**3GPP TSG-RAN WG4 Meeting #100-e R4-** **2113346**

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

**Source:** Vodafone

**Title:** TP for TR 37.717-11-11: DC\_38\_n8

**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\_n8.

The ΔTIB,c, ΔRIB and coexistence values are derived from those used for CA\_8\_38 in 36101 and DC\_8\_n41 in 38101-3.

# 2. Reference

3. Text Proposal

**<Start of Text Proposal>**

## 5.x DC\_38\_n8

### 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\_n8A | DC\_38A\_n8A | 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\_n8A | 23 | +2/-3 |

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

Table 5.x.3-1 lists the Band 38A + Band n8A 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 n8 UL harmonics and IMD products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | | **fn\_low** | **fn\_high** | |
| UL frequency (MHz) | 2570 | 2620 | | 880 | 915 | |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | | 2\* fn\_low | 2\* fn\_high | |
| 2nd harmonics frequency limits (MHz) | 5140 – 5240 | | | 1760 – 1830 | | |
| 3rd harmonics frequency limits | 3\*fx\_low | | 3\*fx\_high | 3\* fn\_low | | 3\* fn\_high |
| 3rd harmonics frequency limits (MHz) | 7710 – 7860 | | | 2640 – 2745 | | |
| 2nd order IMD products | |fn\_low – fx\_high| | |fn\_high – fx\_low| | | |fn\_low + fx\_low| | |fn\_high + fx\_high| | |
| IMD frequency limits (MHz) | 1655 – 1740 | | | 3450 – 3535 | | |
| 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) | 4225 – 4360 | | | 740 – 860 | | |
| 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) | 6020 – 6155 | | | 4330 – 4450 | | |
| 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) | 6795 – 6980 | | | 20 – 175 | | |
| 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) | 3310 – 3480 | | | 6900 – 7070 | | |
| 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) | 8590 – 8775 | | | 5210 – 5365 | | |
| 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) | 900 – 1090 | | | 9365 – 9600 | | |
| 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) | 2395 – 2600 | | | 5880 – 6100 | | |
| 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) | 6090 – 6280 | | | 11160 – 11395 | | |
| 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) | 7780 – 7985 | | | 9470 – 9690 | | |

Based on Table 5.x.3-1,

- 2nd order harmonics may fall into Rx frequencies of band 3

- 3rd order harmonics may fall into Rx frequencies of bands 7, 41, 46 and 90

- 2nd order IMD may fall into Rx frequencies of bands 22, 42, 77 and 78

- 3rd order IMD may fall into Rx frequencies of bands 12, 13, 14, 17, 20, 26, 27, 28, 44, 67, 68, 79 and 85

- 4th order IMD may fall into Rx frequencies of bands 42, 46, 52, 77 and 78

- 5th order IMD may fall into Rx frequencies of bands 8, 38, 40, 41, 46, 47, 53, 69 and 90

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 n8 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 | Yes | US/Europe | IMD5 |
| 2400 | - | 2494 | Yes | Asia | IMD5 |
| ISM band  (5GHz) | 5150 | - | 5925 | Yes | US | 3rd Harmonic, IMD4, IMD5 |
| 5150 | - | 5350 | Yes | Europe | 3rd Harmonic, IMD4 |
| 5470 | - | 5725 | No |  |
| 5150 | - | 5825 | Yes | Asia | 3rd Harmonic, IMD4 |

The following requirements for spurious emission band UE coexistence are proposed for DC\_38\_n8 reflecting a combination of those used for bands 8 and 38 in 36101.

Table 5.x.3-3: Requirements

| EN-DC Configuration | | Spurious emission | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Protected band | | Frequency range (MHz) | | | | Maximum Level (dBm) | | MBW (MHz) | | NOTE | |
| DC\_38\_n8 | | E-UTRA Band 1, 2, 4, 12, 13, 14, 17 20, 27, 28, 29, 30, 31, 32, 33, 34, 39, 40, 45, 50, 51, 65, 66, 67, 68, 72, 73, 74, 75, 76, 85, 87, 88 | | FDL\_low | - | FDL\_high | | -50 | | 1 | |  | |
| E-UTRA band 3, 22, 42, 43, 52  NR Band n77, n78, n79 | | FDL\_low | - | FDL\_high | | -50 | | 1 | | 2 | |
| E-UTRA Band 8 | | FDL\_low | - | FDL\_high | | -50 | | 1 | | 5 | |
| E-UTRA Band 11, 21 | | FDL\_low | - | FDL\_high | | -50 | | 1 | | 12 | |
| Frequency range | | 860 | - | 890 | | -40 | | 1 | | 5, 12 | |
| Frequency range | | 1884.5 |  | 1915.7 | | -41 | | 0.3 | | 3, 12 | |
| Frequency range | | 2620 | - | 2645 | | -15.5 | | 5 | | 5, 7, 22 | |
| Frequency range | | 2645 | - | 2690 | | -40 | | 1 | | 5, 22 | |
| NOTE 2: As exceptions, measurements with a level up to the applicable requirements defined in Table 6.6.3.1-2 in TS 36.101 [4] and Table 6.5.3.1-2 in TS 38.101-1 [2] are permitted for each assigned carrier used in the measurement due to 2nd, 3rd, 4th or 5th harmonic spurious emissions. Due to spreading of the harmonic emission the exception is also allowed for the first 1 MHz frequency range immediately outside the harmonic emission on both sides of the harmonic emission. This results in an overall exception interval centred at the harmonic emission of (2 MHz + N x LCRB x 180 kHz), where N is 2, 3, 4, 5 for the 2nd, 3rd, 4th or 5th harmonic respectively. The exception is allowed if the measurement bandwidth (MBW) totally or partially overlaps the overall exception interval.  NOTE 3: Applicable when co-existence with PHS system operating in 1884.5 - 1915.7 MHz  NOTE 5: These requirements also apply for the frequency ranges that are less than FOOB (MHz) in Table 6.6.3.1-1, Table 6.6.3.1A-1 in TS 36.101 [4] or in Table 6.5.3.1-1 in TS 38.101-1 [2] from the edge of the channel bandwidth.  NOTE 7: For these adjacent bands, the emission limit could imply risk of harmful interference to UE(s) operating in the protected operating band.  NOTE 12: This requirement is applicable only for the following cases: A: for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 902.5 MHz ≤ Fc < 907.5 MHz with an uplink transmission bandwidth less than or equal to 20 RB; B: for carriers of 5 MHz channel bandwidth when carrier centre frequency (Fc) is within the range 907.5 MHz ≤ Fc ≤ 912.5 MHz without any restriction on uplink transmission bandwidth; C: for carriers of 10 MHz channel bandwidth when carrier centre frequency (Fc) is Fc = 910 MHz with an uplink transmission bandwidth less than or equal to 32 RB with RBstart > 3.  NOTE 22: This requirement is applicable for power class 3 UE for any channel bandwidths within the range 2570 - 2615 MHz with the following restriction: for carriers of 15 MHz bandwidth when carrier centre frequency is within the range 2605.5 - 2607.5 MHz and for carriers of 20 MHz bandwidth when carrier centre frequency is within the range 2597 - 2605 MHz the requirement is applicable only for an uplink transmission bandwidth less than or equal to 54 RB. | | | | | | | | | | | | | |

### 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\_n8 | 38 | 0.6 |
| n8 | 0.3 |

**Table 5.x.4-2: ΔRIB**

| Inter-band DC Configuration | E-UTRA and NR Band | ΔRIB [dB] |
| --- | --- | --- |
| DC\_38A\_n8 | 38 | 0 |
| n8 | 0 |

### 5.x.5 Reference sensitivity exceptions

No additional MSD exceptions required for IMD5 compared to CA\_8A-38A or DC\_8A\_n41A.

<End of Text Proposal>