3GPP TSG-RAN WG4 Meeting # 96-e R4-2100258

Electronic Meeting, 25th January – 5th February, 2021

**Source: Verizon**

**Title: Requirement of band 46 reference sensitivity measurement for NR EN-DC band combinations**

Agenda item: 9.3.2

Document for: Discussion/Approval

# **Introduction**

In drafting TPs for DC\_46\_n2, DC\_46\_n5 and DC\_46\_n66 into TR 37.717-11-11 according to the request in [1], we realized a requirement of band 46 reference sensitivity measurement exclusion region is missing for the impact from licensed component carriers. This interrupts the related TPs works. However, a clear requirement for the LTE CA is defined in 36.101[2].

This contribution is to search for a RAN4 decision for how to utilize the band 46 in the EN-DC band combination in Rel-17.

# **Reference**

[1] RP-202545, New WID on Rel-17 Dual Connectivity (DC) of 1 band LTE (1DL/1UL) and 1 NR band (1DL/1UL).

[2] TS36.101 ([17.0.0](https://www.3gpp.org/ftp/Specs/archive/36_series/36.101/36101-h00.zip)): Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio transmission and reception

# **Discussion**

## Three EN-DC configurations are from Appendix attached below as an example. The configurations of band 46 are restricted in the inter-band carrier aggregation and in downlink operation only. And its uplink will be paired with a licensed uplink operating band configured as Pcell carrier.

**Table 3-1: Inter-band EN-DC configurations of 1 LTE band + 1 NR band**

| EN-DCconfiguration | Uplink EN-DCconfiguration(NOTE 1) | Single UL allowed |
| --- | --- | --- |
| DC\_46A\_n2A | N/A | N/A |
| DC\_46A\_n5A | N/A | N/A |
| DC\_46A\_n66A | N/A | N/A |
| NOTE 1: Band 46 is restricted in downlink operation to E-UTRA operation when inter-band carrier aggregation is configured. |

### As indicated in the Appendix below, levels of harmonic products of the licensed operation bands will fall into the band 46 receiver frequency ranges although the band 46 is configured in downlink only. Demotion of Rx reference could be a sensitive impact for the individual RE falling in the band downlink operating bandwidth. Then, there is no such requirement defined for the band 46 in 38.101-3.

### Instead, RAN4 defined the requirement in terms of ‘band 46 reference measurement exclusion regions’ for each licensed component carrier in the Table 7.3.1A-0eC of 36.101. Because of the difference between LTE and NR definition, it is hard to re-claim the same requirement from 36.101 to the NR EN-DC band combination. For this, the three EN-DC carrier aggregations items listed in the table above are on pending.

For completion of three NE-DC requirements, a RAN4 decision is needed for whether or not a similar exclusion region should be required for the three NR EN-DC band combinations as indicated in a table below (Table 3-2). And, what is the reference sensitivity measurement region in case if it is.

**Proposal-1: RAN4 should make a decision if the band 46 reference measurement exclusion region is needed for the licensed band n2, n5 and n66 (limited up to 5th harmonic) in the EN-DC carrier aggregations.**

**Proposal-2: Encourage companies to provide inputs for the “band 46 reference measurement exclusion regions” to RAN4**

Table 3-2: Band 46 Reference sensitivity measurement exclusion region in MHz.

|  |
| --- |
| Licensed Component Carriers / E-UTRA Band / Harmonic order / Channel BW in UL |
| Licensed Component Carriers | Harmonic order | 5MHz | 10MHz | 15MHz | 20MHz | 25MHz | 30MHz | 40MHz |
| n2 | 3 | ? | ? | ? | ? |  |  |  |
| n5 | 7 | ? | ? | ? | ? |  |  |  |
| n66 | 3 | ? | ? | ? | ? | ? | ? | ? |

# **Conclusion**

We discussed a possible missing requirement for the EN-DC carrier aggregation with restricted band 46 configuration. And, we have a proposal for the three EN-DC configurations.

**Proposal-1: RAN4 should make a decision if the band 46 reference measurement exclusion regions is needed for the licensed band n2, n5 and n66 (limited up to 5th harmonic) in the EN-DC carrier aggregations.**

**Proposal-2: Encourage companies to provide inputs for the “band 46 reference measurement exclusion regions” to RAN4.**

Appendex (informative purpose only)

3GPP TSG-RAN WG4 Meeting # xx-e R4-21xxxxx

Electronic Meeting, dd/mm/2021

Source:

Title: TP for TR 37.717-11-11 for DC\_46\_n2, DC\_46\_n5 and DC\_46\_n66

Agenda item: x.x.x

Document for:

# **Introduction**

This contribution is a text proposal for TR 37.717-11-11 to include DC\_46\_n2, DC\_46\_n5 and DC\_46\_n66 according to the request in [1].

# **Reference**

[1] RP-202545, New WID on Rel-17 Dual Connectivity (DC) of 1 band LTE (1DL/1UL) and 1 NR band (1DL/1UL).

# **Text Proposal**

**<Start of Text Proposal>**

## 6.1.x DC\_46\_n2, DC\_46\_n5, DC\_46\_n66

### 6.1.x.1 Configuration for DC

**Table 6.1.x.1-1: Inter-band EN-DC configurations of 1 LTE band + 1 NR band**

| EN-DCconfiguration | Uplink EN-DCconfiguration(NOTE 1) | Single UL allowed |
| --- | --- | --- |
| DC\_46A\_n2A | N/A | N/A |
| DC\_46A\_n5A | N/A | N/A |
| DC\_46A\_n66A | N/A | N/A |
| NOTE 1: Band 46 is restricted in downlink operation to E-UTRA operation when inter-band carrier aggregation is configured.  |

### 6.1.x.2 Spurious emission band UE co-existence for DC

**Table 6.1.x.2-1: Spurious emissions for inter-band EN-DC of 1 LTE band + 1 NR band**

| EN-DC CA Configuration | Spurious emission  |
| --- | --- |
| Protected band | Frequency range (MHz) | Maximum Level (dBm) | MBW (MHz) | NOTE |
| DC\_46A\_n2A | N/A |
| DC\_46A\_n5A | N/A |
| DC\_46A\_n66A | N/A |

### 6.1.x.3 MSD analysis for DC

For study of 2UL/2DL, Table 6.1.x3-1 lists up to 5th order harmonics products for DC\_46A-n2A

**Table 6.1.x.3-1: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 5150 | 5925 | 1850 | 1910 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz)  | 10300 | 11850 | 3700 | 3820 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 15450 | 17775 | 5550 | 5730 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\*fy\_low | 4\*fy\_high |
| 4th harmonics frequency limits (MHz) | 20600 | 23700 | 7400 | 7640 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 25750 | 29625 | 9250 | 9550 |

For study of 2UL/2DL, Table 6.1.x3-2 lists up to 5th order harmonics products for DC\_46A-n66A

**Table 6.1.x.4-2: Harmonic and IMD analysis**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UE UL carriers** | **fx\_low** | **fx\_high** | **fy\_low** | **fy\_high** |
| UL frequency (MHz) | 5150 | 5925 | 1710 | 1780 |
| 2nd harmonics frequency limits | 2\*fx\_low | 2\*fx\_high | 2\* fy\_low | 2\* fy\_high |
| 2nd harmonics frequency limits (MHz)  | 10300 | 11850 | 3420 | 3560 |
| 3rd harmonics frequency limits | 3\*fx\_low | 3\*fx\_high | 3\* fy\_low | 3\* fy\_high |
| 3rd harmonics frequency limits (MHz) | 15450 | 17775 | 5130 | 5340 |
| 4th harmonics frequency limits | 4\*fx\_low | 4\*fx\_high | 4\*fy\_low | 4\*fy\_high |
| 4th harmonics frequency limits (MHz) | 20600 | 23700 | 6840 | 7120 |
| 5th harmonics frequency limits | 5\*fx\_low | 5\*fx\_high | 5\* fy\_low | 5\* fy\_high |
| 5th harmonics frequency limits (MHz) | 25750 | 29625 | 8550 | 8900 |

In summary of studies, it could be seen,

* The 3rd order harmonics from band n2 and n66 UL may fall into band 46 DL frequency range

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**<End of Text Proposal>**