**3GPP TSG RAN WG4 Meeting #98-e R4-2100279**

**Online, 25th, Jan. – 05th, Feb. 2021**

**Agenda item:** 9.7.2

**Source:** LG Electronics

**Title:** MSD results for new DC LTE x bands (xDL/1UL, x=1,2,3,4) + NR 2 bands (2DL/1UL) band combinations in Rel-17

**Document for:** Approval

# 1 Introduction

The new DC of LTE x Bands (xDL/1UL, x=1, 2, 3, 4) and NR 2 Bands (2DL/1UL) were approved in RAN#88[1] in Rel-17 timeline. And additional new DC band cpmbinations are included in revised WID in RAN #90[2]. In this paper we propose the required MSD levels for the new EN-DC bands combinations in Rel-17 base on self interference analysis [3].

# 2 MSD analysis

In rel-17 DC of LTE x Bands (xDL/1UL, x=1, 2, 3, 4) and NR 2 Bands (2DL/1UL) basket WI, RAN4 also consider shared antenna RF architectures for NSA UE in sub-6GHz as LTE system. So we consider shared antenna RF architecture for general NSA DC UE to derive MSD levels. Also separate antenna RF architecture is considered in some specific band combinations which was considered in general NR RF session.

For the MSD analysis of these several DC band combinations between LTE and NR, we assume the following parameters and attenuation levels based on current UE RF FE components as shown in Table 1 and 2.

Table 1 show the RF component isolation parameters to derive MSD level at sub-6GHz.

**Table 1: UE RF Front-end component parameters**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| UE ref. architecture  Component | Triplexer-Diplexer  Architecture w/ single ant. or dual ant. | | | |
| DC\_21A\_n28A-n77A, DC\_1A\_n28A-n79A, DC\_3A\_n28A-n79A, DC\_21A\_n28A-n79A, DC\_21A\_n28A-n78A, DC\_5A\_n2A-n77A, DC\_13A\_n5A-n77A | | | |
| IP2 (dBm) | IP3 (dBm) | IP4 (dBm) | IP5 (dBm) |
| Ant. Switch | 112 | 68 | 55 | 55 |
| Triplexer | 110 | 72 | 55 | 52 |
| Quadplexer |  |  |  |  |
| Diplexer | 115 | 87 | 55 | 55 |
| Duplexer | 100 | 75 | 55 | 53 |
| PA Forward | 28.0 | 32 | 30 | 28 |
| PA Reversed | 40 | 30.5 | 30 | 30 |
| LNA | 10 | 0 | 0 | -10 |

Table 2 show the isolation levels according to the RF component.

**Table 2: UE RF Front-end component isolation parameters**

|  |  |  |
| --- | --- | --- |
| Isolation Parameter | Value (dB) | Comment |
| Antenna to Antenna | 10 | Main antenna to diversity antenna |
| PA (out) to PA (in) | 60 | PCB isolation (PA forward mixing) |
| Triplexer | 20 | High/low band isolation |
| Diplexer | 25 | High/low band isolation |
| PA (out) to PA (out) | 60 | L-H/H-L cross-band |
| PA (out) to PA (out) | 50 | H-H cross-band |
| LNA (in) to PA (out) | 60 | L-H/H-L cross-band |
| LNA (in) to PA (out) | 50 | H-H cross-band |
| Duplexer | 50 | Tx band rejection at Rx band |

Based on these assumptions, we proposed the MSD levels as below in Table 3.

**Table 3: Proposed MSD test configuration and results for self desense problems**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc  (MHz) | UL BW (MHz) | UL  RB # | DL Fc  (MHz) | DL BW  (MHz) | MSD  (dB) |
| DC\_21A\_n28A-n77A  DC\_21A\_n28A-n78A | B21 | IMD3 | |2\*fB21 +fn28| | 1457.5 | 5 | 25 | 1505.5 | 5 | **N/A** |
| n28 | 710 | 5 | 25 | 765 | 5 |
| n77/n78 | 3625 | 10 | 50 | 3625 | 10 | **15.7** |
| DC\_1A\_n28A-n79A | B1 | IMD3 | |2\*fB1 +fn28| | 1960 | 5 | 25 | 2150 | 5 | **N/A** |
| n28 | 743 | 5 | 25 | 798 | 5 |
| n79 | 4663 | 40 | 216 | 4663 | 40 | **16.4** |
| DC\_3A\_n28A-n79A | B3 | IMD4 | |2\*fB3 +2\*fn28| | 1720 | 5 | 25 | 1815 | 5 | **N/A** |
| n28 | 710 | 5 | 25 | 765 | 5 |
| n79 | 4860 | 40 | 216 | 4860 | 40 | **10.4** |
| DC\_21A\_n28A-n79A | B21 | IMD4 | |2\*fB21 +2\*fn28| | 1460 | 5 | 25 | 1508 | 5 | **N/A** |
| n28 | 745 | 5 | 25 | 800 | 5 |
| n79 | 4420 | 40 | 216 | 4420 | 40 | **8.8** |
| B21 | IMD5 | |4\*fB21 -fn79| | 1450.4 | 5 | 25 | 1498.4 | 5 | **N/A** |
| n79 | 4980 | 40 | 216 | 4980 | 40 |
| n28 | 745 | 5 | 25 | 800 | 5 | **1.7** |
| DC\_13A\_n5A-n77A | 13 | IMD5 | |4\*fB13 -fn77| | 782 | 5 | 25 | 751 | 5 | **N/A** |
| n77 | 4013 | 10 | 50 | 4013 | 10 |
| n5 | 840 | 5 | 25 | 885 | 5 | **4.5** |

For the DC\_21A\_n28A-n77A, DC\_21A\_n28A-n78A, DC\_21A\_n28A-n79A, DC\_1A\_n28A-n79A and DC\_3A\_n28A-n79A, the related proponent’ papers were considered the above MSD values to derive MSD requirements.

# 3 Proposed text for TR37.717-11-21:

***[Unchanged Parts Skipped]***

## 6.X DC\_13\_n5-n77

### 6.X.5 MSD

Based on Table 5.3-1 in TR 37.717-11-21, there is IMD5 produced by Band 13 and NR band n77 that impact the reference sensitivity of NR band n5.

The required MSD level and test configuration are shown in the following Table.

Table 6.X.5-1: Reference sensitivity exceptions for Scell due to dual uplink operation for DC in NR FR1 (three bands)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DC bands | UL DC | IMD | | UL Fc  (MHz) | UL BW (MHz) | UL  RB # | DL Fc  (MHz) | DL BW  (MHz) | MSD  (dB) |
| DC\_13A\_n5A-n77A | 13 | IMD5 | |4\*fB13 -fn77| | 782 | 5 | 25 | 751 | 5 | **N/A** |
| n77 | 4013 | 10 | 50 | 4013 | 10 |
| n5 | 840 | 5 | 25 | 885 | 5 | **4.5** |

***[End of changes]***