**3GPP TSG-WG RAN4 Meeting #95-e *R4-2006595***

**Online, 25th May – 5th June, 2020**

**Source:** Nokia, Nokia, Shanghai Bell, [AT&T]

**Title:** TP to TR 36.716-03-02 on 3DL/2UL CA\_2-14-30

**Agenda Item:** 5.6.3 [LTE\_CA\_R16\_xBDL\_2BUL-Core]

**Document for:** Approval

# Introduction

This TP introduces the following 3DL/2UL CA configurations to TR 36.716-03-02.

* 3BDL\_2A-14A-30A\_2BUL\_2A-14A\_BCS0
* 3BDL\_2A-14A-30A\_2BUL\_14A-30A\_BCS0

TP to TR 36.716-03-02

<Start of Changes>

6.X LTE-A inter-band CA: Band 2 and Band 14 and Band 30 DL with 2 bands UL

6.X.1 List of specific combination issues

6.X.1.1 Channel bandwidth per operating band for CA

**Table 6.X.1.1-1: CA configurations under study**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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\_2A-14A-30A | CA\_2A-14A  CA\_14A-30A | 2 |  |  | Yes | Yes | Yes | Yes | 40 | 0 |
| 14 |  |  | Yes | Yes |  |  |
| 30 |  |  | Yes | Yes |  |  |

6.X.1.2 Co-existence studies for LTE-A inter-band CA 3 bands DL CA\_2A-14A-30A and 2 bands UL

For 2UL band 2 and band 14, the harmonics and intermodulation products are calculated in the following table.

**Table 6.X.1.2-1: Co-existence study for DL CA\_2A-14A-30A with UL CA\_2A-14A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | f1\_low | f1\_high | f2\_low | f2\_high |
| UL frequencies (MHz) | 788 | 798 | 1850 | 1910 |
| 2nd harmonic | 2\* f1\_low | 2\*f1\_high | 2\*f2\_low | 2\*f2\_high |
| harmonic frequency limit (MHz) | 1576 | 1596 | 3700 | 3820 |
| 3rd harmonic | 3\* f1\_low | 3\*f1\_high | 3\*f2\_low | 3\*f2\_high |
| harmonic frequency limit (MHz) | 2364 | 2394 | 5550 | 5730 |
| 2nd order IMD products | f2\_low – f1\_high | f2\_high – f1\_low | f2\_low + f1\_low | f2\_high + f1\_high |
| IMD frequency limit (MHz) | 1052 | 1122 | 2638 | 2708 |
| 3rd order IMD products | 2\*f1\_low – f2\_high | 2\*f1\_high – f2\_low | 2\*f2\_low – f1\_high | 2\*f2\_high – f1\_low |
| IMD frequency limit (MHz) | -334 | -254 | 2902 | 3032 |
| 3rd order IMD products | 2\*f1\_low + f2\_low | 2\*f1\_high + f2\_high | 2\*f2\_low + f1\_low | 2\*f2\_high + f1\_high |
| IMD frequency limit (MHz) | 3426 | 3506 | 4488 | 4618 |
| 4th order IMD products | 3\*f1\_low – f2\_high | 3\*f1\_high – f2\_low | 3\*f2\_low – f1\_high | 3\*f2\_high – f1\_low |
| IMD frequency limit (MHz) | 454 | 544 | 4752 | 4942 |
| 4th order IMD products | 3\*f1\_low + f2\_low | 3\*f1\_high + f2\_high | 3\*f2\_low + f1\_low | 3\*f2\_high + f1\_high |
| IMD frequency limit (MHz) | 4214 | 4304 | 6338 | 6528 |
| 4th order IMD products | 2\*f1\_low – 2\*f2\_high | 2\*f1\_high – 2\*f2\_low | 2\*f1\_low + 2\*f2\_low | 2\*f1\_high + 2\*f2\_high |
| IMD frequency limit (MHz) | -2244 | -2104 | 5276 | 5416 |
| 5th order IMD products | f1\_low – 4\*f2\_high | f1\_high – 4\*f2\_low | f2\_low – 4\*f1\_high | f2\_high – 4\*f1\_low |
| IMD frequency limit (MHz) | -6852 | -6602 | -1342 | -1242 |
| 5th order IMD products | f1\_low + 4\*f2\_low | f1\_high + 4\*f2\_high | f2\_low + 4\*f1\_low | f2\_high + 4\*f1\_high |
| IMD frequency limit (MHz) | 8188 | 8438 | 5002 | 5102 |
| 5th order IMD products | 2\*f1\_low – 3\*f2\_high | 2\*f1\_high - 3\*f2\_low | 2\*f2\_low – 3\*f1\_high | 2\*f2\_high – 3\*f1\_low |
| IMD frequency limit (MHz) | -4154 | -3954 | 1306 | 1456 |
| 5th order IMD products | 2\*f1\_low + 3\*f2\_low | 2\*f1\_high + 3\*f2\_high | 2\*f2\_low + 3\*f1\_low | 2\*f2\_high + 3\*f1\_high |
| IMD frequency limit (MHz) | 7126 | 7326 | 6064 | 6214 |

For 2UL band 14 and band 30, the harmonics and intermodulation products are calculated in the following table.

**Table 6.X.1.2-1: Co-existence study for DL CA\_2A-14A-30A with UL CA\_14A-30A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | f1\_low | f1\_high | f2\_low | f2\_high |
| UL frequencies (MHz) | 788 | 798 | 2305 | 2315 |
| 2nd harmonic | 2\* f1\_low | 2\*f1\_high | 2\*f2\_low | 2\*f2\_high |
| harmonic frequency limit (MHz) | 1576 | 1596 | 4610 | 4630 |
| 3rd harmonic | 3\* f1\_low | 3\*f1\_high | 3\*f2\_low | 3\*f2\_high |
| harmonic frequency limit (MHz) | 2364 | 2394 | 6915 | 6945 |
| 2nd order IMD products | f2\_low – f1\_high | f2\_high – f1\_low | f2\_low + f1\_low | f2\_high + f1\_high |
| IMD frequency limit (MHz) | 1507 | 1527 | 3093 | 3113 |
| 3rd order IMD products | 2\*f1\_low – f2\_high | 2\*f1\_high – f2\_low | 2\*f2\_low – f1\_high | 2\*f2\_high – f1\_low |
| IMD frequency limit (MHz) | -739 | -709 | 3812 | 3842 |
| 3rd order IMD products | 2\*f1\_low + f2\_low | 2\*f1\_high + f2\_high | 2\*f2\_low + f1\_low | 2\*f2\_high + f1\_high |
| IMD frequency limit (MHz) | 3881 | 3911 | 5398 | 5428 |
| 4th order IMD products | 3\*f1\_low – f2\_high | 3\*f1\_high – f2\_low | 3\*f2\_low – f1\_high | 3\*f2\_high – f1\_low |
| IMD frequency limit (MHz) | 49 | 89 | 6117 | 6157 |
| 4th order IMD products | 3\*f1\_low + f2\_low | 3\*f1\_high + f2\_high | 3\*f2\_low + f1\_low | 3\*f2\_high + f1\_high |
| IMD frequency limit (MHz) | 4669 | 4709 | 7703 | 7743 |
| 4th order IMD products | 2\*f1\_low – 2\*f2\_high | 2\*f1\_high – 2\*f2\_low | 2\*f1\_low + 2\*f2\_low | 2\*f1\_high + 2\*f2\_high |
| IMD frequency limit (MHz) | -3054 | -3014 | 6186 | 6226 |
| 5th order IMD products | f1\_low – 4\*f2\_high | f1\_high – 4\*f2\_low | f2\_low – 4\*f1\_high | f2\_high – 4\*f1\_low |
| IMD frequency limit (MHz) | -8472 | -8422 | -887 | -837 |
| 5th order IMD products | f1\_low + 4\*f2\_low | f1\_high + 4\*f2\_high | f2\_low + 4\*f1\_low | f2\_high + 4\*f1\_high |
| IMD frequency limit (MHz) | 10008 | 10058 | 5457 | 5507 |
| 5th order IMD products | 2\*f1\_low – 3\*f2\_high | 2\*f1\_high - 3\*f2\_low | 2\*f2\_low – 3\*f1\_high | 2\*f2\_high – 3\*f1\_low |
| IMD frequency limit (MHz) | -5369 | -5319 | 2216 | 2266 |
| 5th order IMD products | 2\*f1\_low + 3\*f2\_low | 2\*f1\_high + 3\*f2\_high | 2\*f2\_low + 3\*f1\_low | 2\*f2\_high + 3\*f1\_high |
| IMD frequency limit (MHz) | 8491 | 8541 | 6974 | 7024 |

It is concluded that there is no harmonic or intermodulation relation to the own receiver bands in this 3DL/2UL band combination.

6.X.1.3 MSD

No MSD issues are identified for this band combination.

6.X.1.4 ∆TIB and ∆RIB values

The relaxation values are already specified for 3DL/1UL in the following and is applied to 3DL/2U.

**Table 6.X.4-1: ΔTIB,c**

| Inter-band CA Configuration | **E-UTRA Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_2-14-30 | 2 | 0.5 |
| 14 | 0.3 |
| 30 | 0.5 |

**Table 6.X.4-2: ΔRIB**

| Inter-band CA Configuration | 2 | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_2-14-30 | 14 | 0.3 |
| 30 | 0 |
| 2 | 0.3 |

<End of Changes>