3GPP TSG-RAN WG4 Meeting # 101-bis-e R4-2202281

Electronic Meeting, January 17-25, 2022

**Source:** Charter Communications

**Title:** TP to TR 38.717.02-01 for CA\_n46-n96

**Agenda item:** 5.8.1

**Document for:** Approval

# Background

This contribution provides text proposal on the NR CA band combination CA\_n46-n96 as defined in revised WID on Rel-17 NR Inter-band Carrier Aggregation/Dual Connectivity for 2 bands DL with x bands UL (x=1,2) UL RP-212877[1].

# Text Proposal

##### ---Start of changes---

## 6.X CA\_n46-n96

### 6.X.1 Common for 1 band UL and 2 bands UL CA

#### 6.X.1.1 Operating bands for CA

Table 6.X.1.1-1: CA band combination of band n48+ n96

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band Combination** | **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** | | |
| CA\_ n46-n96X,Y,Z,ZZ | n46 | 5150 MHz | – | 5925 MHz | 5150 MHz | – | 5925 MHz | TDD |
| n96 | 5925 MHz | – | 7125 MHz | 5925 MHz | – | 7125 MHz | TDD |
| NOTE X:   Simultaneous Rx/Tx capability does not apply for UEs supporting CA\_n46-n96. Same restrictions are applied to related higher order configurations  NOTE Y: The minimum requirements for intra-band non-contiguous CA/DC apply for CA\_n46-n96 and related higher order CA/DC configurations.  NOTE Z: The combination is not used alone as fall back mode of other band combinations in which UL in Band 48 is not used.  NOTE ZZ: The minimum requirements for inter-band CA apply when the maximum power spectral density imbalance between downlink carriers is within 6 dB. The power spectral density imbalance condition also applies for these carriers when applicable CA configuration is a subset of a higher order CA configuration. | | | | | | | | |

#### 6.X.1.2 Channel bandwidths per operating band for CA

Table 6.X.1.2-1: Supported bandwidths per CA band combination of band n46 + n96

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA configuration** | **Uplink CA  configuration** | **NR Band** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **Bandwidth combination set** |
| CA\_n46A-n96A | - | n46 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  | 0 |
| n96 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| CA\_n46B-n96A | - | n46 | See CA\_n46B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| CA\_n46C-n96A | - | n46 | See CA\_n46C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| CA\_n46D-n96A | - | n46 | See CA\_n46D Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| CA\_n46N-n96A | - | n46 | See CA\_n46N Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  |
| CA\_n46A-n96B | - | n46 |  | 10 |  | 20 |  |  | 40 |  | 60 |  | 80 |  |  | 0 |
| n96 | See CA\_n96B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| CA\_n46B-n96B | - | n46 | See CA\_n46B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 | See CA\_n96B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| CA\_n46C-n96B | - | n46 | See CA\_n46C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 | See CA\_n96B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| CA\_n46D-n96B | - | n46 | See CA\_n46D Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 | See CA\_n96B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |
| CA\_n46N-n96B | - | n46 | See CA\_n46N Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | 0 |
| n96 | See CA\_n96B Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | |

Note: CA\_n46-n96 with UL is not specified and it is only used on higher order BC’s. Only 1UL in n46 or n96 will be allowed in higher order combos

#### 6.X.1.3 UE Co-existence studies

Table 6.X.1.3-1/2 summarizes frequency ranges where harmonics and/or harmonics mixing occur for CA\_n46-n96.

**Table 6.X.1.3-1: Impact of UL/DL Harmonic**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th Harmonic** | | **6th Harmonic** | | **7th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge | UL Low Band Edge | UL High Band Edge |
| n46 | 5150 | 5925 | 5150 | 5925 | 10300 | 11850 | 15450 | 17775 | 20600 | 23700 | 25750 | 29625 | 30900 | 35550 | 36050 | 41475 |
| n96 | 5925 | 7125 | 5925 | 7125 | 11850 | 14250 | 17775 | 21375 | 23700 | 28500 | 29625 | 35625 | 35550 | 42750 | 41475 | 49875 |

Based on above table, there is no harmonic interference.

**Table 5.X.1.3-2: Impact of UL/DL Harmonic mixing**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th Harmonic** | | **5th harmonic** | | **6th Harmonic** | | **7th Harmonic** | |
| **Band** | **UL Low Band Edge** | UL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge | DL Low Band Edge | DL High Band Edge |
| n46 | 5150 | 5925 | 5150 | 5925 | 10300 | 11850 | 15450 | 17775 | 20600 | 23700 | 25750 | 29625 | 30900 | 35550 | 36050 | 41475 |
| n96 | 5925 | 7125 | 5925 | 7125 | 11850 | 14250 | 17775 | 21375 | 23700 | 28500 | 29625 | 35625 | 35550 | 42750 | 41475 | 49875 |

Based on above table, there is no harmonic issue for CA\_n46-n96.

#### 6.X.1.4 ∆TIB and ∆RIB values

For CA\_n48-n96, the ΔTIB,c and ΔRIB are given in the tables below.

Table 6.X.1.4-1: ΔTIB,c

| Inter-band CA Configuration | NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| CA\_n46-n96 | n46 | 0 |
| n96 | 0.5 |

Table 5.X.1.4-2: ΔRIB

| Inter-band CA Configuration | NR Band | ΔRIB [dB] |
| --- | --- | --- |
| CA\_ n46-n96 | n46 | 0 |
| n96 | 0 |

#### 6.X.1.5 REFSENs requirements

There are no harmonic or IMD overlaps as a result of non-simultaneous Tx/Rx.

Note: if support for simultaneous Tx/Rx for combinations with n96 are needed then these combinations will be subject to MSD or exclusion in the region where MSD would occur

#### 6.X.1.6 OOB blocking exception requirements

There is no OOB blocking exception requirement for CA\_n48-n96.











##### ---End of changes---

# Reference

[1] RP-212877, “Revised WID on Rel-17 NR Inter-band Carrier Aggregation/Dual Connectivity for 2 bands DL with x bands UL (x=1,2)”, ZTE Corporation