**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:**

* ΔMPR= 0.5dB

**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, 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 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.

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

**Agreement:**

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