**3GPP TSG-RAN WG4 Meeting #100-e R4-** **2113345**

**Online, 16th August – 27th August, 2021**

**Source:** Vodafone

**Title:** TP for TR 37.717-11-11: DC\_38\_n1

**Agenda item:** 8.14.2

**Document for:** Approval

1. Introduction

This contribution is a text proposal for TR 37.717-21-11 to include DC\_38\_n1.

The ΔTIB,c, ΔRIB and MSD values provided mirror those already present for DC\_1\_n38 in 38101-3.

# 2. Reference

3. Text Proposal

**<Start of Text Proposal>**

## 5.x DC\_38\_n1

### 5.x.1 Configurations for DC

Table 5.x.1-1: Inter-band DC configurations (two bands)

| DC  configuration | Uplink configuration | Single UL allowed |
| --- | --- | --- |
| DC\_38A\_n1A | DC\_38A\_n1A | No |

### 5.x.2 Maximum Ouput Power for DC

**Table 5.x.2-1:** **Maximum output power for inter-band EN-DC of 1 LTE band + 1 NR band**

| DC configuration | Power class 3  (dBm) | Tolerance  (dB) |
| --- | --- | --- |
| DC\_38A\_n1A | 23 | +2/-3 |

### 5.x.3 Co-existence studies

Table 5.x.3-1 lists the Band 38A + Band n1A 2UL DC 2nd and 3rd order harmonics and 2nd, 3rd, 4th and 5th order IMD for the UE-to-UE coexistence analysis.

Table 5.x.3-1: Band 38 and Band n1 UL harmonics and IMD products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | | **fn\_low** | **fn\_high** | |
| UL frequency (MHz) | 2570 | 2620 | | 1920 | 1980 | |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | | 2\* fn\_low | 2\* fn\_high | |
| 2nd harmonics frequency limits (MHz) | 5140 – 5240 | | | 3840 – 3960 | | |
| 3rd harmonics frequency limits | 3\*fx\_low | | 3\*fx\_high | 3\* fn\_low | | 3\* fn\_high |
| 3rd harmonics frequency limits (MHz) | 7710 – 7860 | | | 5760 – 5940 | | |
| 2nd order IMD products | |fn\_low – fx\_high| | |fn\_high – fx\_low| | | |fn\_low + fx\_low| | |fn\_high + fx\_high| | |
| IMD frequency limits (MHz) | 590 – 700 | | | 4490 – 4600 | | |
| Two-tone 3rd order IMD products | |2\*fx\_low – fn\_high| | |2\*fx\_high – fn\_low| | | |2\*fn\_low – fx\_high| | |2\*fn\_high – fx\_low| | |
| IMD frequency limits (MHz) | 3160 – 3320 | | | 1220 – 1390 | | |
| Two-tone 3rd order IMD products | |2\*fx\_low + fn\_low| | |2\*fx\_high + fn\_high| | | |2\*fn\_low + fx\_low| | |2\*fn\_high + fx\_high| | |
| IMD frequency limits (MHz) | 7060 – 7220 | | | 6410 – 6580 | | |
| Two-tone 3rd order IMD products | (fx\_low – max BW fn) | | (fx\_high + max BW fn) | (fn\_low – max BW fx) | | (fn\_high + max BW fx) |
| IMD frequency limits (MHz) | 2520 – 2670 | | | 1900 – 2000 | | |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fn\_high| | | |3\*fx\_high – 1\*fn\_low| | |3\*fn\_low – 1\*fx\_high| | | |3\*fn\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 5730 – 5940 | | | 3140 – 3370 | | |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fn\_high| | | |2\*fx\_high –2\* fn\_low| | |2\*fx\_low +2\* fn\_low| | | |2\*fx\_high +2\* fn\_high| |
| IMD frequency limits (MHz) | 1180 – 1400 | | | 8980 – 9200 | | |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fn\_low| | | |3\*fx\_high + 1\*fn\_high| | |3\*fn\_low + 1\*fx\_low| | | |3\*fn\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 9630 – 9840 | | | 8330 – 8560 | | |
| Two-tone 5th order IMD products | |fx\_low – 4\*fn\_high| | | |fx\_high – 4\*fn\_low| | |fn\_low – 4\*fx\_high| | | |fn\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 5060 – 5350 | | | 8300 – 8560 | | |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fn\_high| | | |2\*fx\_high - 3\*fn\_low| | |2\*fn\_low - 3\*fx\_high| | | |2\*fn\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 520 – 800 | | | 3750 – 4020 | | |
| Two-tone 5th order IMD products | |fx\_low + 4\*fn\_low| | | |fx\_high + 4\*fn\_high| | |fn\_low + 4\*fx\_low| | | |fn\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 10250 – 10540 | | | 12200 – 12460 | | |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fn\_low| | | |2\*fx\_high + 3\*fn\_high| | |2\*fn\_low + 3\*fx\_low| | | |2\*fn\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 10900 – 11180 | | | 11550 – 11820 | | |

Based on Table 5.x.3-1,

- 2nd order harmonics may fall into Rx frequencies of band 77

- 3rd order harmonics may fall into Rx frequencies of bands 46 and 47

- 2nd order IMD may fall into Rx frequencies of bands 71 and 79

- 3rd order IMD may fall into Rx frequencies of bands 52, 77 and 78

- 4th order IMD may fall into Rx frequencies of bands 46, 47, 52, 77 and 78

- 5th order IMD may fall into Rx frequencies of bands 12, 13, 14, 17, 20, 28, 29, 43, 44, 46, 67, 68, 71, 77, 78 and 85

When a 2UL inter-band DC UE is operating with other systems such as Wi-Fi, Bluetooth and GNSS, the harmonics and intermodulation products can have an impact on these systems. Table 5.x.3-2 lists if up to 3rd order harmonics and IMD up to 5th order falls into one of these receiving bands.

Table 5.x.3-2: 2UL Band 38 + Band n1 harmonic and IMD for ISM and GNSS bands

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Victim Systems** | **Frequency range [MHz]** | | | **Impact** | **Regions** | **Comments** |
| COMPASS  (Beidou) | 1559 | - | 1591 | No |  |  |
| Galileo | 1559 | - | 1591 | No |  |  |
| GLONASS | 1591 | - | 1610 | No |  |  |
| GPS | 1563 | - | 1587 | No |  |  |
| ISM band  (2.4GHz) | 2400 | - | 2483.5 | No | US/Europe |  |
| 2400 | - | 2494 | No | Asia |  |
| ISM band  (5GHz) | 5150 | - | 5925 | Yes | US | 3rd Harmonic, IMD4, IMD5 |
| 5150 | - | 5350 | Yes | Europe | 3rd Harmonic, IMD5 |
| 5470 | - | 5725 | No |  |
| 5150 | - | 5825 | Yes | Asia | 3rd Harmonic, IMD4, IMD5 |

The following requirements for spurious emission band UE coexistence are proposed for DC\_38\_n1 mirroring those already used for DC\_1\_n38 in 38101-3.

Table 5.x.2-3: Requirements

| EN-DC Configuration | Spurious emission | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Protected band | Frequency range (MHz) | | | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC\_38\_n1 | E-UTRA Band 1, 3, 5, 8, 20, 22, 27, 28, 31, 32, 34, 40, 42, 43, 50, 51, 65, 67, 68, 72, 74, 75, 76 | FDL\_low | - | FDL\_high | -50 | 1 |  |

### 5.x.4 ∆TIB and ∆RIB values

Table 5.x.4-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_38A\_n1 | 38 | 0.5 |
| n1 | 0.5 |

**Table 5.x.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_38A\_n1 | 38 | 0 |
| n1 | 0 |

### 5.x.5 Reference sensitivity exceptions

Table 5.x.5-1: Reference sensitivity exceptions (MSD) due to cross band isolation for PC3 EN-DC in NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA or NR Band / Channel bandwidth of the affected DL band / MSD | | | | | | | | | | | | | | |
| UL band | DL band | 5 MHz  (dB) | 10 MHz  (dB) | 15 MHz  (dB) | 20 MHz  (dB) | 25 MHz  (dB) | 30 MHz  (dB) | 40 MHz  (dB) | 50 MHz  (dB) | 60 MHz  (dB) | 70 MHz  (dB) | 80 MHz  (dB) | 90 MHz  (dB) | 100 MHz  (dB) |
| 38 | n1 | 1.9 | 1.9 | 1.9 | 1.9 |  |  |  |  |  |  |  |  |  |
| n1 | 38 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |  |  |  |  |  |  |

Table 5.x.5-2: Uplink configuration for reference sensitivity exceptions due to cross band isolation for EN-DC in NR FR1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| E-UTRA or NR Band / SCS / Channel bandwidth of the affected DL band / UL RB allocation of the agressor band | | | | | | | | | | | | | | | |
| UL band | DL band | SCS of UL band (kHz) | 5 MHz  (LCRB) | 10 MHz  (LCRB) | 15 MHz  (LCRB) | 20 MHz  (LCRB) | 25 MHz  (LCRB) | 30 MHz  (LCRB) | 40 MHz  (LCRB) | 50 MHz  (LCRB) | 60 MHz  (LCRB) | 70 MHz  (LCRB) | 80 MHz  (LCRB) | 90 MHz  (LCRB) | 100 MHz  (LCRB) |
| 38 | n1 | 15 | 100 | 100 | 100 | 100 |  |  |  |  |  |  |  |  |  |
| n1 | 38 | 15 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |  |  |  |  |  |  |

<End of Text Proposal>