**3GPP TSG-RAN WG4 Meeting # 112 R4-2411937**

**Maastricht, Netherlands, Aug.19th – 23th, 2024**

Source: ZTE Corporation, Skyworks Solutions, Inc.

Title: TP for TR38.719-03-01\_CA\_n28A-n41A/C-n79A/C

Agenda Item: 7.3.4

Document for: Approval

# **Introduction**

CA\_n28A-n41A/C-n79A/C was requested and included in the new R19 basket WID[1], Hence, we provide a TP to TR38.719-02-01 to introduce CA\_n28A-n41A/C-n79A/C. Noted that the fallbacks of CA\_n28-n41, CA\_n28-n79 and CA\_n41-n79 have already completed.

# **Reference**

[1] RP-241674, New WID: Rel-19 NR Carrier Aggregation (CA)/Dual Connectivity (DC) for x bands DL with y bands UL (x<7, y<3) and Supplementary Uplink (SUL) band combinations/CA band combinations with a single SUL or two SUL cells, Ericsson, ZTE, Huawei

[2] TR38.719-03-01,Rel-19 NR Inter-band Carrier Aggregation/Dual Connectivity for 3 bands DL with x bands UL (x=1,2)

# Text Proposal

**----- Start of TP -----**

## 5.x CA\_n28-n41-n79

### 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 | 703 MHz – 748MHz | FDD |
| n41 | 2496 MHz – 2690 MHz | 2496 MHz – 2690 MHz | TDD |
| n79 | 4400 MHz – 5000 MHz | 4400 MHz – 5000 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

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NR CA configuration | Uplink CA configuration  or single uplink carrier6 | | NR Band | | Channel bandwidth (MHz) (NOTE 3) | | Bandwidth combination set | |
| CA\_n28A-n41A-n79C | | CA\_n79C  CA\_n28A-n41A  CA\_n28A-n79A  CA\_n28A-n79C  CA\_n41A-n79A  CA\_n41A-n79C | | n28 | | n28 channel bandwidths in Table 5.3.5-1 | | 4 and 5 | |
|  | |  | | n41 | | n41 channel bandwidths in Table 5.3.5-1 | |  | |
|  | |  | | n79 | | CA\_n79C\_BCS 4 and 5 | |  | |
| CA\_n28A-n41C-n79A | | CA\_n41C  CA\_n28A-n41A  CA\_n28A-n79A  CA\_n41A-n79A | | n28 | | n28 channel bandwidths in Table 5.3.5-1 | | 4 and 5 | |
|  | |  | | n41 | | CA\_n41C\_BCS 4 and 5 | |  | |
|  | |  | | n79 | | n41 channel bandwidths in Table 5.3.5-1 | |  | |
| CA\_n28A-n41C-n79C | | CA\_n41C  CA\_n79C  CA\_n28A-n41A  CA\_n28A-n79A  CA\_n28A-n79C  CA\_n41A-n79A | | n28 | | n28 channel bandwidths in Table 5.3.5-1 | | 4 and 5 | |
|  | |  | | n41 | | CA\_n41C\_BCS 4 and 5 | |  | |
|  | |  | | n79 | | CA\_n79C\_BCS 4 and 5 | |  | |

#### 5.x.1.3 ∆TIB,c and ∆RIB,c values

∆TIB,c and ∆RIB,c values have already been defined in the current spec.

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

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

The co-existence studies of fallback configurations of 2UL band with one CC per band can be applied.

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

For CA\_n28A-n41A/C-n79A/C, the two UL bands with one CC per band IMD interference analysis have already been analysed in the fallback.

##### 5.x.2.1.2 Co-existence studies for 2UL band with 3CC (2CC intra-band in one band)

Table 5.x.2.1.2-1 provides the two UL band with one band, along with 2CC intra-band uplink CA triple beat products into band n41 interference analysis for CA\_n28A-n79C with n79C transmitting with a 200MHz maximum instantaneous bandwidth.

Table 5.x.2.1.2-1: Two UL band with intra-band ULCA Triple beat analysis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Band / CA1** | **n28** | | **CA\_n79C** | |
| **Frequency limit (all MHz)** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| **fUL** | 703 -- 748 | | 4400 -- 5000 | |
| **fDL** | 758 -- 803 | | N/A | N/A |
| **2CCBW2** | N/A | N/A | Minimum | Maximum |
| 0 -- 200 | |
| **IMD3 products** | fxUL\_low-max2CCBW | fxUL\_low | fxUL\_high | fxUL\_high+ max2CCBW |
| **IMD3 (MHz)** | 503 -- 703 | | 748 -- 948 | |
| **Analysis** | There are no triple beat products caused by UL CA\_n28A-n79C falls into band n41. | | | |
| Note 1: If the two bands are not part of the same or adjacent band groups as defined in table A.1, the analysis can be ignored.  Note 2: For contiguous intra-band ULCA, the minimum and maximum separation BW are 0MHz and Min(fy\_high-fy\_low, maximum aggregated BW) respectively. | | | | |

Table 5.x.2.1.2-2 provides the two UL band with one band, along with 2CC intra-band uplink CA triple beat products into band n28 interference analysis for CA\_n41A-n79C with n79C transmitting with a 200MHz maximum instantaneous bandwidth.

Table 5.x.2.1.2-2: Two UL band with intra-band ULCA Triple beat analysis.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Band / CA1** | **n41** | | **CA\_n79C** | |
| **Frequency limit (all MHz)** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| **fUL** | 2496 -- 2690 | | 4400 -- 5000 | |
| **fDL** | 2496 -- 2690 | | N/A | N/A |
| **2CCBW2** | N/A | N/A | Minimum | Maximum |
| 0 -- 200 | |
| **IMD3 products** | fxUL\_low-max2CCBW | fxUL\_low | fxUL\_high | fxUL\_high+ max2CCBW |
| **IMD3 (MHz)** | 2296 -- 2496 | | 2690 -- 2890 | |
| **Analysis** | There are no triple beat products caused by UL CA\_n41A-n79C falls into band n28. | | | |
| Note 1: If the two bands are not part of the same or adjacent band groups as defined in table A.1, the analysis can be ignored.  Note 2: For contiguous intra-band ULCA, the minimum and maximum separation BW are 0MHz and Min(fy\_high-fy\_low, maximum aggregated BW) respectively. | | | | |

#### 5.x.2.2 REFSENS requirements

There is no need to define additional REFSEN requirements (i.e. MSD) for CA\_n28A-n41A/C-n79C due to there are no additional triple beat co-existence issue.

**----- End of TP -----**