**3GPP TSG RAN WG1 #105-e R1-210xxxx**

**e-Meeting, May 10th – 27th, 2021**

**Agenda item:** 7.2.12

**Source:** Moderator (NTT DOCOMO, INC.)

**Title:** Summary on [105-e-NR-TEI16-01]

**Document for:** Discussion and Decision

1. Introduction

This contribution summarizes the following email discussion.

[105-e-NR-TEI16-01] Email discussion/approval on Rel-16 NR TEI related issues, till 5/24 – Hiroki (DoCoMo)

* Discuss following proposal and corresponding specification impact
  + The DL/UL collision handling should be supported by a UE capable of such handling for each band within a band combination where the UE supports inter-band simultaneous transmission and reception.

1. Discussion on Rel-16 NR TEI related issues
   1. Half-duplex operation in CA with unpaired spectrum

Following proposal is made in a contribution.

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| [6] | According to the previous agreements, UE can report the DL/UL collision handling capability for a band or band combination (BC) not supporting simultaneous transmission and reception (simul-RxTx for short) on two carriers within one band or on different bands, and the base station can configure the UE for such collision handling.  From UE implementation point of view, although no explicit UE capability, it is naturally understood that even if a UE can support simul-RxTx between bands, the UE cannot support simul-RxTx within each band of that BC respectively.  Thus, for a band combination (BC), according to current specifications, a UE   * Case a) may, or Case b) may not, support simul-RxTx for inter-band BC, based on *simultaneousRxTxInterBandCA*, and * When the UE does not report/support *simultaneousRxTxInterBandCA* (Case b), the UE may or may not support collision handling based on *half-DuplexTDD-CA-SameSCS-r16* for the inter-band BC   + The UE may also support/report *half-DuplexTDD-CA-SameSCS-r16* for a BC that is intra-band only (i.e. if one of the bands is also an intra-band only BC), according to the recent agreements   As can be seen, it is not clear what is the intended UE reporting for Case a) when a UE supports *simultaneousRxTxInterBandCA* for a BC, and can support *half-DuplexTDD-CA-SameSCS-r16* for each single band only (rather than for inter-band BC which is an advanced UE capability), given that a UE cannot report DL/UL collision handling capability for the BC in this scenario. On the other hand, if the intra band combination is a subset of the above inter-band combination, the UE may be able to report/support DL/UL collision handling then it is not clear whether gNB has correct/same understanding in order for a proper configuration.  One example assumes a CA scenario of two bands, with one carrier in band A and two carriers in band B. The UE reports supporting simul-RxTx across band A and B, and the UE doesn’t support simul-RxTx on the two carriers in band B. RAN1 needs to clarify whether the UE can support DL/UL collision handling for the two carriers in band B, especially when the UE can report DL/UL collision handling capability for band B. From our understanding, the UE should be able to handle the DL/UL collision for the carriers in band B in the above example, however the current specification does not seem to allow this. Corresponding specification impact needs to be further discussed after that.  ***Proposal:*** *The DL/UL collision handling should be supported by a UE capable of such handling for each band within a band combination where the UE supports inter-band simultaneous transmission and reception.* |

Based on the above proposal, following point can be discussed in RAN1#105-e meeting.

### **FL proposal #1**

* **Discuss following proposal and corresponding specification impact**
  + **The DL/UL collision handling should be supported by a UE capable of such handling for each band within a band combination where the UE supports inter-band simultaneous transmission and reception.**

Companies are encouraged to check above FL proposal and to provide feedback if any in below.

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| Company | Comment |
| Huawei | Y as our proposal…  The spec impact in RAN1 may be to clarify the definition of reference cell is determined among a cell group within a band or within a BC. Potential spec impact e.g. on RAN2 could be left to RAN2 to decide, if any. |
| ZTE | It seems the issue only exists when UE supports *simultaneousRxTxInterBandCA* for a band combination but doesn’t support simultaneous Tx and Rx within one certain band.  If the proposal is agreed, then the reference cell determination is divided into two cases,  1. If UE doesn’t indicate *simultaneousRxTxInterBandCA*, the reference cell is determined based on all serving cells configured with *half-duplex-behavior* within this cell group.  2. If UE indicates *simultaneousRxTxInterBandCA*, the reference cell is determined based on all serving cells configured with *half-duplex-behavior* within this band.  The second case seems to have huge spec impac with potential NBC issue. It seems better if we can also update the corresponding UE feature for this the second case by updating the existing FG or defiing new FG for it. |
| ZTE2 | Add some more comments…  According to the RAN4 spec, it seems the same TDD pattern is required for intra-band CA case. It seems that UE doesn’t need to perform half-duplex collision handling purly for the intra-band CA case. If this is the case, then it seems the proposal is not needed. |
| Huawei | We just agreed last meeting that half duplex operation is possible for intra-band only case, and even if the pattern is the same, collision may happen on flexible symbols.  Spec impact can be discussed – right now in our assessment it is minor: only clarify the definition of reference cell once in the text is fine. |

1. Conclusion

TBD

Reference

[1] R1-2104325 Remaining Issues of Rel-16 UL Tx Switching ZTE

[2] R1-2104653 Remaining issues for 1Tx-2Tx switching Qualcomm Incorporated

[3] R1-2104730 Enhancement on uplink power control for M-TRP OPPO

[4] R1-2104731 Text Proposals for Tx Switching between Two Uplink Carriers OPPO

[5] R1-2104858 Summary of Rel-16 uplink Tx switching Moderator (China Telecom)

[6] R1-2105524 Discussion on half duplex operation for TDD CA Huawei, HiSilicon

[7] R1-2105925 Discussion on the remaining problems of supporting Tx switching between two uplink carriers Huawei, HiSilicon