**23GPP TSG-RAN WG2 Meeting #115 electronicR2-210XXXX**

**Online, 16th – 27th August 2021**

**Agenda item:** 8.22

**Source:** CMCC (Rapporteur)

**Title:** The report of [AT115-e][034][NR17] TX diversity (CMCC)

**Document for:** Discussion and Agreement

# 1 Introduction

The document summarizes the following offline discussion:

* [AT115-e][034][NR17] TX diversity (CMCC)

Scope: Treat papers under 8.22 on TX diversity, Determine agreeable points, agree CRs

Intended outcome: Report, Agreed CRs, LS out if found needed.

Deadline: Schedule 1

**1ST round:** collect comments and strive to determine the agreeable points. No discussion on the CRs. Deadline for 1st round comments is **Thursday Aug 19 1200 UTC.**

**Intermediate summary check:** collect comments on the intermediate summary. Deadline is **Friday Aug 20 900 UTC**

**2nd round:** Strive to agree the CRs in principle. Deadline for 2nd round is **Wednesday Aug 25 1200 UTC.**

# 2 Contact Information

To make it easier to find the correct contact delegate in each company for potential follow-up questions, the rapporteur encourages the delegates who provide input to provide their contact information in this table:

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| CMCC (Rapporteur) | zhangxiaoran@chinamobile.com |
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| Huawei, HiSilicon | Yiru Kuang (kuangyiru@huawei.com) |
| Samsung | Sangyeob Jung (sy0123.jung@samsung) |
| Qualcomm Incorporated | mkitazoe@qti.qualcomm.com |
| ZTE | li.wenting@zte.com.cn |
| OPPO | duzhongda@oppo.com |
| MediaTek | Felix Tsai (chun-fan.tsai@mediatek.com) |
| Nokia, Nokia Shanghai Bell | Tero Henttonen (tero.henttonen@nokia.com) |
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| vivo | Chenli (Chenli5g@vivo.com) |
| Ericsson | lian.araujo@ericsson.com |
| Apple | yuqin\_chen@apple.com |

# 3 Discussion

## 3.1 1st round

Two discussion papers [1] [2] related to this topic were submitted to this meeting. Both contributions propose to introduce a new per-band capability signalling for FR1 UEs supporting transparent TxD by allowing early implementation from Rel-15. The difference is which release should the capability signalling be introduced, Rel-16 or Rel-17?

Question 1: Do you agree to introduce a new per-band capability signalling for FR1 UEs supporting transparent TxD by allowing early implementation from Rel-15?

|  |  |  |
| --- | --- | --- |
| Company | Agree or disagree | Detailed Comments (e.g., why it is not agreeable) |
| Intel | Agree | This has been agreed by RAN2 pending feedback from RAN4 on whether all PCs are supported and RAN4 already agreed that it is for all PCs in FR1 in Rel-15 and Rel-16 in R4-2107740.  Also RAN2 had agreed to have release independent via early implementation from Rel-15 |
| Huawei, HiSilicon | Agree | This has been agreed by RAN2, and based on the conclusion of RAN plenary, the concluded agreements related to Tx Diversity (TxD) shall be followed. |
| Samsung | Agree | Same view with others |
| Qualcomm Incorporated | Disagree | In general, RAN2 should be well coordinated with RAN4.  We have not received a response from RAN4. More importantly, release-17 WI was approved in the last plenary meeting (RP-211597). So the latest status is that we are in the phase 1 of the WI, where RAN4 still need to work on the necessary specification “to enable UE to implement Transmit Diversity” (borrowing the phrase from the WID).  Adding UE capability at this stage seems to mean that we are having a UE capability for a feature that can be implemented differently by UEs. |
| ZTE | Agree | Share the view as Intel |
| OPPO | Agree | We also share the view as Intel. Maybe Qualcomm can explain what could be the potential difference in terms of UE capability since this is only one bit capability i.e. support or not support. |
| MediaTek | Agree | We understand the WID (RP-211597) clearly specify that this feature is intended to be early implemented from Rel-15. |
| Nokia, Nokia Shanghai Bell | Disagree | The work item states:  UE Requirements for the feature Transparent Tx Diversity (TxD):   * Phase 1:   + Complete needed specification changes to such items as spectral flatness, MPR, EVM, ACLR for all power classes to enable UE to implement Transmit Diversity (TxD) [RAN4]     - The concluded agreements related to Tx Diversity (TxD) shall be followed   + UE capability signalling of Transparent Tx Diversity (TxD) and allowing early implementation from Rel-15 [RAN2]   The introduction of the capability itself at the end of phase 1 (which happens when RAN4 has completed the above-mentioned requirements) is fine. Hence, we should wait for RAN4 to indicate that they have completed the requirements as the signalling can even be harmful without clear definition. |
| China Telecom | Agree | Same view with others |
| CATT | Agree | Same view with others |
| vivo | Agree | This has been agreed in RAN2 before. The only part is whether we need to wait for the reply from RAN4 on the applicable power class and capability dependence. Based on our understanding, RAN4 have agreed on this new capability is applicable for all power class in Rel-15 and Rel-16. |
| Ericsson | Agree | This was previously discussed in RAN2, so we are ok to follow the previous decision. |
| CMCC | Agree | The WI clearly states that introduce UE capability signalling of transparent TxD and allow early implementation from Rel-15.  In last RAN4 meeting, RAN4 already agreed that the capability is applicable for all PCs, but no formal LS was sent to RAN2.  The controversial part is whether to introduce the signalling now or RAN2 should wait for RAN4 LS.  Our view is that we can discuss the CRs and maybe agree CRs in principle, If there is any update from RAN4 formal LS, RAN2 can further refine the CRs. |
| Apple | No strong view | We see the point raised by QC and Nokia. CMCC’s suggestion looks nice to agree the CR in principle and refine it later when needed. |
|  |  |  |

Question 2: Which release should the transparent TxD capability signalling be introduced? Rel-16 or Rel-17?

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| --- | --- | --- |
| Company | Rel-16 or Rel-17 | Detailed Comments |
| Intel | Rel-16 | In our understanding although this is a Rel-17 WI, the capability signalling can be defined starting from Rel-16 and allow early implementation from Rel-15. |
| Huawei, HiSilicon | Rel-16 | Considering the UE capability signalling of transparent TxD has to be early implemented from Rel-15, it is beneficial to introduce the capability signalling from Rel-16 by early implementation from Rel-15, once RAN4 finishes the requirement definition, this feature can be truly implemented. |
| Samsung | Rel-16 |  |
| Qualcomm Incorporated | Rel-17 | We are fine to have Rel-17 CRs in “in-principle-agreed” state and put on-hold until RAN2 receives further notice from RAN4.  It is too risky to approve release-16 CRs now without knowing exactly what the feature is. |
| ZTE | Rel-16 | We share the view with Intel, Rel-16 is more complied with the RAN2/RAN’s decision. |
| OPPO | Rel-16 | Share Intel’s view also |
| MediaTek | Rel-16 (Prefer) or Rel-17 (acceptable) | It is our understanding that RAN2 almost agree the Rel-16 CR in previous meetings and the only uncertainty part is in early implementation. However, it looks confusing that RAN4 first asked RAN2 to have this capability in Rel-16 and then RP approved a Rel-17 WI for the same feature.  Anyway, this per-band capability is quite simple and we are fine to have this in Rel-16 or Rel-17. |
| Nokia, Nokia Shanghai Bell | Rel-17 | Agree with Qualcomm. The WI states that early implementability from Rel-15 is allowed, but doesn't mandate Rel-16 signalling. Normally Rel-17 WI only creates Rel-17 CRs. |
| China Telecom | Rel-16 |  |
| CATT | Rel-16 |  |
| vivo | Rel-16 and Rel-17 | Of course, we need introduce rel-17 capability for rel-17 WI.  The question is whether we introduce rel-16 capability for this feature. Considering to have chance for early implementation, we think the capability could be introduced from Rel-16, once RAN4 decided the open issue on applicable power class and capability dependence as indicated in the LS from RAN2. |
| Ericsson | Rel-17 | If the feature is going to be defined in Rel-17 we don’t think we can at this point introduce a Rel-16 capability since the details have to be discussed by RAN4. It can only be implemented anyway once the feature is completed, and once completed, if early implementable then a Rel-15 or Rel-16 UE could anyway support it. |
| CMCC | Rel-16 | During the RAN plenary discussion when this WI was created, it was the common understanding that RAN2 will continue to work on the capability signalling in Rel-16. The reason to create the WI is to facilitate the discussion in RAN4, but not to delay the capability signalling to Rel-17. And since Rel-17 ASN.1 will be frozen in June 2022, define the capability in Rel-17 may delay the implementation of this feature. |
| Apple | Rel-17 | Since this feature is a Rel-17 feature, it looks straightforward to make the UE capability also from Rel-17. As long as early implementation is allowed, we don’t see any problem with supporting it in Rel-16. |

## 3.2 Intermediate summary after 1st round

For Question 1, 11 companies agree with the proposal, while 2 companies have concern that RAN2 should wait for RAN4 complete the requirements.

So moderator recommends to agree on introducing a new per-band capability signalling for FR1 UEs supporting transparent TxD by allowing early implementation from Rel-15 when RAN4 has completed the Phase 1 requirements.

For Question 2, 10 companies support to introduce the capability signalling in Rel-16, while 4 companies support to introduce the capability signalling in Rel-17.

Since majority companies support to introduce the capability signalling in Rel-16, the main concern is that signalling should be introduced when the requirements have been completed. Moderator recommends to introduce the capability signalling in Rel-16 when RAN4 has completed the Phase 1 requirements.

Considering the current discussion, the following tentative agreement is recommended:

**Tentative Agreement:**

**Introduce a new per-band capability signalling for FR1 UEs supporting transparent TxD in Rel-16 by allowing early implementation from Rel-15 when RAN4 has completed the Phase 1 requirements.**

**CRs can be discussed and agreed in principle. Formal CRs can only be approved when RAN4 has completed the Phase 1 requirements.**

## 3.3 2nd round:

Collect comments on the CRs

[R2-2108537](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108537.zip) CR on 38.331 for introducing UE capability of txDiversity CMCC CR Rel-16 38.331 16.5.0 2778 - C TEI16, NR\_RF\_TxD-Core

[R2-2108538](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108538.zip) CR on 38.306 for introducing UE capability of txDiversity CMCC CR Rel-16 38.306 16.5.0 0627 - C TEI16, NR\_RF\_TxD-Core

Question 1: Do you agree with the contents of above two CRs? Detailed comments are welcome.

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| Company | Agree or disagree | Detailed Comments (e.g., why it is not agreeable) |
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## 3.4 Summary after 2nd round:

# 5 References

[1] [R2-2107417](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2107417.zip) Discussion on capability of supporting txDiversity vivo discussion Rel-17 NR\_RF\_TxD-Core

[2] [R2-2108588](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108588.zip) Discussion on transparent TxD capability signalling Huawei, HiSilicon, CMCC discussion Rel-17 NR\_RF\_TxD-Core

[3] [R2-2108537](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108537.zip) CR on 38.331 for introducing UE capability of txDiversity CMCC CR Rel-16 38.331 16.5.0 2778 - C TEI16, NR\_RF\_TxD-Core

[4] [R2-2108538](file:///D:\Documents\3GPP\tsg_ran\WG2\TSGR2_115-e\Docs\R2-2108538.zip) CR on 38.306 for introducing UE capability of txDiversity CMCC CR Rel-16 38.306 16.5.0 0627 - C TEI16, NR\_RF\_TxD-Core