**3GPP TSG-WG4 Meeting #113 *R4-2420351***

Orlando, USA, November 18 – 22, 2024

**Title:** WF on simultaneous Rx-Tx for CA\_n40A-n41A

**Agenda Item:** 6.1

**Source:** Huawei

**Document for:** Approval

# Background:

In Rel-18, the cross-band isolation defined for simultaneous Rx-Tx of CA\_n40A-n41A was based on 4Rx RF front-end architecture. The MSD defined for CA\_n40-n41 is large due to the close frequency separation between UL & DL and the marginal filter isolation. The current cross band isolation test point is not reflecting operator deployment scenario. It is asked to create an additional test point which provides MSD with respect to realistic deployment scenario.

There is implementation difficulty for handheld UE with 4 layers in band n41 supporting both simultaneous Rx-Tx in CA\_n40-n41 and 4x4 MIMO. In RAN4#112, the WF [1] was approved with candidate ways to handle the simultaneous Rx-Tx for CA\_n40A-n41A in Rel-19. One of the options listed in the WF is to analyse the UE architecture with n41 using 2Rx in simultaneous Rx-Tx, as illustrated in [2].

In RAN4#112bis, the WF[3] was approved that companies should provide further information on the need for new test point for CA\_n40A-n41A, taking into consideration the applicable bandwidth and frequency range of n40 and n41 from operator(s). For example, wider frequency separation between n40 and n41, and wider DL bandwidth.

During the discussion in RAN4#113, it is pointed out that for CA\_n40A-n41A, the different UL-DL configuration will be used for some vertical scenario in FWA device and simultaneous Rx-Tx is required for the combo. But for handheld UE, the same UL-DL configuration may be used for band n40 and n41, and simultaneous Rx-Tx would not be applied. And also considering the real spectrum from operators, the new test point should be specified in Rel-19 for FWA device. RAN4 discuss candidate options for test point of CA\_n40-n41, as follows

* + - Option 1:

**Table 1** Reference sensitivity exceptions (MSD) and uplink/downlink configurations due to cross band isolation from a PC3/PC2 aggressor NR UL band for CA\_n40-n41 proposed by CMCC

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | **Cross-band**  **Interference**  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2350 | 100 | 30 | 270 (RBstart=3) | 2565 | 100 | [TBD] | ACLR2 |
| n41 | n40 | 2565 | 100 | 30 | 270 (RBstart=0) | 2350 | 100 | [TBD] | ACLR2 |

* + - Option 2:

**Table 5** PC3 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Murata test point

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2345 | 50 | 30 | 128 (RBstart=5) | 2565 | 100 | 11.8 | >ACLR2 |
| n41 | n40 | 2565 | 100 | 30 | 270 (RBstart=0) | 2345 | 50 | 28.6 | ACLR2 |

**Table 6** PC2 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Murata test point

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2345 | 50 | 30 | 128 (RBstart=5) | 2565 | 100 | 14.4 | >ACLR2 |
| n41 | n40 | 2565 | 100 | 30 | 270 (RBstart=0) | 2345 | 50 | 31.6 | ACLR2 |

* + - Option 3: Based on minimum separation rule for aggressor and victim channel

**Table 5** PC3 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Apple

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2375 | 50 | 30 | 128 (RBstart=5) | 2546 | 100 | [TBD] | >ACLR2 |
| n41 | n40 | 2546 | 100 | 30 | 270 (RBstart=0) | 2375 | 50 | [TBD] | ACLR2 |

**Table 6** PC2 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Apple

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2375 | 50 | 30 | 128 (RBstart=5) | 2546 | 100 | [TBD] | >ACLR2 |
| n41 | n40 | 2546 | 100 | 30 | 270 (RBstart=0) | 2375 | 50 | [TBD] | ACLR2 |

# <Way forward>

* Introduce the new additional test point of CA\_n40A-n41A for FWA device with simultaneous Rx-Tx, assuming 4x4 MIMO is supported on band n41. Interested companies are invited to verify the following 2nd MSD test points of CA\_n40A-n41A
  + Do not mention MIMO layer in the requirement of specification.
  + The test point to be specified in Rel-19 refers to

**Table 1** PC3 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Murata test point

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2345 | 50 | 30 | 128 (RBstart=5) | 2565 | 100 | [11.8] | >ACLR2 |
| n41 | n40 | 2565 | 100 | 30 | 270 (RBstart=0) | 2345 | 50 | [28.6] | ACLR2 |

**Table 2** PC2 MSD for simultaneous Rx-Tx CA\_n40A-n41A proposed by Murata test point

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UL band** | **DL band** | **UL Fc** | **UL BW** | **SCS of UL band** | **UL RB Allocation** | **DL Fc** | **DL BW** | **MSD** | Cross-band  Interference  **source** |
| **(MHz)** | **(MHz)** | **(kHz)** | **LCRB** | **(MHz)** | **(MHz)** | **(dB)** |
| n40 | n41 | 2345 | 50 | 30 | 128 (RBstart=5) | 2565 | 100 | [14.4] | >ACLR2 |
| n41 | n40 | 2565 | 100 | 30 | 270 (RBstart=0) | 2345 | 50 | [31.6] | ACLR2 |

* + Release independent from Rel-18.

# Reference

[1] R4-2412606, WF on simultaneous Rx-Tx for CA\_n40-n41

[2] R4-2415359, Further discussion on simultaneous Rx-Tx of CA\_n40-n41, Murata

[3] R4-2417058, WF on simultaneous Rx-Tx for CA\_n40A-n41A