR1 RF: RRM Tx switching enhancements	Huawei, HiSilicon	Agreeable