**3GPP TSG-RAN WG4 Meeting #104-e R4-2213091**

**Electronic Meeting, 15 August – 26 August 2022**

**Source:** Ericsson, Verizon

**Title:** TP for TR 36.718-02-01: CA\_48-66

**Agenda item:**  12.1.3.2

**Document for:** Approval

1. Introduction

This contribution is a text proposal for TR 36.718-02-01 to add dual UL for existing CA\_48-66 combinations according to the request in [1].

# 2. Reference

1. RP-221831, New WID: Rel-18 LTE Advanced Carrier Aggregation for x bands (x<= 6) DL with y bands (y=1, 2) UL, Huawei, HiSilicon

3. Text Proposal

---Start of changes---

5.3.x CA\_48-66

5.3.x.1 Channel bandwidths per operating band for CA

**Table 5.2.1-1: E-UTRA CA configurations and bandwidth combination sets**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA CA configuration / Bandwidth combination set** | | | | | | | | | | |
| **E-UTRA CA Configuration** | **Uplink CA configurations** | **E-UTRA Bands** | **1.4 MHz** | **3 MHz** | **5 MHz** | **10 MHz** | **15 MHz** | **20 MHz** | **Maximum aggregated bandwidth**  **[MHz]** | **Bandwidth combination set** |
| CA\_48A-66A | CA\_48A-66A | 48 |  |  | Yes | Yes | Yes | Yes | 40 | 0 |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_48A-48A-66A | CA\_48A-66A | 48 | See CA\_48A-48A Bandwidth combination set 0 in the Table 5.6A.1-3 | | | | | | 60 | 0 |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_48C-66A | CA\_48A-66A | 48 | See CA\_48C Bandwidth combination set 0 in the Table 5.6A.1-1 | | | | | | 60 | 0 |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_48D-66A | CA\_48A-66A | 48 | See CA\_48D Bandwidth combination set 0 in the Table 5.6A.1-1 | | | | | | 80 | 0 |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_48A-66A-66A | CA\_48A-66A | 48 |  |  | Yes | Yes | Yes | Yes | 60 | 0 |
| 66 | See CA\_66A-66A Bandwidth Combination Set 0 in Table 5.6A.1-3 | | | | | |
| CA\_48C-66A-66A | CA\_48A-66A | 48 | See CA\_48C Bandwidth combination set 0 in the Table 5.6A.1-1 | | | | | | 80 | 0 |
| 66 | See CA\_66A-66A Bandwidth Combination Set 0 in Table 5.6A.1-3 | | | | | |
| CA\_48D-66A-66A | CA\_48A-66A | 48 | See CA\_48D Bandwidth combination set 0 in the Table 5.6A.1-1 | | | | | | 100 | 0 |
| 66 | See CA\_66A-66A Bandwidth Combination Set 0 in Table 5.6A.1-3 | | | | | |
| CA\_48E-66A-66A | CA\_48A-66A | 48 | See CA\_48E Bandwidth combination set 0 in the Table 5.6A.1-1 | | | | | | 120 | 0 |
| 66 | See CA\_66A-66A Bandwidth Combination Set 0 in Table 5.6A.1-3 | | | | | |

5.3.x.2 Co-existence studies

For 2UL / 2DL own receiver desensitization study 2nd and 3rd order harmonics and 2nd, 3rd, 4th and 5th order intermodulation products were calculated and presented in Table 5.3.x.2-1.

**Table 5.3.x.2-1: Harmonic and IMD analysis**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **UE UL carriers** | | **fx\_low** | | **fx\_high** | | **fy\_low** | | **fy\_high** |
| UL frequency (MHz) | | 1710 | | 1780 | | 3550 | | 3700 |
| 2nd harmonics frequency limits | | 2\*fx\_low | | 2\*fx\_high | | 2\* fy\_low | | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz) | 3420 | | 3560 | | 7100 | | 7400 | |
| 3rd harmonics frequency limits | | 3\*fx\_low | | 3\*fx\_high | | 3\* fy\_low | | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | | 5130 | | 5340 | | 10650 | | 11100 |
| Two tone 2nd order IMD products | | |fy\_high – fx\_low| | | |fy\_low – fx\_high| | | |fy\_low + fx\_low| | | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | | 1990 | | 1770 | | 5260 | | 5480 |
| Two-tone 3rd order IMD products | | |fy\_high – 2\*fx\_low| | | |fy\_low – 2\*fx\_high| | | |2\*fy\_low – fx\_high| | | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | | 280 | | 10 | | 5320 | | 5690 |
| 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) | | 6970 | | 7260 | | 8810 | | 9180 |
| Two-tone 4th order IMD products | | |2\*fx\_low –2\* fy\_high| | | |2\*fx\_high – 2\*fy\_low| | | |2\*fx\_low +2\* fy\_low| | | |2\*fx\_high +2\* fy\_high| |
| IMD frequency limits (MHz) | | 3980 | | 3540 | | 10520 | | 10960 |
| 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) | | 1430 | | 1790 | | 8870 | | 9390 |
| 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) | | 8680 | | 9040 | | 12360 | | 12880 |
| 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) | | 13090 | | 12420 | | 3570 | | 3140 |
| 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) | | 15910 | | 16580 | | 10390 | | 10820 |
| 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) | | 7680 | | 7090 | | 1760 | | 2270 |
| 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) | | 14070 | | 14660 | | 12230 | | 12740 |

**Table 5.3.x.2-2: Requirements for uplink inter-band carrier aggregation (two bands)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **E-UTRA CA Configuration** | **Spurious emission** | | | | | | |
| **Protected band** | **Frequency range (MHz)** | | | **Maximum Level (dBm)** | **MBW (MHz)** | **NOTE** |
| CA\_48-66 | E-UTRA Band 2, 4, 5, 12, 13, 14, 17, 24, 25, 26, 29, 30, 41, 50, 51, 66, 70, 71, 74, 85, 103 | FDL\_low | - | FDL\_high | -50 | 1 |  |

5.3.x.3 ∆TIB and ∆RIB values

Already included in TS 36.101.

5.3.x.4 REFSENS requirements

Based on co-existence analysis in 5.3.x.2 there are IMD5 into band 66 and 2nd harmonic into band 48.

MSD due to IMD5 to be added in Table 7.3.1A-0f in TS 36.101 as in Table 5.3.x.4-1 below:

Table 5.3.x.4-1: 2DL/2UL interband Reference sensitivity QPSK PREFSENS and uplink/downlink configurations

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Band / Channel bandwidth / NRB / Duplex mode | | | | | | | | Source of IMD |
| EUTRA CA  Configuration | EUTRA band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  CLRB | DL Fc (MHz) | MSD  (dB) | Duplex mode |
| CA\_48-66 | 48 | 3660 | 5 | 25 | 3660 | N/A | TDD  FDD | N/A |
| 66 | 1730 | 5 | 25 | 2130 | 5.0 | IMD5 |

Exceptions due to harmonics for CA\_48-66 is already defined in TS 36.101.

Harmonic mixing due to 5th order DL 66 into 3rd order UL 48 can occur but is not specified.

---End of changes---