**3GPP TSG-RAN WG2 Meeting #116 electronic R2-21xxxxxx**

**Online, Nov 1-12, 2021**

**Agenda item:** 8.24.1

**Source:** Huawei, HiSilicon

**Title:** Summary of [AT116-e] [025][NR17] UL TX Switching & 100M BW (Huawei)

**Document for:** Discussion and Decision

# 1. Introduction

This document attempts to summarize the following offline discussion.

* [AT116-e][025][NR17] UL TX Switching & 100M BW (Huawei)

 Scope: Treat R2-2111059, R2-2111060, R2-2111061, R2-2110424, R2-2110974

 Determine agreeable parts, Identify discussion points for online (if needed).

 Intended outcome: Ph1 Report, Ph2 if applicable: endorsed CRs.

 Deadline: Friday W1 (CB online if needed)

Rapporteur suggests companies to provide comments before Thursday W1 UTC 10:00, so that the agreeable part/possible way forwards can be summarized before on-line CB Friday W1.

# 2. Contact info

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| Company Name | Contact Person | Email Address |
| Qualcomm Incorporated | Masato Kitazoe | mkitazoe@qti.qualcomm.com |
| Ericsson | Lian Araujo | lian.araujo@ericsson.com |
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# 3. Phase 1 discussion

## 3.1 UL Tx switching

In previous RAN2 meetings, the UE capability reporting has been discussed and according to RAN2 agreements and common understanding, the running CRs to TS 38.331 and TS 38.306 on UE capability reporting were endorsed in R2-2109225 and R2-2109226 in RAN2 #115 meeting. However, RAN2 did not go deep into the RRC configuration part as some related aspects were under-discussion in RAN1.

In R2-2111059 explained that in RAN1 Oct meeting RAN1 made some progress related to the RRC configuration, i.e.:

* RAN1 agreed to introduce a new RRC parameter to configure switching state for inter-band CA 2T-2T switching option2.
* RAN1 has not achieved conclusion on how to enable UE/NW have aligned understanding on which switching mode (i.e. 1T-2T switching or 2T-2T switching) to be used, e.g. via new RRC configuration or existing RRC parameters.

Then R2-2111059 propose to capture the new RRC parameter into the RRC running CR. With regard to 2T-2T switching, R2-2111059 propose to continue waiting for RAN1 conclusion.

Meanwhile, for 1T-2T switching with 2CCs configured in Band B, as RAN1 agreed the existing Rel-16 1T-2T switching mechanism is reused, R2-2111059 propose RAN2 start to discuss this case and propose to reuse the existing Rel-16 parameters to indicate the switching period location and carrier role.

Companies are welcome to give comments on the 4 proposes within R2-2111059.

Proposal 1: RAN2 to capture the RRC parameter to configure the state of Tx chains for UL-CA option2 in case of 2Tx-2Tx switching.

Proposal 2: RAN2 to wait for RAN1 further progress on whether to reuse existing RRC parameter or introduce a new RRC parameter for UE differentiation 1Tx-2Tx switching and 2Tx-2Tx switching.

Proposal 3: To configure 2CCs on band B for 1Tx-2Tx switching, among the 3 uplinks configured with UplinkTxSwitching, the field uplinkTxSwitchingPeriodLocation is configured to either the uplink on band A or both uplinks on band B (i.e. the band capable of 2Tx).

Proposal 4: To configure 2CCs on band B for 1Tx-2Tx switching, among the 3 uplinks configured with UplinkTxSwitching, the field uplinkTxSwitchingCarrier is set as carrier1 for the uplink on band A, while the field uplinkTxSwitchingCarrier is set as carrier2 for the both uplinks on band B (i.e. the band capable of 2Tx).

**Q1-1: Do companies agree P1 within R2-2111059 as it is: RAN2 to capture the RRC parameter to configure the state of Tx chains for UL-CA option2 in case of 2Tx-2Tx switching?**

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| Company | Yes/No | Comments |
| Qualcomm Incorporated | No | We appreciate the effort from the proponents updating RAN2 for RAN1 progress. We however do not think it is a good idea to continue this process requiring RAN2 to figure out what is going on in RAN1. RAN2 should act based on official input from RAN1. |
| Ericsson |  | We are fine with Qualcomm’s suggestion to wait for official input from RAN1. |
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**Q1-2: Do companies agree P2 within R2-2111059 as it is: RAN2 to wait for RAN1 further progress on whether to reuse existing RRC parameter or introduce a new RRC parameter for UE differentiation 1Tx-2Tx switching and 2Tx-2Tx switching?**

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| Company | Yes/No | Comments |
| Qualcomm Incorporated | No | We appreciate the effort from the proponents updating RAN2 for RAN1 progress. We however do not think it is a good idea to continue this process requiring RAN2 to figure out what is going on in RAN1. RAN2 should act based on official input from RAN1. |
| Ericsson | Yes | This should be in line with Qualcomm’s suggestion on wait for official input from RAN1. |
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**Q1-3: Do companies agree P3 within R2-2111059 as it is: To configure 2CCs on band B for 1Tx-2Tx switching, among the 3 uplinks configured with UplinkTxSwitching, the field uplinkTxSwitchingPeriodLocation is configured to either the uplink on band A or both uplinks on band B (i.e. the band capable of 2Tx)?**

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| Company | Yes/No | Comments |
| Qualcomm Incorporated | No | We appreciate the effort from the proponents updating RAN2 for RAN1 progress. We however do not think it is a good idea to continue this process requiring RAN2 to figure out what is going on in RAN1. RAN2 should act based on official input from RAN1. |
| Ericsson |  | We are fine with Qualcomm’s suggestion to wait for official input from RAN1. |
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**Q1-4: Do companies agree P4 within R2-2111059 as it is: To configure 2CCs on band B for 1Tx-2Tx switching, among the 3 uplinks configured with UplinkTxSwitching, the field uplinkTxSwitchingCarrier is set as carrier1 for the uplink on band A, while the field uplinkTxSwitchingCarrier is set as carrier2 for the both uplinks on band B (i.e. the band capable of 2Tx)?**

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| Company | Yes/No | Comments |
| Qualcomm Incorporated | No | We appreciate the effort from the proponents updating RAN2 for RAN1 progress. We however do not think it is a good idea to continue this process requiring RAN2 to figure out what is going on in RAN1. RAN2 should act based on official input from RAN1. |
| Ericsson |  | We are fine with Qualcomm’s suggestion to wait for official input from RAN1. |
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Moderator understand the R2-2111061 and R2-2110424 are resubmissions of the endorsed running CR ported on the latest version of TS 38.331 and TS 38.306. If companies have any concerns on either contribution, please comment in below table.

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| Company | Comments |
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## 3.2 100M BW

In RAN2#115 meeting, the newly introduced capability for 100M bandwidth for band n40 was discussed and the CRs for Rel-15/Rel-16 were agreed. However, how to handle the capability for 100M bandwidth in Rel-17 is not clear and postponed.

Regarding the two available options on table, R2-2110974 propose to support a consistent handling of the capability bit for 100MHz as Rel-15/Rel-16 for Rel-17, i.e. option2.

* Option 1: The UE shall set it to be 1 if 100MHz bandwidth is mandatory according to TS 38.101-1. (The 100MHz includes the existing 100MHz for bands n41, n48, n77, n78, n79 and n90 and introduced new 100MHz). **It means, the handling of the capability bit for 100MHz is different between Rel-15/Rel-16 and Rel-17.**
* Option 2: The UE shall set it to be 1 if 100MHz bandwidth is required to be mandatory from or after TS 38.101-1 v17.2.0. (The 100MHz only includes introduced new 100MHz). **It means, the handling of the capability bit for 100MHz is the same between Rel-15/Rel-16 and Rel-17.**

**Q2-1: Do companies agree P1 within R2-2110974 as it is: support a consistent handling of the capability bit for 100MHz as Rel-15/Rel-16 for Rel-17?**

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| Company | Yes/No | Comments |
| Qualcomm Incorporated | ? | First of all, The current text below seems to indicate that the 100MHz bit (the fourth bit) does not have any meaning in case of the listed non-applicable bands.* The fourth leftmost bit (for 100MHz) is not applicable for bands n41, n48, n77, n78, n79 and n90 as defined in TS 38.101-1 [2]

So if for example 70MHz is made applicable to n41 in the future and the UE signals channelBWs-DL-v1590, the fourth bit can be of any value, but does not indicate anything.After that, we are not sure if we need to further deal with 100MHz specifically in more detail. We think the standard can simply say that the UE shall set a bit for mandatory channel BW to 1. As a general comment, we think RAN2 failed in handling of the channel BW capabilities by trying to specify too much for RAN4’s requirement, which however is moving target. |
| Ericsson | Yes | The Rel-17 specification should use the exact same field description as agreed for Rel-15/16. This means that if 100 MHz is introduced for any other (existing or new) band than n41, n48, n77, n78, n79 or n90, a UE supporting such band shall use the “100 MHz bit” to indicate explicitly whether it supports this channel bandwidth.This is aligned with how we always strive to maintain the consistency of UE capability parameters across releases (and the reason why we proposed the existing text on 100MHZ). In response to Qualcomm comment, we acknowledge that RAN4 requirements are a moving target. It was a mistake that RAN2 did not introduce a “100 MHz” bit in the bitmap already in Rel-15. Omitting capability signalling to enforce mandatoriness is never a good idea. Clearly the 100MHz bit will not be set by existing legacy UEs in the field, and hence cannot be used by a network to verify support for those bands where 100MHz was already mandated. By listing them specifically in 38.306 we get a crystal clear spec and never revisit. We avoided to instead refer to certain RAN4 spec version (since moving target…). And we avoided any inter-op problems with UEs setting or not setting the 100MHz bit in case UE would signal channelBWs-DL-v1590 for other reason. |
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## 3.3 Any others issues?

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# 4. Phase 2 discussion

Based on Ph1 discussion, could discuss if any CR is needed.

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# 5. Conclusion

 [To be updated]

6. References

[R2-2111059](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111059.zip) RAN2 signalling to support R17 UL Tx switching enhancements Huawei, HiSilicon, China Telecom, Apple discussion Rel-17 NR\_RF\_FR1\_enh

[R2-2111060](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111060.zip) RRC configuration to support R17 UL Tx switching enhancements Huawei, HiSilicon, China Telecom, Apple draftCR Rel-17 38.331 16.6.0 NR\_RF\_FR1\_enh

[R2-2111061](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2111061.zip) Running CR to TS38.331 to support Tx switching enhancements Huawei, HiSilicon, China Telecom, Apple, CATT draftCR Rel-17 38.331 16.6.0 NR\_RF\_FR1\_enh R2-2109225

[R2-2110424](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110424.zip) Running CR to TS 38.306 to support Tx switching enhancements China Telecom, Huawei, HiSilicon, Apple, CATT draftCR Rel-17 38.306 16.6.0 B NR\_RF\_FR1\_enh R2-2109226

[R2-2110974](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_116-e%5CDocs%5CR2-2110974.zip) Discussion on 100M bandwidth capability for Rel-17 Huawei, HiSilicon discussion Rel-17 NR\_bands\_R17\_BWs