**3GPP TSG RAN WG4 Meeting #109 R4-231xxxx**

**Chicago, USA, November 13th – 17th, 2023**

**Title:** LS on signalling for 2Tx-TxD and 4Tx-TxD

**Response to:**

**Release:** Rel-18

**Work Item:** NR\_ENDC\_RF\_FR1\_enh2-Core

**Source:** RAN4

**To:** RAN2

**Cc:**

**Contact person:** Yuanyuan Zhang, tina55 (dot) zhang (at) samsung (dot) com

**Send any reply LS to:** 3GPP Liaisons Coordinator, <mailto:3GPPLiaison@etsi.org>

**Attachments:** None

1 Overall description

In RAN4#108bis meeting, RAN4 sent a LS (R4-2317617) asking RAN2 to introduce a new per band per band combination (FS) capability for UE to indicate the support of TxDiversity (TxD) for 4Tx in the band configured. Meanwhile RAN4 sent a separate LS (R4-2317762) asking RAN2 to introduce a new FS UE capability to indicate the support of TxDiversity for 2Tx in the band configured.

After further discussion during RAN4#109, RAN4 would like to have following further clarification with RAN2.

1) New Rel-18 FS *[txDiversity2Tx-r18]* is applicable for both single band (non-CA) case and CA case.

2) New Rel-18 FS *[txDiversity4Tx-r18]* is applicable for both single band (non-CA) case and CA case.

3) In terms of the interaction between *[txDiversity2Tx-r18]* and *[txDiversity4Tx-r18]*, RAN4 concludes that the presence of *[txDiversity4Tx-r18]* does not require the support of *[txDiversity2Tx-r18]*.

4) RAN4 discuss the interaction between *txDiversity-r16* and *[txDiversity2Tx-r18]*, and the following understanding is reached for single band (Non-CA) case and RAN4 assume there is no NBC issue with the assumption that the advertised benefit for TxD reporting is to facilitate the conformance test.

- In case only *txDiversity-r16* is indicated for a single band, it means UE can support TxD capability for this single band;

- In case only *[txDiversity2Tx-r18]* is indicated for a single band, it means UE can support TxD capability for this single band;

- It is not necessary for UE to indicate both *txDiversity-r16* and *[txDiversity2Tx-r18]* for a single band, but if both are indicated, it means UE can support TxD capability for this single band

(below table is just here as a reference and would be removed in the final version)

|  |  |  |
| --- | --- | --- |
|  | **Rel-17 and backwards NW** | **Rel-18 and onwards NW** |
| **Rel-17 and backwards UE** | Legacy case (Network can only understand legacy *txDiversity-r16*) | Network can understand legacy *txDiversity-r16* |
| **Rel-18 and onwards UE** | In case only *txDiversity-r16* is indicated, it determines the TxD capability for the single band case;  In case only *[txDiversity2Tx-r18]* is indicated by UE, NW cannot understand it;  In case both *txDiversity-r16* and *[txDiversity2Tx-r18]* are indicated for single band case, NW can only understand *txDiversity-r16* and it determines the TxD capability for the single band | In case only *txDiversity-r16* is indicated, it determines the TxD capability for the single band case;  In case only *[txDiversity2Tx-r18]* is indicated by UE, it determines the TxD capability for the single band case;  In case both *txDiversity-r16* and *[txDiversity2Tx-r18]* are indicated for single band case, NW can understand both. |

And the following understanding for CA case is also reached for Rel-18 and onwards:

- In terms of 2Tx TxD capability, it is agreed that CA does not inherit the corresponding single band TxD capability, which means for example if *[txDiversity2Tx-r18]* is absent for band A within CA\_A-B, it means A within A-B does not support 2Tx TxD even TxD is supported for single band A.

A clarification for Rel-17 and backwards is that there is no requirements specified in RAN4 for inter-band ULCA+ TxD case which requires 3Tx Chain transmitting simultaneously.

5) RAN4 discuss the interaction between *txDiversity-r16* and *[txDiversity4Tx-r18]*, the logic is same as the interaction between *txDiversity-r16* and *[txDiversity4Tx-r18]*.

2 Actions

**To RAN2:**

**ACTION:** RAN4 respectfully ask RAN2 to take above clarification into account.

3 Dates of next TSG-RAN WG4 meetings

TSG-RAN WG4 Meeting #110 26Feb – 01 Mar, 2024 Athens, Greece

TSG-RAN WG4 Meeting #110bis 15– 19 Apr, 2024 China