**3GPP TSG-WG RAN4 Meeting #95-e *R4-2006597***

**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\_2-14-66

**Agenda Item:** 5.6.2 [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-66A\_2BUL\_2A-14A\_BCS0
* 3BDL\_2A-14A-66A\_2BUL\_14A-66A\_BCS0
* 3BDL\_2A-2A-14A-66A\_2BUL\_2A-14A-BCS0
* 3BDL\_2A-2A-14A-66A\_2BUL\_14A-66A\_BCS0
* 3BDL\_2A-14A-66A-66A\_2BUL\_2A-14A\_BCS0
* 3BDL\_2A-14A-66A-66A\_2BUL\_14A-66A\_BCS0
* 3BDL\_2A-14A-66A-66A-66A\_2BUL\_2A-14A-BCS0
* 3BDL\_2A-14A-66A-66A-66A\_2BUL\_14A-66A\_BCS0

**TP to TR 36.716-03-02 v10.0.0**

**<Start of Changes>**

**Table 5.1.5-1: Summary of self-interference analysis for 3 bands DL with 2 bands UL CA**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Downlink  CA configuration** | **Uplink  CA configuration** | **Harmonic**  **relation to 3rd band  without uplink** | **Intermodulation to 3rd band  without uplink** | **Interference due to small frequency separation** | **MSD**  **(Maximum Sensitivity Degradation)** |
| CA\_3A-11A-18A | CA\_3A-11A | - | 5th IMD | - | 4.9 dB |
| CA\_3A-11A-26A | CA\_3A-11A | - | 5th IMD | - | 4.9 dB |
| CA\_1A-3A-42C | CA\_1A-42C | - | - | - | N/A |
| CA\_1A-3A-42C | CA\_3A-42C | - | - | - | N/A |
| CA\_2A-4A-13A | CA\_2A-13A | - | 4th IMD | - | 7.6 dB |
| CA\_4A-13A | - | 4th IMD | - | 6.2 dB |
| CA\_2A-2A-4A-5A | CA\_2A-5A | - | 4th IMD | - | 7.6 dB |
| CA\_4A-5A | - | 2nd IMD  5th IMD | - | - 2nd and 5th IMD problems were already covered in Table 7.3.1A-0f:2DL/2UL\_4A-5A of TS36.101. |
| CA\_2A-2A-5A-66A-66A  CA\_2A-5A-66A,  CA\_2A-5A-66B,  CA\_2A-5A-66C,  CA\_2A-5B-66A,  CA\_2A-5B-66B,  CA\_2A-5B-66C,  CA\_2A-2A-5A-66A,  CA\_2A-2A-5A-66B,  CA\_2A-2A-5A-66C,  CA\_2A-5A-66A-66A,  CA\_2A-5B-66A-66A | CA\_2A-5A | - | 4th IMD | - | 7.2 dB |
| CA\_5A-66A | - | - | - | N/A |
| CA\_2A-5A-66A | CA\_2A-66A | - | - | - | N/A |
| CA\_2A-5A-66A-66A | CA\_2A-66A | - | - | - | N/A |
| CA\_5A-66A | - | - | - | N/A |
| CA\_2A-5A-48A | CA\_2A-48A | - | - | - | N/A |
| CA\_5A-48A | - | 3rd IMD | - | FFS |
| CA\_2A-5A-48C  CA\_2A-5A-48D | CA\_2A-48A | - | - | - | N/A |
| CA\_5A-48A | - | 3rd IMD | - | FFS |
| CA\_2A-5A | 2nd harmonic at high frequency band edge | 3rd IMD | - | FFS |
| CA\_2A-5A-46D | CA\_2A-5A | 3rd Harmonic | 4th IMD  5th IMD | - | - No need to study for 3rd harmonic impact from B2 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS36.101.  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101. |
| CA\_5A-46D-66A | CA\_5A\_46A | - | 5th IMD | - | 0.3 dB |
| CA\_5A\_66A | 3rd Harmonic | 4th IMD  5th IMD | - | - No need to study for 3rd harmonic impact from B66 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS36.101.  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101. |
| CA\_2A-13A-66A-66B  CA\_2A-13A-66A,  CA\_2A-2A-13A-66A,  CA\_2A-13A-66A-66A,  CA\_2A-13A-66B,  CA\_2A-13A-66C, | CA\_2A-13A | - | 4th IMD | - | 7.2 dB |
| CA\_13A-66A | - | 4th IMD | - | 6.2 dB |
| CA\_2A-13A-66A,  CA\_2A-13A-66A-66A | CA\_2A-66A | - | - | - | N/A |
| CA\_2A-13A-48A | CA\_2A-48A | - | - | - | N/A |
| CA\_13A-48A | - | 3rd IMD | - | FFS |
| CA\_2A-13A-48A-48C | CA\_2A-13A | 2nd Harmonic at high frequency band edge | - | - | 2nd harmonic impact from B2 to B48 was covered in  Table 7.3.1A-0a of TS 36.101. |
| CA\_13A-46D-66A | CA\_13A-66A | 3rd Harmonic | 4th IMD  5th IMD | - | - No need to study for 3rd harmonic impact from B66 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS36.101.  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101. |
| CA\_2A-13A-46D  CA\_2A-13A-46A-46D  CA\_2A-13A-46A-46C  CA\_2A-13A-46C  CA\_2A-13A-46A-46A  CA\_2A-13A-46A  CA\_2A-13A-46E | CA\_2A-13A | 3rd Harmonic | 4th IMD | - | - No need to study for 3rd harmonic impact from B2 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS36.101.  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101. |
| CA\_1A-3A-38A | CA\_1A-3A | - | - | Yes | Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101. |
| CA\_2A-12A-66A | CA\_2A-12A | 3rd Harmonic impact from B12 to B66 | - | - | - 3rd harmonic impact from B12 to B66 was covered in Table 7.3.1A-0a of TS36.101. |
| CA\_2A-66A | - | - | - | N/A |
| CA\_12A-66A | 3rd Harmonic impact from B12 to B66 | Side lobe impact of 4th IMD | - | - 3rd harmonic impact from B12 to B66 was covered in Table 7.3.1A-0a of TS36.101.  - 0 dB |
| CA\_1A-3A-42D | CA\_1A-3A | 2nd Harmonic impact from B3 to B42 | 4th IMD | Yes | - Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101.  - 2nd harmonic impact from B3 to B42 was covered in Table 7.3.1A-0a of TS36.101.  - 4th IMD problem was already covered in Table 7.3.1A0g:3DL/2UL\_CA\_1A-3A-42A/CA\_1A-3A of TS36.101. |
| CA\_1A-42A | - | - | - | N/A |
| CA\_3A-42A | - | - | - | N/A |
| CA\_1A-42C | - | - | - | N/A |
| CA\_3A-42C | - | - | - | N/A |
| CA\_2A-46E-48A,  CA\_2A-46D-48A  CA\_2A-46D-48C  CA\_2A-46C-48C  CA\_2A-46D-48A  CA\_2A-46A-48C  CA\_2A-46C-48A  CA\_2A-46A-48A | CA\_2A-48A | 3rd Harmonic | 2nd IMD  3rd IMD | - | - No need to study for 3rd harmonic impact from B2 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS 36.101  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101 |
| CA\_2A-48A-66A  CA\_2A-48A-66A-66A,  CA\_2A-48D-66A,  CA\_2A-48C-66A-66A,  CA\_2A-48D-66A-66A,  CA\_2A-48E-66A,  CA\_2A-48E-66A-66A | CA\_2A-48A | - | 4th IMD | - | - 12.1 dB |
| CA\_48A-66A | - | 2nd IMD  5th IMD | - | - 28.3 dB for IMD2  - 0 dB for IMD5 |
| CA\_2A-48A-66A,  CA\_2A-48A-66A-66A,  CA\_2A-48D-66A  CA\_2A-48C-66A-66A,  CA\_2A-48D-66A-66A,  CA\_2A-48E-66A,  CA\_2A-48E-66A-66A | CA\_2A-66A | 2nd Harmonics | 2nd IMD | - | FFS |
| CA\_3A-8A-38A | CA\_3A-8A | - | 2nd IMD  3rd IMD | - | - 26.4 dB for IMD2  - 15.7 dB for IMD3 |
| CA\_1A-1A-3C-5A | CA\_1A-3A | - | - | Yes | Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101. |
| CA\_1A-5A | - | - | - | N/A |
| CA\_3A-5A | - | - | - | N/A |
| CA\_1A-1A-3C-28A | CA\_1A-3A | - | - | Yes | Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101. |
| CA\_1A-28A | - | 5th IMD | - | - 4 dB for IMD5 |
| CA\_3A-28A | 3rd Harmonic | 4th IMD | - | - 3rd harmonic impact from B28 to B1 was covered in Table 7.3.1A-0a of TS36.101.  - 11 dB for IMD5 |
| CA\_1A-3A-3A-7A,  CA\_1A-3A-3A-7A-7A | CA\_1A-3A | - | - | Yes | Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101. |
| CA\_1A-7A | - | - | - | N/A |
| CA\_3A-7A | - | - | - | N/A |
| CA\_2A-14A-30A | CA\_2A-14A | - | - | - | N/A |
| CA\_14A-30A | - | - | - | N/A |
| CA\_2A-14A-66A  CA\_2A-2A-14A-66A  CA\_2A-14A-66A-66A  CA\_2A-2A-14A-66A-66A  CA\_2A-14A-66A-66A-66A | CA\_2A-14A | - | 4th IMD | - | 7.2 dB  (The same as CA\_2A-13A-66A) |
| CA\_14A-66A | - | 4th IMD | - | 6.2 dB  (The same as CA\_2A-13A-66A) |
| CA\_14A-30A-66A  CA\_14A-30A-66A-66A | CA\_14A-30A | - | - | - | N/A |
| CA\_14A-66A | - | - | - | N/A |
| CA\_2A-46E-66A  CA\_2A-46D-66A  CA\_2A-46C-66A  CA\_2A-46A-66A | CA\_2A-66A | 3rd harmonic | 3rd IMD  5th IMD | - | - No need to study for 3rd harmonic impact from B2 to B46 since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS 36.101. |
| CA\_13A-48A-66A  CA\_13A-48A-66A-66A  CA\_13A-48C-66A | CA\_13A-48A | - | 3rd IMD | - | -17.1 dB |
| CA\_13A-66A | 2nd harmonic | 5th IMD | - | - 2nd harmonic impact from B66 to B48 was covered in Table 7.3.1A-0a of TS36.101.  -0 dB (no impact from 5th IMD) |
| CA\_48A-66A | - | - | - | N/A |
| CA\_46D-48C-66A  CA\_46C-48C-66A  CA\_46A-48C-66A  CA\_46D-48A-66A  CA\_46C-48A-66A  CA\_46A-48A-66A | CA\_48A-66A | 3rd harmonic | 2nd IMD  3rd IMD | - | - No need to study for 3rd harmonic impact since B46 is specified as reference measurement exclusion region in Table 7.3.1A-0eC of TS36.101.  - No need to study for MSD since the requirements do not need to apply in exclusion zone in Table 7.3.1A-0eA of TS36.101. |
| CA\_1A-7A-20A | CA\_1A-7A | - | 5th IMD | - | MSD is proposed to be 0 dB as the similar CA combination CA\_1A-5A-7A has a very small MSD requirement (i.e., 1 dB) which should not be specified. |
| CA\_1A-20A | - | - | - | N/A |
| CA\_7A-20A | - | - | - | N/A |
| CA\_1A-3A-3A-8A | CA\_1A-3A | - | - | Yes | - Close proximity issue was already covered in Table 7.3.1A-0bA in TS 36.101. |
| CA\_1A-8A | - | - | - | N/A |
| CA\_3A-8A | - | - | - | N/A |
| CA\_1A-7A-8A  CA\_1A-7A-7A-8A | CA\_7A-8A | - | - | - | N/A |
| CA\_1A-7A-7A-8A | CA\_1A-7A | - | - | - | N/A |
| CA\_1A-8A | 3rd harmonic | - | - | - 3rd harmonic impact from B8 to B7 was covered in Table 7.3.1A-0a of TS36.101. |
| CA\_2A-13A-48C | CA\_2A-48A | - | - | - | N/A |
| CA\_13A-48A | - | 3rd IMD | - | FFS |
| CA\_2A-13A | 2nd harmonic at high frequency band edge | - | - | -2nd harmonic impact from B2 to B48 was covered in Table 7.3.1A-0a of TS36.101. |
| CA\_2A-13A-48D | CA\_13A-48A | - | 3rd IMD | - | FFS |
| CA\_2A-48A | - | - | - | N/A |
| CA\_13A-48C-66A-66A,  CA\_13A-48D-66A-66A | CA\_48A-66A | - | - | - | N/A |
| CA\_13A-48A | - | 3rd IMD | - | - 3rd IMD problem was already covered in Table 7.3.1A0g:3DL/2UL\_CA\_13A-48A-66A/CA\_13A-48A of TS36.101. |
| CA\_13A-66A | 2nd harmonic | 5th IMD | - | -2nd harmonic impact from B66 to B48 was covered in Table 7.3.1A-0a of TS36.101.  - No MSD is needed. |
| CA\_13A-48D-66A | CA\_48A-66A | - | - | - | N/A |
| CA\_13A-48A | - | 3rd IMD | - | - 3rd IMD problem was already covered in Table 7.3.1A0g:3DL/2UL\_CA\_13A-48A-66A/CA\_13A-48A of TS36.101. |
| CA\_5A-48A-66A,  CA\_5A-48C-66A,  CA\_5A-48A-66A-66A,  CA\_5A-48D-66A-66A,  CA\_5A-48C-66A-66A | CA\_48A-66A | - | - | - | N/A |
| CA\_5A-66A | 2nd harmonic | 5th IMD | - | -2nd harmonic impact from B66 to B48 was covered in Table 7.3.1A-0a of TS36.101.  -FFS for IMD |
| CA\_5A-48A | - | - | - | N/A |
| CA\_5A-48D-66A | CA\_48A-66A | - | - | - | N/A |
| CA\_5A-48A | - | - | - | N/A |

**<Next Changes>**

**Table 5.1.5.4 Proposed 3 bands DL/ 2 bands UL inter-band CA REFSENS exceptions and test configurations**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA Band / Channel bandwidth / NRB / Duplex mode | | | | | | | | | | |
| EUTRA CA  DL Configuration | EUTRA CA  UL Configuration | EUTRA band | UL Fc  (MHz) | UL BW  (MHz) | UL  CLRB | DL Fc (MHz) | DL BW  (MHz) | MSD  (dB) | Duplex mode | Source of IMD |
| CA\_3A-11A-18A | CA\_3A-11A | 3 | 1730 | 5 | 25 | 1825 | 5 | N/A | FDD | IMD5 |
| 11 | 1442.9 | 5 | 25 | 1490.9 | 5 |
| 18 | 823.7 | 5 | 25 | 868.7 | 5 | **4.9** |
| CA\_3A-11A-26A | CA\_3A-11A | 3 | 1730 | 5 | 25 | 1825 | 5 | N/A | FDD | IMD5 |
| 11 | 1442.9 | 5 | 25 | 1490.9 | 5 |
| 26 | 823.7 | 5 | 25 | 868.7 | 5 | **4.9** |
| CA\_2A-4A-13A | CA\_2A-13A | 2 | 1855 | 5 | 25 | 1935 | 5 | N/A | FDD | IMD4 |
| 13 | 782 | 5 | 25 | 751 | 5 |
| 4 | 1746 | 5 | 25 | 2146 | 5 | **7.6** |
| CA\_4A-13A | 4 | 1750 | 5 | 25 | 2150 | 5 | N/A | FDD | IMD4 |
| 13 | 780 | 5 | 25 | 749 | 5 |
| 2 | 1860 | 5 | 25 | 1940 | 5 | **6.2** |
| CA\_2A-2A-4A-5A | CA\_2A-5A | 2 | 1900 | 5 | 25 | 1980 | 5 | N/A | FDD | IMD4 |
| 5 | 834 | 5 | 25 | 879 | 5 |
| 4 | 1732 | 5 | 25 | 2132 | 5 | **7.6** |
| CA\_2A-5B-66A-66A  CA\_2A-5A-66A,  CA\_2A-5A-66B,  CA\_2A-5A-66C,  CA\_2A-5B-66A,  CA\_2A-5B-66B,  CA\_2A-5B-66C,  CA\_2A-2A-5A-66A,  CA\_2A-2A-5A-66B,  CA\_2A-2A-5A-66C,  CA\_2A-5A-66A-66A,  CA\_2A-2A-5A-66A-66A | CA\_2A-5A | 2 | 1900 | 5 | 25 | 1980 | 5 | N/A | FDD | IMD4 |
| 5 | 834 | 5 | 25 | 879 | 5 |
| 66 | 1712 | 5 | 25 | 2132 | 5 | **7.2** |
| CA\_2A-13A-66A,  CA\_2A-2A-13A-66A,  CA\_2A-13A-66A-66A,  CA\_2A-13A-66B,  CA\_2A-13A-66C,  CA\_2A-13A-66A-66B | CA\_2A-13A | 2 | 1860 | 5 | 25 | 1940 | 5 | N/A | FDD | IMD4 |
| 13 | 782 | 5 | 25 | 751 | 5 |
| 66 | 1736 | 5 | 25 | 2156 | 5 | **7.2** |
| CA\_13A-66A | 2 | 1880 | 5 | 25 | 1960 | 5 | **6.2** | FDD | IMD4 |
| 13 | 782 | 5 | 25 | 751 | 5 | N/A |
| 66 | 1762 | 5 | 25 | 2162 | 5 |
| CA\_2A-12A-66A | CA\_12A-66A | 2 | 1907.5 | 5 | 25 | 1987.5 | 5 | **0** | FDD | IMD4 |
| 12 | 713.5 | 5 | 25 | 743.5 | 5 | N/A |
| 66 | 1712.5 | 5 | 25 | 2112.5 | 5 |
| CA\_2A-48A-66A | CA\_48A-66A | 2 | 1880 | 5 | 25 | 1960 | 5 | **28.3** | FDD-TDD | IMD2 |
| 48 | 3695 | 5 | 25 | 3695 | 5 | N/A |
| 66 | 1735 | 5 | 25 | 2135 | 5 | N/A |
| 2 | 1895 | 5 | 25 | 1975 | 5 | **0** | FDD-TDD | IMD5 |
| 48 | 3620 | 5 | 25 | 3620 | 5 | N/A |
| 66 | 1755 | 5 | 25 | 2155 | 5 | N/A |
| CA\_3A-8A-38A | CA\_3A-8A | 3 | 1720 | 5 | 25 | 1815 | 5 | N/A | FDD-TDD | IMD2 |
| 8 | 885 | 5 | 25 | 930 | 5 | N/A |
| 38 | 2605 | 5 | 25 | 2605 | 5 | **26.4** |
| 3 | 1745 | 5 | 25 | 1840 | 5 | N/A | FDD-TDD | IMD3 |
| 8 | 895 | 5 | 25 | 940 | 5 | N/A |
| 38 | 2595 | 5 | 25 | 2595 | 5 | **15.7** |
| CA\_1A-1A-3C-28A | CA\_1A-28A | 1 | 1975 | 5 | 25 | 2165 | 5 | N/A | FDD | IMD5 |
| 3 | 1731 | 5 | 25 | 1826 | 5 | **4.0** |
| 28 | 708 | 5 | 25 | 763 | 5 | N/A |
| CA\_3A-28A | 1 | 1949 | 5 | 25 | 2139 | 5 | **11.0** | FDD | IMD4 |
| 3 | 1780 | 5 | 25 | 1875 | 5 | N/A |
| 28 | 710.5 | 5 | 25 | 765.5 | 5 | N/A |
| CA\_2A-48A-66A  CA\_2A-48C-66A | CA\_2A-48A | 2 | 1905 | 5 | 25 | 1985 | 5 | N/A | FDD-TDD | IMD4 |
| 48 | 3560 | 5 | 25 | 3560 | 5 | N/A |
| 66 | 1755 | 5 | 25 | 2155 | 5 | **12.1** |
| CA\_2A-14A-66A  CA\_2A-2A-14A-66A  CA\_2A-14A-66A-66A  CA\_2A-2A-14A-66A-66A  CA\_2A-14A-66A-66A-66A | CA\_2A-14A | 2 | 1870 | 5 | 25 | 1950 | 5 | N/A | FDD | IMD4 |
| 14 | 793 | 5 | 25 | 763 | 5 | N/A |
| 66 | 1734 | 5 | 25 | 2154 | 5 | **7.2** |
| CA\_14A-66A | 2 | 1874 | 5 | 25 | 1954 | 5 | **6.2** | FDD | IMD4 |
| 14 | 793 | 5 | 25 | 763 | 5 | N/A |
| 66 | 1770 | 5 | 25 | 2190 | 5 | N/A |
| CA\_13A-48A-66A | CA\_13A-48A | 13 | 782 | 5 | 25 | 751 | 5 | N/A | FDD-TDD | IMD3 |
| 48 | 3695 | 5 | 25 | 3695 | 5 | N/A |
| 66 | 1731 | 5 | 25 | 2131 | 5 | **17.1** |
| CA\_13A-66A | 13 | 782 | 5 | 25 | 751 | 5 | N/A | FDD-TDD | IMD5 |
| 48 | 3626 | 5 | 25 | 3626 | 5 | **0.0** |
| 66 | 1730 | 5 | 25 | 2130 | 5 | N/A |
| CA\_1A-7A-20A | CA\_1A-7A | 1 | 1960 | 5 | 25 | 2150 | 5 | N/A | FDD | IMD5 |
| 7 | 2540 | 10 | 50 | 2660 | 10 | N/A |
| 20 | 841 | 5 | 25 | 800 | 5 | **0.0** |
| CA\_2A-5A-48A  CA\_2A-5A-48C  CA\_2A-5A-48D | CA\_5A-48A | 2 | 1882 | 5 | 25 | 1962 | 5 | **TBD** | FDD-TDD | IMD3 |
| 5 | 839 | 5 | 25 | 884 | 5 | N/A |  |  |
| 48 | 3640 | 5 | 25 | 3640 | 5 | N/A |  |  |
| CA\_2A-5A-48C  CA\_2A-5A-48D | CA\_2A-5A | 2 | 1905 | 5 | 25 | 1985 | 5 | N/A | FDD-TDD | IMD3 |
| 5 | 844 | 5 | 25 | 889 | 5 | N/A |
| 48 | 3593 | 5 | 25 | 3593 | 5 | **TBD** |
| CA\_2A-13A-48A  CA\_2A-13A-48C  CA\_2A-13A-48D | CA\_13A-48A | 2 | 1903.5 | 5 | 25 | 1983.5 | 5 | **TBD** | FDD-TDD | IMD3 |
| 13 | 784.5 | 5 | 25 | 753.5 | 5 | N/A |
| 48 | 3552.5 | 5 | 25 | 3552.5 | 5 | N/A |
| CA\_2A-48A-66A,  CA\_2A-48D-66A,  CA\_2A-48E-66A,  CA\_2A-48A-66A-66A,  CA\_2A-48C-66A-66A,  CA\_2A-48D-66A-66A,  CA\_2A-48E-66A-66A | CA\_2A-66A | 2 | 1855 | 5 | 25 | 1935 | 5 | N/A | FDD-TDD | IMD2 |
| 48 | 3625 | 5 | 25 | 3625 | 5 | **TBD** |
| 66 | 1770 | 5 | 25 | 2190 | 5 | N/A |
| CA\_5A-48A-66A,  CA\_5A-48C-66A,  CA\_5A-48A-66A-66A,  CA\_5A-48D-66A-66A,  CA\_5A-48C-66A-66A | CA\_5A-66A | 5 | 829 | 5 | 25 | 874 | 5 | N/A | FDD-TDD | IMD5 |
| 48 | 3622 | 5 | 25 | 3622 | 5 | **TBD** |
| 66 | 1760 | 5 | 25 | 2180 | 5 | N/A |

**<Next Changes>**

6.X LTE-A inter-band CA: Band 2 and Band 14 and Band 66 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-66A | CA\_2A-14A  CA\_14A-66A | 2 |  |  | Yes | Yes | Yes | Yes | 50 | 0 |
| 14 |  |  | Yes | Yes |  |  |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_2A-2A-14A-66A | CA\_2A-14A  CA\_14A-66A | 2 | See CA\_2A-2A Bandwidth Combination Set 0 in Table 5.6A.1-3 | | | | | | 70 | 0 |
| 14 |  |  | Yes | Yes |  |  |
| 66 |  |  | Yes | Yes | Yes | Yes |
| CA\_2A-14A-66A-66A | CA\_2A-14A  CA\_14A-66A | 2 |  |  | Yes | Yes | Yes | Yes | 70 | 0 |
| 14 |  |  | Yes | Yes |  |  |
| 66 | See CA\_66A-66A Bandwidth combination set 0 in Table 5.6A.1-3 | | | | | |
| CA\_2A-14A-66A-66A-66A | CA\_2A-14A  CA\_14A-66A | 2 |  |  | Yes | Yes | Yes | Yes | 90 | 0 |
| 14 |  |  | Yes | Yes |  |  |
| 66 | See CA\_66A-66A-66A Bandwidth Combination Set 0 in Table 5.6A.1-4 | | | | | |

6.X.1.2 Co-existence studies for LTE-A inter-band CA 3 bands DL CA\_2A-14A-60A 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-66A 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-66A with UL CA\_14A-66A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE UL carriers | f1\_low | f1\_high | f2\_low | f2\_high |
| UL frequencies (MHz) | 788 | 798 | 1710 | 1780 |
| 2nd harmonic | 2\* f1\_low | 2\*f1\_high | 2\*f2\_low | 2\*f2\_high |
| harmonic frequency limit (MHz) | 1576 | 1596 | 3420 | 3560 |
| 3rd harmonic | 3\* f1\_low | 3\*f1\_high | 3\*f2\_low | 3\*f2\_high |
| harmonic frequency limit (MHz) | 2364 | 2394 | 5130 | 5340 |
| 2nd order IMD products | f2\_low – f1\_high | f2\_high – f1\_low | f2\_low + f1\_low | f2\_high + f1\_high |
| IMD frequency limit (MHz) | 912 | 992 | 2498 | 2578 |
| 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) | -204 | -114 | 2622 | 2772 |
| 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) | 3286 | 3376 | 4208 | 4358 |
| 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) | 584 | 684 | 4332 | 4552 |
| 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) | 4074 | 4174 | 5918 | 6138 |
| 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) | -1984 | -1824 | 4996 | 5156 |
| 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) | -6332 | -6042 | -1482 | -1372 |
| 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) | 7628 | 7918 | 4862 | 4972 |
| 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) | -3764 | -3534 | 1026 | 1196 |
| 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) | 6706 | 6936 | 5784 | 5954 |

It is concluded that IMD issues exist for the own receiver bands in the following.

* The 4th IMD of 2UL band 2 and band 14 falls into DL band 66.
* The 4th IMD of 2UL band 14 and band 66 falls into DL band 2.

6.X.1.3 MSD

UE RF architecture for CA\_2-14-66 is smilar to CA\_2-13-66 which has the same IMD4 issues as identified above. The same MSD values are prposed as summarized in Table 5.1.5.4.

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\_2-14-66 | 2 | 0.5 |
| 14 | 0.3 |
| 66 | 0.5 |

**Table 6.X.4-2: ΔRIB**

| Inter-band CA Configuration | **E-UTRA Band** | **ΔTIB,c [dB]** |
| --- | --- | --- |
| CA\_2-14-66 | 2 | 0.3 |
| 14 | 0 |
| 66 | 0.3 |

**<End of Changes>**