**3GPP TSG-RAN WG4 Meeting # 112 R4-2414274**

**Maastricht, Netherlands, August 19 – August 23, 2024**

**Agenda item:** 7

**Source:** CMCC

**Title:** WF on introduction of PC2 and 40MHz CBW in NR band n28

**Document for:** Approval

# Introduction

This way forward captures the agreements for [112][115] NR\_n28\_PC2\_40MHz. The summary in RAN4#112 is R4-2412817.

# UE RF requirements

### Sub-topic 2-1 General issue

**Issue 2-1-1: UE architecture assumption**

**Agreement:**

* No need to study the feasibility of UE architecture, companies are encouraged to provide analysis on RF requirements based on their own implementation.
* RAN4 RF requirements should accommodate different UE architecture assumption.
* FFS on whether single set of requirements for different UE architectures should be defined.

**Issue 2-1-2: A-MPR simulation assump**ti**on**

**Agreement:**

* Reuse Rel-18 A-MPR simulation assumption in this WI.

### Sub-topic 2-2 PC2 requirements for BW<=30MHzs

**Issue 2-2-1 PC2 RSD for 1Tx and 2Tx for BW<=30MHz**

**Agreement:**

* Define RSD requirements as following:

Table 1: Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for single Tx

| Operating Band | 3  MHz (dB) | 5  MHz (dB) | 10  MHz (dB) | 15  MHz (dB) | 20  MHz (dB) | 25  MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40  MHz (dB) | 45 MHz (dB) | 50  MHz (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n28 | 0.6 | 0.6 | 0.7 | 0.8 | 1.3 | 2.4 | 2.9 |  |  |  |  |

Table 2 Reference Sensitivity Degradation from PC3 to PC2 for FDD bands for dual Tx

| Operating Band | 3  MHz (dB) | 5  MHz (dB) | 10  MHz (dB) | 15  MHz (dB) | 20  MHz (dB) | 25  MHz (dB) | 30 MHz (dB) | 35 MHz (dB) | 40  MHz (dB) | 45 MHz (dB) | 50  MHz (dB) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n28 | 1.1 | 1.1 | 1.1 | 1.3 | 3.0 | 6.6 | 7.9 |  |  |  |  |

**Issue 2-2-2 NS\_17 A-MPR for PC2 for BW<=30MHz**

**Agreement:**

* Use following values in Rel-18 WF as starting point:
* **Table 1: A-MPR regions for NS\_17 for PC2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Channel Bandwidth, MHz** | **Carrier Center Frequency, Fc, MHz** | **Regions** | | **A-MPR** |
|  |  | **RBstart\*12\*SCS**  **MHz** | **LCRB\*12\*SCS**  **MHz** |  |
| 10 MHz | 723 ≤ Fc ≤ 728 | ≤ 0.18 | ≤ 1.44 | A1 |
| ≥ 0 | > 5.4 | A2 |

* **Table 2: A-MPR for NS\_17 for PC2**

|  |  |  |  |
| --- | --- | --- | --- |
| **Modulation/Waveform** | | **A1** | **A2** |
|  | | **Outer/Inner** | **Outer/Inner** |
| DFT-s-OFDM | PI/2 BPSK | ≤ [3] | ≤ [4] |
| QPSK | ≤ [3] | ≤ [4] |
| 16 QAM | ≤ [3.5] | ≤ [4] |
| 64 QAM | ≤ [4] | ≤ [4.5] |
| 256 QAM |  | ≤ [5.5] |
| CP-OFDM | QPSK | ≤ [5] | ≤ [5.5] |
| 16 QAM | ≤ [5] | ≤ [5.5] |
| 64 QAM | ≤ [5] | ≤ [5.5] |
| 256 QAM |  |  |

**Issue 2-2-3 NS\_18 A-MPR for PC2 for BW<=30MHz**

**Agreement:**

* Reuse Rel-18 requirement for NS\_18. (refer to R4-2310245)

### Sub-topic 2-3 40MHz requirements for PC3 and PC2

**Issue 2-3-1 Uplink configuration for n28 REFSENS**

**Agreement:**

* Adopt the following UL configuration for 40MHz

| Operating band / SCS (kHz) / Channel bandwidth (MHz) / Duplex mode | | | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Operating Band | SCS | 3 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 60 | 70 | 80 | 90 | 100 | Duplex Mode |
| n28 | 15 | 15 | 25 | 251 | 251 | 251 | 251 | 251 |  | 251 |  |  |  |  |  |  |  | FDD |
|  | 30 |  |  | 101 | 101 | 101 | 101 | 101 |  | 101 |  |  |  |  |  |  |  |  |
| Note 1: UL resource blocks shall be located as close as possible to the downlink operating band but confined within the transmission bandwidth configuration for the channel bandwidth (Table 5.3.2-1). | | | | | | | | | | | | | | | | | | |

**Issue 2-3-2 n28 REFSENS for PC3**

**Agreement:**

* FFS on PC3 REFSENS based on more companies’ input.
* Following values are proposed in this meeting as starting point.

|  |  |
| --- | --- |
| Source | 40 MHz (dBm) |
| Skyworks(R4-2413062) | -66.3 |
| Qualcomm (R4-2413149) | -65.9 |
| Muruta (R4-2411476) | -67.1 for 15KHz  -67.2 for 30KHz |
| Average | -66.4 |

**Issue 2-3-3 PC2 RSD for 1Tx and 2Tx for 40MHz**

**Agreement:**

* FFS on PC2 RSD for 40MHz

**Issue 2-3-4 ∆MPR for 40MHz**

**Agreement:**

* Further check if ΔMPR= 0.5dB is sufficient

**Issue 2-3-5 NS\_17 for 40MHz**

**Agreement:**

* Do not specify NS\_17 for 40 MHz CBW

**Issue 2-3-6 NS\_18 for 40MHz**

**Agreement:**

* Specify NS\_18 for 40MHz. FFS on the requirements.

**Issue 2-3-7 General coex requirements for 40MHz**

**Agreement:**

* FFS on whether general co-existence requirements specified for n28 are applicable for 40MHz

**Issue 2-3-8 channel location**

**Agreement:**

* For UEs supporting 40MHz max bandwidth, the following requirements apply. For the 20 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 713-733 MHz or 728-738 MHz. For the 25 MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to either 715.5-730.5 MHz or 730.5-735.5 MHz. For the 30MHz bandwidth, the minimum requirements are specified for NR UL carrier frequencies confined to 718-728MHz or 733MHz. For the 40MHz bandwidth, the minimum requirements are specified for NR UL transmission bandwidth configuration confined to 703-743MHz.
* Note: The wording can be refined when drafting the CR.

**Issue 2-3-9 channel raster**

**Agreement:**

* Add the exceptional channel raster point of n28 (UL: 723.04MHz, DL: 778.04MHz) to UE RF specification TS 38.101-1 for UE CBW 40MHz.
* FFS on UE supporting 40 MHz channel bandwidth in band n28 shall support Enhanced channel raster.

<HW>: If the exceptional channel raster is added, the enhanced channel raster seems unnecessary for 40MHz. The 40MHz spectrum on n28 is available in very limited regions. In reality, the operator may only use the exceptional channel raster point to accommodate both 40MHz and 30MHz UEs.

**Issue 2-3-10 Release independence**

**Agreement:**

* FFS on the release independence of 40MHz for n28
  + Option 1: Rel-15
  + Option 2: Rel-16

<HW>: The exceptional channel raster point for n28 is available from Rel-16. It seems that the answer is obvious. Still FFS?