**3GPP TSG-RAN WG4 Meeting #104-bis-e R4-2216184**

**Online, 10th – 19th October 2022**

**Source:** Vodafone

**Title:** TP for TR 37.718-21-11: DC\_3-20\_n3

**Agenda item:** 5.4.2

**Document for:** Approval

1. Introduction

This contribution is a text proposal for TR 37.718-21-11 to include DC\_3-20\_n3.

The proposed ΔTIB,c, ΔRIB and MSD values were derived from those which have already been specified for DC\_20\_n3 in 38.101-3.

# 2. Reference

3. Text Proposal

**<Start of Text Proposal>**

## 5.x DC\_3-20\_n3

### 5.x.1 Configurations for DC

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

| **EN-DC**  **configuration** | **Uplink EN-DC**  **configuration**  **(NOTE 1)** |
| --- | --- |
| DC\_3A-20A\_n3A | DC\_3A\_n3A2  DC\_20A\_n3A |
| NOTE 2: Only single switched UL is supported | |

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### 5.x.2 Co-existence studies

Table 5.x.2-1 lists the Band 20A + Band n3A 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.2-1: Band 20 and Band n3 UL harmonics and IMD products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | | **fn\_low** | **fn\_high** | |
| UL frequency (MHz) | 832 | 862 | | 1710 | 1785 | |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | | 2\* fn\_low | 2\* fn\_high | |
| 2nd harmonics frequency limits (MHz) | 1664 – 1724 | | | 3420 – 3570 | | |
| 3rd harmonics frequency limits | 3\*fx\_low | | 3\*fx\_high | 3\* fn\_low | | 3\* fn\_high |
| 3rd harmonics frequency limits (MHz) | 2496 – 2586 | | | 5130 – 5355 | | |
| 2nd order IMD products | |fn\_low – fx\_high| | |fn\_high – fx\_low| | | |fn\_low + fx\_low| | |fn\_high + fx\_high| | |
| IMD frequency limits (MHz) | 848 – 953 | | | 2542 – 2647 | | |
| 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) | 14 – 121 | | | 2558 – 2738 | | |
| 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) | 3374 – 3509 | | | 4252 – 4432 | | |
| 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) | 802 – 892 | | | 1690 – 1805 | | |
| 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) | 711 – 876 | | | 4268 – 4523 | | |
| 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) | 1696 – 1906 | | | 5084 – 5294 | | |
| 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) | 4206 – 4371 | | | 5962 – 6217 | | |
| 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) | 5978 – 6308 | | | 1543 – 1738 | | |
| 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) | 3406 – 3691 | | | 834 – 1074 | | |
| 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) | 7672 – 8002 | | | 5038 – 5233 | | |
| 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) | 6794 – 7079 | | | 5916 – 6156 | | |

Based on Table 5.x.2-1,

- 2nd order harmonics may fall into Rx frequencies of band 46.

- 3rd order harmonics may fall into Rx frequencies of bands 22, 38, 41, 42, 48, 49, 69, 77, 78 and 90.

- 2nd order IMD may fall into Rx frequencies of bands 5, 6, 7, 8, 18, 19, 26, 27, 38, 41, 69 and 90.

- 3rd order IMD may fall into Rx frequencies of bands 7, 38, 41, 42, 52, 69, 77, 78, 79 and 90.

- 4th order IMD may fall into Rx frequencies of bands 3, 5, 6, 9, 12, 13, 14, 17, 18, 19, 20, 26, 27, 28, 29, 33, 35, 39, 44, 46, 67, 68, 79 and 85.

- 5th order IMD may fall into Rx frequencies of bands 5, 6, 8, 18, 19, 22, 24, 26, 27, 42, 43, 46, 47, 48, 49, 77 and 78.

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.2-2 lists if up to 3rd order harmonics and IMD up to 5th order falls into one of these receiving bands.

Table 5.x.2-2: 2UL Band 20 + Band n3 harmonic and IMD for ISM and GNSS bands

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Victim Systems** | **Frequency range [MHz]** | | | **Impact** | **Regions** | **Comments** |
| COMPASS  (Beidou) | 1559 | - | 1591 | Yes |  | IMD5 |
| Galileo | 1559 | - | 1591 | Yes |  | IMD5 |
| GLONASS | 1591 | - | 1610 | Yes |  | IMD5 |
| GPS | 1563 | - | 1587 | Yes |  | IMD5 |
| ISM band  (2.4GHz) | 2400 | - | 2483.5 | No | US/Europe |  |
| 2400 | - | 2494 | No | Asia |  |
| ISM band  (5GHz) | 5150 | - | 5925 | Yes | US | 2nd Harmonic, IMD4, IMD5 |
| 5150 | - | 5350 | Yes | Europe | 2nd Harmonic, IMD4, IMD5 |
| 5470 | - | 5725 | No |  |
| 5150 | - | 5825 | Yes | Asia | 2nd Harmonic, IMD4, IMD5 |

The requirements for spurious emission band UE coexistence already exist in 38.101-3 for DC\_20\_n3.

### 5.x.3 ∆TIB and ∆RIB values

Table 5.X.3-1: ΔTIB,c

| Inter-band DC Configuration | E-UTRA and NR Band | ΔTIB,c [dB] |
| --- | --- | --- |
| DC\_3-20\_n3 | 3 | 0.3 |
| 20 | 0.3 |
| n3 | 0.3 |

### 5.x.4 Reference sensitivity exceptions

Table 5.x4-1: MSD test points for Scell due to dual uplink operation for EN-DC in NR FR1 (three bands)

| NR or E-UTRA Band / Channel bandwidth / NRB / MSD | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| EN-DC Configuration | EUTRA / NR band | UL Fc  (MHz) | UL/DL BW  (MHz) | UL  LCRB | DL Fc (MHz) | MSD  (dB) | IMD order |
| DC\_3A-20A\_n3A | 3 | 1755 | 5 | 25 | 1850 | 4 | IMD4 |
| 20 | 845 | 5 | 25 | 804 | N/A | N/A |
| n3 | 1770 | 5 | 25 | 1865 | N/A | N/A |
| 3 | 1775 | 5 | 25 | 1870 | N/A | N/A |
| 20 | 835 | 5 | 25 | 794 | N/A | N/A |
| n3 | 1765 | 5 | 25 | 1860 | 4 | IMD4 |

<End of Text Proposal>