**3GPP TSG-RAN WG4 Meeting #97-e R4-2016652**

**Electronic Meeting, 02 November – 13 November 2020**

Source: Ericsson, T-Mobile US

Title: TP for TR 38.717-03-01 to include CA\_n41-n66-n77

Agenda Item: 10.9.2

Document for: Approval

# **Introduction**

This contribution provides a text proposal to introduce CA\_n41A-n66A-n77A, CA\_n41(2A)-n66A-n77A, CA\_n41C-n66A-n77A in 38.717-03-01.

# **Reference**

1. TR 38.717-03-01, Rel-17 NR inter-band Carrier Aggregation for 3 bands DL with 1 band UL,v0.1.0

# Text Proposal

# ---Start of changes---

6.X CA\_n41-n66-n77

6.X.1 Operating bands for CA

**Table 6.X.1-1: 3DL Inter-band CA operating bands**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Band** | **NR Band** | **Uplink (UL) operating band** | | | **Downlink (DL) operating band** | | | **Duplex Mode** |
| **BS receive / UE transmit** | | | **BS transmit / UE receive** | | |
| **FUL\_low – FUL\_high** | | | **FDL\_low – FDL\_high** | | |
| CA\_n41-n66-n77 | n41 | 2496 MHz | – | 2690 MHz | 2496 MHz | – | 2690 MHz | TDD |
| n66 | 1710 MHz | – | 1780 MHz | 2110 MHz | – | 2200 MHz | FDD |
| n77 | 3300 MHz | – | 4200 MHz | 3300 MHz | – | 4200 MHz | TDD |

6.X.2 Channel bandwidths per operating band for CA

**Table 6.X.2-1: Supported channel bandwidths per CA configuration for 3DL inter-band CA**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NR CA Configuration** | **UL Config** | **NR Band** | **SCS [kHz]** | **5** | **10** | **15** | **20** | **25** | **30** | **40** | **50** | **60** | **70** | **80** | **90** | **100** | **BCS** |
| CA\_n41A-n66A-n77A | - | n41 | 15 |  | Yes | Yes | Yes |  | Yes | Yes | Yes |  |  |  |  |  | 0 |
| 30 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes |  | Yes | Yes | Yes | Yes |  | Yes | Yes | Yes |
| n66 | 15 | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41(2A)-n66A-n77A | - | n41 | See CA\_n41(2A) Bandwidth Combination Set 1 in Table 5.5A.2-1 | | | | | | | | | | | | | | 0 |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| CA\_n41C-n66A-n77A | - | n41 | See CA\_n41C Bandwidth Combination Set 0 in Table 5.5A.1-1 | | | | | | | | | | | | | | 0 |
| n66 | 15 | Yes | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes |  |  |  |  |  |  |  |  |  |
| 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n77 | 15 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes |  |  |  |  |  |
| 30 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| 60 |  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

6.X.3 Co-existence studies

For 3DL/1UL NR CA, only single uplink operation needs to be considered. For single uplink operation of this combination, only harmonic issue and harmonic mixing issue need to be considered.

Table 6.x.3-1 summarizes frequency ranges where harmonics occur due to 3DL bands CA with 1 UL. It can be seen that there are 2nd harmonic issues from n66 UL into n77 DL which need to be addressed in lower order combination.

**Table 6.x.3-1: Harmonic Interference for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th 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** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 3420 | 3560 | 5130 | 5340 | 6840 | 7120 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

Table 6.x.3-2 gives harmonic mixing issue for the 3DL bands CA with 1 UL. No issues can be seen.

**Table 6.x.3-2 Harmonic mixing for 3DLs/1UL**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  | **2nd Harmonic** | | **3rd Harmonic** | | **4th 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** |
| n41 | 2496 | 2690 | 2496 | 2690 | 4992 | 5380 | 7488 | 8070 | 9984 | 10760 |
| n66 | 1710 | 1780 | 2110 | 2200 | 4220 | 4400 | 6330 | 6600 | 8440 | 8800 |
| n77 | 3300 | 4200 | 3300 | 4200 | 6600 | 8400 | 9900 | 12600 | 13200 | 16800 |

6.X.4 ∆TIB and ∆RIB values

For three simultaneous DLs and one UL of Band n41, n66 and n77, the ΔTIB,c and ΔRIB,c  values are shown in table 5.1.x.4-1 and table 5.1.x.4-2, respectively. Values are derived from DC\_66\_n7-n78.

**Table 6.x.4-1: ΔTIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 0.5 |
| n66 | 0.6 |
| n77 | 0.8 |

**Table 6.x.4-2: ΔRIB,c for 3DL aggregation**

| **Inter-band CA Configuration** | **NR Band** | **ΔRIB,c [dB]** |
| --- | --- | --- |
| CA\_n41-n66-n77 | n41 | 0.2 |
| n66 | 0.2 |
| n77 | 0.5 |

6.X.5 MSD

The 2nd harmonic issues from n66 DL into n77 UL will be addressed in lower order combination.

---End of changes---