**3GPP TSG-RAN WG4 Meeting # 116-bis R4-2514228**

**Prague Meeting, Oct. 13th – Oct. 17th, 2025**

**Title: TP to TR 38.719-03-01 CA\_n28-n75-n78**

**Source: Nokia, BT PLC**

**Agenda item: 5.3.4**

**Document for: Approval**

# 1 Introduction

This is a TP to TR 38.719-03-01 to add CA\_n28-n75-n78 including the CA\_n78(2A) extension in UL and DL. The fallback combination CA\_n75A-n78(2A) BCS 4 and 5 has been submitted in the same meeting as R4-2514222.

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## 5.x CA\_n28-n75-n78

### 5.x.1 Common for 1 band UL and 2 bands UL CA

#### 5.x.1.1 Operating bands for CA

Table 5.x.1.1-1: CA band combination constituent bands definition

|  |  |  |  |
| --- | --- | --- | --- |
| NR Band | Uplink (UL) band | Downlink (DL) band | Duplex Mode |
| BS receive / UE transmit | BS transmit / UE receive |
| FUL\_low – FUL\_high | FDL\_low – FDL\_high |
| n28 | 703 MHz - 748 MHz | 758 MHz - 803 MHz | FDD |
| n75 | - | 1432 MHz - 1517 MHz | SDL |
| n78 | 3300 MHz - 3800 MHz | 3300 MHz - 3800 MHz | TDD |

#### 5.x.1.2 Channel bandwidths per operating band for CA

Table 5.x.1.2-1: Supported bandwidths per CA band combination

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CA operating/channel bandwidth (MHz) | | | | |
| NR CA configuration | Uplink CA configuration or single uplink carrier | NR Band | Channel bandwidth (MHz) | Bandwidth combination set |
| CA\_n28A-n75A-n78A | CA\_n28A-n78A | n28 | n28 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n75 | n75 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n78 | n78 channel bandwidths in Table 5.3.5-1 |  |
| CA\_n28A-n75A-n78(2A) | CA\_n78(2A) CA\_n28A-n78A | n28 | n28 channel bandwidths in Table 5.3.5-1 | 4 and 5 |
|  |  | n75 | n75 channel bandwidths in Table 5.3.5-1 |  |
|  |  | n78 | CA\_n78(2A) BCS 4 and 5 |  |

#### 5.x.1.3 ∆TIB,c and ∆RIB,c values

For CA\_n28-n75-n78, the ΔTIB,c and ΔRIB,c values are already defined in current specification.

### 5.x.2 Specific for 2 bands UL CA

#### 5.x.2.1 UE co-existence studies

##### 5.x.2.1.1 Co-existence studies for 2UL band with 1CC per band

Table 5.x.2.1.1-1 provides the two UL bands with one CC per band IMD interference analysis for CA\_n28A-n75A-n78A with UL CA\_n28A-n78A.

**Table 5.x.2.1.1-1: Two UL bands IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2552 - 3097 | | 4003 - 4548 | |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 1804 - 2394 | | 5852 - 6897 | |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4706 - 5296 | | 7303 - 8348 | |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1056 - 1691 | | 9152 - 10697 | |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| |  | |
| IMD frequency limits (MHz) | 5104 - 6194 | |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5409 - 6044 | | 10603 - 12148 | |
| Two-tone 4th order IMD products | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |  | |
| IMD frequency limits (MHz) | 8006 - 9096 | |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 12452 - 14497 | | 308 - 988 | |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 8404 - 9994 | | 4356 - 5491 | |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 13903 - 15948 | | 6112 - 6792 | |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11306 - 12896 | | 8709 - 9844 | |
| NOTE : For each IMD item, when two bound values before taking absolute have different signs, the relevant IMD range shall be set such that (1) the lower bound is 0 and (2) the upper bound is the bigger value of the two after taking absolute. The lowest even order and lowest odd order IMD MSDs shall be considered. | | | | |

The analysis shows there is an IMD4 issue that affects n75 DL.

#### 5.x.2.2 REFSENS requirements

The MSD value for the IMD4 issue of n75 DL is found in the table below.

**Table 5.x.2.2-1: 3DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Band / Channel bandwidth / NRB / Duplex mode | | | | | | | | Source of IMD |
| NR CA band combination | NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | Duplex mode |  |
| CA\_n28-n75-n78 | n28 | 725 | 5 | 25 | 780 | N/A | FDD | N/A |
|  | n75 | N/A | 5 | N/A | 1476 | 9.0 | SDL | IMD4 |
|  | n78 | 3651 | 10 | 50 | 3651 | N/A | TDD | N/A |

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