3GPP TSG-RAN WG4 Meeting # 102-e R4-2203829

**Electronic Meeting, February 21 – March 3, 2022**

Source: Verizon

Title: TP for TR 38.841: CA\_n2-n77

Agenda item: 9.30.2

Document for: Approval

1. Introduction

This is a text proposal to include MSD due to cross band isolation for the approved PC2 CA\_n2-n77 combo in [1].

# 2. Reference

1. 3GPP TR 38.841

3. Text Proposal

**<Start of Text Proposal>**

## 5.5 CA\_n2-n77

### 5.5.1 Configurations

**Table 5.5.1-1: NR CA configurations and bandwidth combinations sets for supporting power class 2**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration | NR Band | 5 MHz | 10  MHz | 15  MHz | 20  MHz | 25 MHz | 30 MHz | 40  MHz | 50  MHz | 60  MHz | 70  MHz | 80  MHz | 90 MHz | 100 MHz | Bandwidth combination set |
| CA\_n2A-n77A  CA\_n2A-n77(2A) | n778,9,  CA\_n2A-n77A | n2 | 5 | 10 | 15 | 20 | 25 | 30 | 40 |  |  |  |  |  |  | 0 |
| n77 |  | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
| NOTE 8: Power Class 2 is allowed for this uplink combination or single uplink carrier in this downlink/uplink combination  NOTE 9: Power Class 1.5 is allowed for this single uplink carrier in this downlink/uplink combination | | | | | | | | | | | | | | | | |



### 5.5.2 Maximum output power

Table 5.5.2-1 UE Power Class 2 for uplink inter-band CA (two bands)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Uplink CA configuration** | **Power class 2 cases for CA\_n2A-n77A** | **CA power class** | **Carrier n2 power class** | **Carrier n77 power class** |
| CA\_n2A-n77A | Case a | 26dBm | 23dBm | 23dBm |
| Case b | 26dBm | 23dBm | 26dBm |

The tolerance +2/-3 dB is applied. Also when the transmission bandwidths confined within FUL\_low and FUL\_low + 4 MHz or FUL\_high – 4 MHz and FUL\_high, the maximum output power requirement is relaxed by reducing the lower tolerance limit by 1.5 dB.

### 5.5.3 REFSENS requirements

According to the PC3 CA\_n2A-n77A study, the 2nd harmonic mixing products from band 2 may fall into band n77 UL frequency range. And, the 2nd, 4th and 5th order IMD products generated by dual uplink from both band 2 and band n77 may fall into band 2 Rx frequency range. Thus additional MSD should be considered to mitigate the impact of the interference for PC2 CA\_n2A-n77A combination.

#### 5.5.3.1 Power class 2 Case A

The MSD due to receiver harmonic mixing for PC2 Case A are same as PC3 CA\_n2A-n77A.

The additional MSD due to intermodulation for PC2 CA\_n2A-n77A are defined in table 5.5.3.1-1.

**Table 5.5.3.1-1: MSD test points for PCell due to dual uplink operation for PC2 NR CA in NR FR1 (two bands)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Band / Channel bandwidth / NRB / Duplex mode** | | | | | | | | |
| **NR CA** | **NR band** | **UL Fc** | **UL/DL BW** | **UL** | **DL Fc (MHz)** | **MSD for PC2** | **Duplex mode** | **Source of IMD** |
| **Configuration** | **(MHz)** | **(MHz)** | **CLRB** | **(dB)** |
| CA\_n2A-n77A | n2 | 1855 | 5 | 25 | 1935 | 32.10 | FDD | IMD2 |
| 34.755 |
| n77 | 3790 | 10 | 50 | 3790 | N/A | TDD | N/A |
| n2 | 1885 | 5 | 25 | 1965 | 19.10 | FDD | IMD44 |
| 21.855 |
| n77 | 3690 | 10 | 50 | 3690 | N/A | TDD | N/A |
| NOTE 4: This band is subject to IMD5 also which MSD is not specified.  NOTE 5: Applicable only if operation with 4 antenna ports is supported in the band with carrier aggregation configured. | | | | | | | | |

#### 5.5.3.2 Power class 2 Case B

The additional MSD due to receiver harmonic mixing for Case B are defined in table 5.5.3.2-1.

Table 5.5.3.2-1: Reference sensitivity exceptions (MSD) due to receiver harmonic mixing for NR CA in NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / Channel bandwidth of the affected DL band / MSD | | | | | | | | | | | | | |
| UL band | DL band | 5  MHz (dB) | 10  MHz (dB) | 15 MHz  (dB) | 20 MHz  (dB) | 25 MHz  (dB) | 40 MHz  (dB) | 50 MHz  (dB) | 60 MHz  (dB) | 70 MHz  (dB) | 80 MHz  (dB) | 90 MHz  (dB) | 100 MHz  (dB) |
| n77 | 2 | 9.1 | 8.0 | 7.0 | 6.7 |  |  |  |  |  |  |  |  |

Although no cross-band isolation MSD was identified for PC3 band n77 into n2, additional MSD due to cross band isolation from PC2 band n77 into mid-band shall be considered because of transmitter noise floor rising ~ 3dB. Referring the proposed MSD value for PC2 CA\_n25-n77, the MSD requirements are defined in Table 5.5.3.2-2 and Table 5.5.3.2-3 when band n77 transmitting with PC2.

Table 5.5.3.2-2: UE PC2 MSD due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz (dB) | 10 MHz (dB) | 15 MHz (dB) | 20 MHz (dB) | 25 MHz (dB) | 30 MHz (dB) | 40 MHz (dB) | 50 MHz (dB) | 60 MHz (dB) | 70  MHz  (dB) | 80 MHz (dB) | 90 MHz (dB) | 100 MHz (dB) |
| n77 | n2 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |  |  |  |  |  |  |

Table 5.5.3.2-3: Uplink configuration for reference sensitivity exceptions due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | |
| UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n77 | n2 | 15 | 25 | 50 | 75 | 100 | 128 | 160 | 216 |  |  |  |  |  |  |
| NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies. | | | | | | | | | | | | | | | |

The additional MSD due to intermodulation for PC2 Case B CA\_n2A-n77A are same as the Case A defined in table 5.5.3.1-1.

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#### 5.5.3.3 Single uplink power Class 1.5

Additional MSD due to cross band isolation from PC1.5 band n77 into mid-band shall be considered because of transmitter noise floor rising ~6dB. Referring the proposed MSD value for CA\_n25-n77, the MSD requirements are defined in Table 5.5.3.3-1 and Table 5.5.3.3-2 when band n77 transmitting with PC1.5.

**Table 5.5.3.3-1: Reference sensitivity exceptions (MSD) due to cross band isolation for PC2 n77 single band uplink into n66**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR Band / Channel bandwidth of the affected DL band** | | | | | | | | | | | | | | |
| **UL band** | **DL band** | **5 MHz (dB)** | **10 MHz (dB)** | **15 MHz (dB)** | **20 MHz (dB)** | **25 MHz (dB)** | **30 MHz (dB)** | **40 MHz (dB)** | **50 MHz (dB)** | **60 MHz (dB)** | **70**  **MHz**  **(dB)** | **80 MHz (dB)** | **90 MHz (dB)** | **100 MHz (dB)** |
| n77 | n25 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 |  |  |  |  |  |  |

Table 5.5.3.3-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR Band / SCS / Channel bandwidth of the affected DL band | | | | | | | | | | | | | | | |
| UL band | DL band | SCS of UL band (kHz) | 5 MHz | 10 MHz | 15 MHz | 20 MHz | 25 MHz | 30 MHz | 40 MHz | 50 MHz | 60 MHz | 70  MHz | 80 MHz | 90 MHz | 100 MHz |
| n77 | n2 | 15 | 25 | 50 | 75 | 100 | 128 | 160 | 216 |  |  |  |  |  |  |
| NOTE 1: The UL configuration applies regardless of the channel bandwidth of the UL band unless the UL resource blocks exceed that specified in Table 7.3.2-3 for the uplink bandwidth in which case the allocation according to Table 7.3.2-3 applies. | | | | | | | | | | | | | | | |

### 5.5.4 ∆TIB and ∆RIB values

For the ∆TIB,c and ∆RIB,c values, same PC3 CA\_n2A-n77A requirements are applied for PC2 CA\_n2A-n77A.

**<End of Text Proposal>**