**3GPP TSG-RAN WG4 Meeting # 116-bis Rev R4-2514234**

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

**Title: TP to TR 38.719-03-01 CA\_n7-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\_n7A-n75A-n78(2A). 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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## 5.7 CA\_n7-n75-n78

### 5.7.1 Common for 1 band UL and 2 bands UL CA

#### 5.7.1.1 Operating bands for CA

Table 5.7.1.1-1: 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** |
| n7 | 2500 MHz – 2570 MHz | 2620 MHz – 2690 MHz | FDD |
| n75 | N/A | 1432 MHz – 1517 MHz | SDL19 |
| n78 | 3300 MHz – 3800 MHz | 3300 MHz – 3800 MHz | TDD |

#### 5.7.1.2 Channel bandwidths per operating band for CA

Table 5.7.1.2-1: 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\_n7A-n75A-n78A | CA\_n7A-n78A | n7 | n7 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\_n7A-n75A-n78(2A) | CA\_n78(2A) CA\_n7A-n78A | n7 | n7 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)\_BCS4 and 5 |  |

*Editor's note: The valid UL configurations shall refer to the Annex B.*

#### 5.7.1.3 ∆TIB,c and ∆RIB,c values

*Editor’s note: For the table of ∆TIB,c and ∆RIB,c values, please use the same table format as in the latest TS 38.101-1.*

For CA\_n7-n75-n78, the ΔTIB,c and ΔRIB,c values have already been specified in TS 38.101-1.

### 5.7.2 Specific for 2 bands UL CA

#### 5.7.2.1 UE co-existence studies

*Editor’s Note: The tables in this section are provided to identify potential issues to be analyzed based on interference frequency range calculations, whether to specify the MSD related to collisions with the victim receiver frequency range should be based on the detailed REFSENS analysis.*

##### 5.7.2.1.1 Co-existence studies for 2UL band with 1CC per band

*Editor’s Note: Since the IMD tables have already been calculated for the different two band fallbacks, the tables below may skip the IMD calculations and refer to the relevant two band TP tables. Nonetheless, the IMD issues should be stated, and the related TPs referenced. Only one example table is provided in this template but there may be up to three cases for the victim DL band and as many tables may be needed.*

Table 5.7.2.1.1-1 provides the two UL bands with one CC per band IMD interference analysis for CA\_n7A-n75A-n78A with UL CA\_n7A-n78A.

Table 5.7.2.1.1-1: 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) | 730–1300 | | 5800–6370 | |
| 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) | 1200–1840 | | 4030–5100 | |
| 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) | 8300–8940 | | 9100–10170 | |
| 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) | 3700–4410 | | 7330–8900 | |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| |  | |
| IMD frequency limits (MHz) | 1460–2600 | |
| 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) | 10800–11510 | | 12400–13970 | |
| Two-tone 4th order IMD products | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |  | |
| IMD frequency limits (MHz) | 11600–12740 | |
| 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) | 10630–12700 | | 6200–6980 | |
| 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) | 4760–6400 | | 100–1110 | |
| 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) | 15700–17770 | | 13300–14080 | |
| 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) | 14900–16540 | | 14100–15310 | |
| 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. | | | | |

Based on the above table, 3rd and 4th order IMD generated by UL CA\_n7A-n78A may fall into own Rx of Band n75

#### 5.7.2.2 REFSENS requirements

Based on the co-existence studies there is no need to define MSD values.

We analyze the amount of IMD using the following component linearity assumptions:

Table 5.7.2.2-1 General linearity parameters

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **IP2 (dBm)** | **IP3 (dBm)** | **IP4 (dBm)** | **IP5 (dBm)** |
| Antenna switch | 112 | 68 | 56 | 53 |
| Diplexer | 115 | 86 | 55 | 53 |
| Triplexer | 113 | 82 | 55 | 53 |
| PA forward mixing | 28 | 32 | 30 | 28 |
| PA reverse mixing | 40 | 30 | 30 | 30 |
| LNA | 5 | -6 | -6 | -10 |

Table 5.7.2.2-2 Attenuation and isolation

|  |  |
| --- | --- |
| **Parameters** | **Values (dB)** |
| Antenna isolation | 10 |
| PCB isolation PA-PA | 60 |
| Diplexer isolation | 15 |
| Triplexer isolation | 15 |
| Tx duplexer rejection at Rx Band | 50 |

Based on these parameters we get the following MSD.

Table 5.7.2.2-3: MSD for the CA configuration

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Band / Channel bandwidth / NRB / Duplex mode | | | | | | | | Source of IMD |
| NR CA band combination | NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  CLRB | DL Fc (MHz) | MSD  (dB) | Duplex mode |  |
| CA\_n7-n75-n78 | n7 | 2510 | 5 | 25 | 2630 | N/A | FDD | N/A |
|  | n75 | N/A | 5 | N/A | 1470 | 16 | SDL | IMD3 |
|  | n78 | 3550 | 10 | 50 | 3550 | N/A | TDD | N/A |
|  | n7 | 2560 | 5 | 25 | 2680 | N/A | FDD | N/A |
|  | n75 | N/A | 5 | N/A | 1500 | 10.5 | SDL | IMD4 |
|  | n78 | 3310 | 10 | 50 | 3310 | N/A | TDD | N/A |

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