**3GPP TSG-RAN WG4 Meeting # 98-bis-e R4-210XXXX**

**Electronic Meeting, 12th – 20th April, 2021**

**Agenda item:** 8.2.2.2, 8.2.2.3

**Source:** Moderator (China Telecom)

**Title:** Email discussion summary for [98-bis-e][129] NR\_RF\_FR1\_enh\_Part\_2

**Document for:** Information

# Introduction

This email thread discusses the maintenance on Rel-17 Tx switching enhancement for inter-band SUL and uplink CA.

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

* 1st round:
  + Review and comment the recommended WF for each issue in section 1.2.
  + Review and comment the draft CRs in section 1.3.2.
* 2nd round:
  + TBA

# Topic #1: Rel-17 Tx switching maintenance

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2104592 | CMCC | Draft CR to 38.101-1 Correction on DL interruption applicability for inter-band CA:  Correct the note for DL interruption applicability in Table 5.2A.2.1-1 to support all the following cases for dynamic Tx switching  – 1Tx-2Tx switching between carrier 1 and carrier 2  – 2Tx-2Tx switching between carrier 1 and carrier 2  – 1Tx-2Tx and 2Tx-2Tx switching between band A (carrier 1) and band B (carrier 2+3) |
| R4-2104593 | CMCC | In this contribution, we discuss the DL interruption applicability for dynamic Tx switching for Rel-17 1Tx-2Tx and 2Tx-2Tx switching between band A and band B. The proposals are provided as follows:  Proposal 1: it is proposed to correct the NOTE 8 in Table 5.2A.2.1-1 TS 38.101-1 as follows:  NOTE 8: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13].  Proposal 2: RAN4 should discuss whether the correction on NOTE for “DL interruption allowed” should be adopted for Rel-16 TS 38.101-1 and Rel-16/17 TS 38.101-3 in order to keep the spec consistency. |
| R4-2104638 | ZTE Wistron Telecom AB | Observation 1: In new Rel-17 UL Tx switching schemes, the Case 2 maximum transmit power gap between CA and SUL is still the same as that in Rel-16.  Observation 2: The capability demand for Carrier #1 in Rel-17 new UL Tx switching schemes has no impact on the power boosting capability of Carrier #2 in Rel-16.  Observation 3: The power boosting in Rel-17 new UL Tx switching schemes can be enabled as that in Rel-16 with the same set of signalling and without any additional requirement.  Proposal: Support power boosting scheme for CA in Rel-17 new UL Tx switching schemes. |
| R4-2104639 | ZTE Wistron Telecom AB | draftCR on Rel-17 UL Tx switching time mask for 2Tx-2Tx switching between two carriers and 1Tx-2Tx/2Tx-2Tx switching between two bands in Rel-17:  Enable power boosting for the new Rel-17 UL Tx switching. |
| R4-2105087 | Ericsson | We propose  Proposal 1: RAN4 to send an LS to inform the upcoming RAN meeting that MPR for TxD is considered by RAN4, but that this does not preclude approval of the endorsed CR RP-210850 nor band combinations with TX switching and MPR allowance according to the existing MPR specification for PC2.  while observing that  Observation 1: power boosting for UL CA PC3 also applies to the 2TX-2TX case as per the specification in 38.331, recognising that the 3 dB boosting only occurs on carrier2. |

## Open issues summary

### Sub-topic 1-1: Note for DL interruption applicability

**Issue 1-1: Note for DL interruption applicability**

* *RAN4 #98e agreement on the applicability of DL interruption (see approved WF in R4-2103235)*
  + *There is no need to differentiate the DL interruption applicability between Rel-16 1Tx-2Tx switching and Rel-17 Tx switching scenarios, which means that “DL interruption allowed” specified in existing TS 38.101-1 should also be applied to the Rel-17 Tx switching scenarios including:*
    - *2Tx-2Tx switching between carrier 1 and carrier 2*
    - *1Tx-2Tx and 2Tx-2Tx switching between band A (carrier 1) and band B (carrier 2+3)*
* Proposals
  + Proposal 1: it is proposed to correct the NOTE 8 in Table 5.2A.2.1-1 TS 38.101-1 as follows: (CMCC)

NOTE 8: Applicable when dynamic Tx switching is conducted. The DL interruption requirement is specified in clause 8.2.2.2.10 of 38.133 [13].

* + Proposal 2: RAN4 should discuss whether the correction on NOTE for “DL interruption allowed” should be adopted for Rel-16 TS 38.101-1 and Rel-16/17 TS 38.101-3 in order to keep the spec consistency. (CMCC)
* Recommended WF
  + Is proposal 1 agreeable?
  + Encourage feedback on proposal 2.

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| **Company** | **Comments** |
| OPPO | Proposal 1 is ok. |
| China Telecom | On proposal 1: We support Proposal 1 to implement the RAN4 #98e agreement. In addition, the reference clause number to 38.133 needs also to be updated after the RRM requirements for Rel-17 switching scenarios are finished.  On proposal 2: We prefer not to change the NOTE for Rel-16 TS 38.101-1 and Rel-16/17 TS 38.101-3, since the switching scenarios are not extended for those specs. But we are open to follow majority view as well. |
| CHTTL | Regarding proposal 1, though we don’t have strong view, since this DL interruption allowance is for the switching between carriers from different bands, how about “dynamic Tx switching between two UL bands”?  On proposal 2: we think it’s ok to modify the note from Rel.17. |
| CMCC | Support proposal 1. Regarding the proposal from CHTTL, since the following sentence referred to 38.133 spec, I think it is clear enough, so we prefer to keep the NOTE simple and avoid creating potential confusion in the future.  For proposal2, the proposed changed NOTE is more general, so we slightly prefer to change the NOTE in Rel-16 TS 38.101-1 and Rel-16/17 TS 38.101-3 in order to keep the spec consistency. |
| CATT | Proposal 1: Support.  Proposal 2: No strong view. Either way works. |
| ZTE | Fine with Proposal 1. |
| Huawei | c |
| QC | The original wording in 38.133 and TR 37.867, 'dynamic switching between two uplink carriers' covers the cases specified in this WID. Therefore, no wording change is needed  Based on our understanding, "dynamic switching between two uplink carriers" should cover the cases CMCC listed:   * + - *2Tx-2Tx switching between carrier 1 and carrier 2*     - *1Tx-2Tx and 2Tx-2Tx switching between band A (carrier 1) and band B (carrier 2+3)*   Could CMCC clarify why the wording change is needed? |
| vivo | Ok with proposal 1. No strong view for proposal 2. |

### Sub-topic 1-2: Power boosting for CA Tx switching

**Issue 1-2: Power boosting for CA Tx switching**

* Proposals
  + Proposal 1:Support power boosting scheme for CA in Rel-17 new UL Tx switching schemes. (ZTE)
  + Proposal 2: Power boosting for UL CA PC3 also applies to the 2TX-2TX case as per the specification in 38.331, recognising that the 3 dB boosting only occurs on carrier2. (E///)
* Recommended WF
  + Encourage feedback on proposal 1 and 2.

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| **Company** | **Comments** |
| OPPO | In Rel-17, the inter-band CA PC2 feature is introduced for the band combinations that support PC2 this power boosting is not needed. For the band combinations that doesn’t support PC2 but can support PC2 in high band then maybe power boosting is needed. |
| China Telecom | It is not necessary to introduce power boosting for PC3 in Rel-17 switching scenarios, since Rel-17 has already specified PC2. This is a different situation to Rel-16.  From the first meeting for Rel-17 Tx switching, companies have spent efforts to discuss the technical aspects, and no one has found any UE architecture that supporting PC3 + power boosting but not supporting PC2.  Regarding OPPO’s comment, we agree with the first sentence; we don’t seen any BC that doesn’t support PC2 BC but can support PC2 in high band. |
| CMCC | This issue had been discussed for a few meetings. In our understanding, there will be no UE only support power boosting, but not support PC2 CA. So it is not necessary to support power boosting for CA in Rel-17 Tx switching scheme. |
| CATT | Prefer not to define power boosting in Rel-17 given PC2 will be defined for inter band CA. Is there an example UE architecture where power boosting is supported in carrier 2 but PC2 is not supported by inter-band CA? |
| ZTE | If we comparing the Tx switching schemes of two carriers in Rel-16 and Rel-17, the only difference is the escalation of Carrier#1 from 1Tx to 2Tx, while Carrier#2 capable of power boosting remains the same.  So there is no reason for that PC3 Carrier#2 is enabled power boosting when Carrier#1 is configured with 1Tx, but no power boosting of Carrier #2 when Carrier#1 is configured with 2Tx.  Another reason is what OPPO mentioned: for the BC that does not support PC2 but can support PC2 in high band, there is a need for power boosting, which is also one of the concerns in our paper that we would like to guarantee of removing the gap between CA and SUL from standardization perspective.  To China Telecom and CATT, of course UE architecture is never an issue at all, even from Rel-16 days! Otherwise there would not have been power boosting scheme. The issue is whether or not specs allow. |
| Huawei | We don’t think it is necessary to introduce power boosting in Rel-17 as PC2 inter-band CA is already supported in R17. We agree with other companies that it doesn’t make sense the UE supports power boosting but not supporting PC2 in NUL band. |
| Ericsson | We support Proposal 2. Boosting on carrier2 in accordance with the Rel-16 version of 38.331 can also apply to a UE supporting a switched 2TX-2TX UL CA band combination of CA PC3 if the UE is capable of 3 dB boosting on carrier2 (but does not apply for carrier1). |
| Nokia | We just technically understand why power boosting is needed.  If a UE can transmit up to 26dBm over carrier 2, then, the UE will report PC2 for UL inter band CA, PC3 for carrier 1 for Band A and PC2 for carrer2 for Band B. The total PC is capped by the PC2 for uplink CA. And when PC2 2Tx over carrier 2 is used, only this carrier 2 is available and the PC is the same as that of uplink inter band CA. |
| vivo | We think it is not necessary to introduce power boosting in Rel-17 switching scenarios. |
| AT&T | We support option 2. |

### Sub-topic 1-3: MPR for TxD

**Issue 1-3: MPR for TxD**

* Proposals
  + Proposal 1: RAN4 to send an LS to inform the upcoming RAN meeting that MPR for TxD is considered by RAN4, but that this does not preclude approval of the endorsed CR RP-210850 nor band combinations with TX switching and MPR allowance according to the existing MPR specification for PC2. (E///)
* Recommended WF
  + Encourage feedback on proposal 1.

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| **Company** | **Comments** |
| OPPO | Maybe it is better to wait for the MPR introduced for 2T which could be finished in a short time. |
| ZTE | Is this also covered in thread #101? |
| Huawei | This is a Rel-16 issue which should not be discussed under the Rel-17 agenda. Also the MPR requirement for PC2 2Tx are not finished yet. No need to have further discussion of this issue in this meeting. |
| Ericsson | The discussion in #101 on the MPR allowed for PC2 implemented with TxD for Rel-16 is also relevant for any PC2 band combination in Rel-17 implementing 2TX with TxD. However, this discussion is not relevant for any other implementation of 2TX on a carrier of a Rel-17 band combination such as one of the full-power modes or UL-MIMO for which the existing MPR for PC2 applies. RAN4 should inform RAN that these Rel-17 band combinations with TX switching can be approved notwithstanding the discussion on MPR for TxD. The endorsed CR RP-210850 is also applicable for these combinations (and does not refer to the MPR for any specific implementation of PC2 with 2TX).  An LS should be sent no later than RAN#99-e. |

## Companies views’ collection for 1st round

### Open issues

*Provided under each issue in section 1.2*

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **Draft CR number** | **Comments collection** |
| R4-2104592, CMCC | China Telecom: support |
| CMCC: Support |
| ZTE: Fine with us. |
| Huawei: Support |
| Vivo：Fine for us. |
| R4-2104639, ZTE | China Telecom: not support |
| CMCC: Wait for conclusion on issue 1-2 |
| ZTE: We strongly recommend the group to consider this change, as seen in our comments on Issue 1-2. |
| Huawei: Disagree with the draft CR. Not necessary. |
| Ericsson: we support Proposal 2 for issue 1-2 and the proposed changes to the 38.101-1 to this end. (However, the power boosting should be specified in the sub-clause on configured maximum output power.) |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round

1. Recommendations for Tdocs
   1. 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents
   1. 2nd round

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
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Notes:

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2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents