**3GPP TSG-RAN WG4 Meeting # 114 *R4-2501436***

**Athens, Greece, 17th – 21st February, 2025**

**Source:** Huawei, HiSilicon, Xiaomi

**Title:** TP for TR 37.719-21-11 on introduction of DC\_8A-28A\_n77A and DC\_8A-28C\_n77A

**Agenda item:** 6.2.3

**Document for:** Approval

# 1 Background

This contribution provides text proposal on the NR band combination DC\_8A-28A\_n77A and DC\_8A-28C\_n77A.

# 2 Text Proposal

##### ---Start of changes---

## 6.X DC\_8-28\_n77

### 6.X.1 Configurations for DC

Table 6.X.1-1: Inter-band EN-DC configurations within FR1 (three bands)

| EN-DC  configuration | Uplink EN-DC  configuration  (NOTE X) |
| --- | --- |
| DC\_8A-28A\_n77A  DC\_8A-28C\_n77A | DC\_8A\_n77A  DC\_28A\_n77A |
|  | |

### 6.X.2 Co-existence analysis for DC

Table 6.X.2-1: Band 8 and Band n77 UL IMD products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2385 | 3320 | 4180 | 5115 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2440 | 1470 | 5685 | 7520 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 5060 | 6030 | 7480 | 9315 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 1560 | 555 | 8985 | 11720 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| |  |  |
| IMD frequency limits (MHz) | 6640 | 4770 |  |  |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5940 | 6945 | 10780 | 13515 |
| Two-tone 4th order IMD products | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |  |  |
| IMD frequency limits (MHz) | 8360 | 10230 |  |  |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 15920 | 12285 | 360 | 680 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 10840 | 8070 | 3855 | 5760 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 14080 | 17715 | 6820 | 7860 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11660 | 14430 | 9240 | 11145 |
| NOTE 1: For each IMD item, when two bound values before taking absolute have different signs, the relevant IMD range shall be set such that (1) the lower bound is 0 and (2) the upper bound is the bigger value of the two after taking absolute.  NOTE 2: The lowest even order and lowest odd order IMD MSDs shall be considered. | | | | |

Based on Table 6.x.2-1, IMD4 may fall into Rx frequency range of band 28 when both band 8 and n77 transmit signals.

Table 6.X.2-2: Band 28 and Band n77 UL IMD products

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| 2nd order IMD products | |fy\_low – fx\_high| | |fy\_high – fx\_low| | |fy\_low + fx\_low| | |fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 2552 | 3497 | 4003 | 4948 |
| Two-tone 3rd order IMD products | |2\*fx\_low – fy\_high| | |2\*fx\_high – fy\_low| | |2\*fy\_low – fx\_high| | |2\*fy\_high – fx\_low| |
| IMD frequency limits (MHz) | 2794 | 1804 | 5852 | 7697 |
| Two-tone 3rd order IMD products | |2\*fx\_low + fy\_low| | |2\*fx\_high + fy\_high| | |2\*fy\_low + fx\_low| | |2\*fy\_high + fx\_high| |
| IMD frequency limits (MHz) | 4706 | 5696 | 7303 | 9148 |
| Two-tone 4th order IMD products | |3\*fx\_low –1\* fy\_high| | |3\*fx\_high – 1\*fy\_low| | |3\*fy\_low – 1\*fx\_high| | |3\*fy\_high – 1\*fx\_low| |
| IMD frequency limits (MHz) | 2091 | 1056 | 9152 | 11897 |
| Two-tone 4th order IMD products | |2\*fx\_low –2\* fy\_high| | |2\*fx\_high –2\* fy\_low| |  |  |
| IMD frequency limits (MHz) | 6994 | 5104 |  |  |
| Two-tone 4th order IMD products | |3\*fx\_low +1\* fy\_low| | |3\*fx\_high + 1\*fy\_high| | |3\*fy\_low + 1\*fx\_low| | |3\*fy\_high + 1\*fx\_high| |
| IMD frequency limits (MHz) | 5409 | 6444 | 10603 | 13348 |
| Two-tone 4th order IMD products | |2\*fx\_low +2\* fy\_low| | |2\*fx\_high +2\* fy\_high| |  |  |
| IMD frequency limits (MHz) | 8006 | 9896 |  |  |
| Two-tone 5th order IMD products | |fx\_low – 4\*fy\_high| | |fx\_high – 4\*fy\_low| | |fy\_low – 4\*fx\_high| | |fy\_high – 4\*fx\_low| |
| IMD frequency limits (MHz) | 16097 | 12452 | 308 | 1388 |
| Two-tone 5th order IMD products | |2\*fx\_low - 3\*fy\_high| | |2\*fx\_high - 3\*fy\_low| | |2\*fy\_low - 3\*fx\_high| | |2\*fy\_high -3\*fx\_low| |
| IMD frequency limits (MHz) | 11194 | 8404 | 4356 | 6291 |
| Two-tone 5th order IMD products | |fx\_low + 4\*fy\_low| | |fx\_high + 4\*fy\_high| | |fy\_low + 4\*fx\_low| | |fy\_high + 4\*fx\_high| |
| IMD frequency limits (MHz) | 13903 | 17548 | 6112 | 7192 |
| Two-tone 5th order IMD products | |2\*fx\_low + 3\*fy\_low| | |2\*fx\_high + 3\*fy\_high| | |2\*fy\_low + 3\*fx\_low| | |2\*fy\_high + 3\*fx\_high| |
| IMD frequency limits (MHz) | 11306 | 14096 | 8709 | 10644 |

Based on Table 6.x.2-2, IMD5 may fall into Rx frequency range of band 8 when both band 28 and n77 transmit signals.

### 6.X.3 ∆TIB and ∆RIB values

Referring to the DC\_8A\_n28A-n78A, the ΔTIB,c and ΔRIB,c can be specified below

Table 6.X.3-1: ΔTIB,c due to EN-DC

| Inter-band EN-DC configuration | ΔTIB,c for E-UTRA band / NR band (dB)\* | | |
| --- | --- | --- | --- |
| Component band in order of bands in configuration\*\* | | |
| DC\_8-28\_n77 | 0.6 | 0.5 | 0.8 |
| NOTE \*: “-” denotes ΔTIB,c = 0.  NOTE \*\*: The component band order in the configuration should be listed by the order of E-UTRA band and NR band respectively. | | | |

Table 6.X.3-2: ΔRIB,c due to EN-DC

| **Inter-band EN-DC configuration** | ΔRIB,c for E-UTRA band / NR band (dB)\* | | |
| --- | --- | --- | --- |
| Component band in order of bands in configuration\*\* | | |
| DC\_8-28\_n77 | 0.2 | 0.2 | 0.5 |
| NOTE \*: “-” denotes ΔRIB,c = 0.  NOTE \*\*: The component band order in the configuration should be listed by the order of E-UTRA band and NR band respectively. | | | |

### 6.X.4 Analysis of MSD requirements

Referring to the DC\_28A\_n8A-n78A and DC\_8A\_n28A-n78A, the MSD due to IMD4 and IMD5 can be specified below.

| 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\_8A-28A\_n77A | 8 | 910 | 5 | 25 | 955 | N/A | N/A |
|  | 28 | N/A | 5 | N/A | 765 | 11.6 | IMD4 |
|  | n77 | 3495 | 10 | 50 | 3495 | N/A | N/A |
|  | 8 | N/A | 5 | N/A | 935 | 4.3 | IMD5 |
|  | 28 | 713 | 5 | 25 | 768 | N/A | N/A |
|  | n77 | 3787 | 10 | 50 | 3787 | N/A | N/A |

##### ---End of changes---

# Reference

[1] RP-243257, “Revised WID for for Rel-19 Dual connectivity (DC) of x LTE band(s), y NR band(s) (1<=x<6, 1<=y<6, x+y<=6) and single or two NR Supplementary Uplink (SUL) bands”, Nokia, CHTTL, LGE, Samsung