**3GPP TSG-RAN WG4 Meeting #116bis R4-25xxxxxx**

**Prague, Czech Republic, 13rd – 17st Oct, 2025**

**Title:**  WF on 6MHz

**Agenda Item:** 7.1.1

**Source:** Samsung, Nokia, Ericsson, Skyworks, Apple, [Huawei, CATT, ZTE, Qualcomm]

**Document for:** Approval

# 1. System parameters

## 1.1 Spectrum utilization

**Agreement:**

* For 6MHz (SCS=15KHz), the maximum transmission bandwidth configuration (NRB) is 30RB and guard band is 292.5KHz.

## 1.2 Channel spacing, channel raster and sync raster

**Agreement:**

* Channel spacing, channel raster and sync raster are not affected by the introduction of 6 MHz channel bandwidth.

## 1.3 Optional CBW

**Agreement:**

* Support of 6 MHz is optional in Rel-20 and in the previous releases. Update TS38.101-1 Table 5.3.5-1 as shown below.
* For single CC operation, 6 MHz is release independent from Rel-15.

| **NR Band** | **SCS (kHz)** | **UE Channel bandwidth (MHz)** | | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **3** | **5** | **6** | **10** | **15** | **20** | **25** | **30** | **35** | **40** | **45** | **50** | **60** | **70** | **80** | **90** | **100** |
| n5 | 15 | 34 | 5 | 64 | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  | 10 | 15 | 20 | 253 |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n8 | 15 |  | 5 | 64 | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  | 10 | 15 | 20 | 253 | 303 | 353 |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n12 | 15 | 34 | 5 | 64 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n29 | 15 |  | 5 | 64 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  | 10 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| n85 | 15 | 34 | 5 | 64 | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30 |  |  |  | 10 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| NOTE 4: This UE channel bandwidth is optional in this release of the specification. | | | | | | | | | | | | | | | | | | |

## 1.4 Minimum CBW

**Agreement:**

* 6 MHz can not be the minimum channel BW in a NR band.

# 2. UE RF

## SEM

**Agreement:**

* SEM requirement for 6MHz channel BW is the same with 7 and 10 MHz channel BW.

## MPR

**Agreement:**

* The MPR requirements are not impacted by the introduction of 6MHz.

## NS\_01 and NS\_100

**Agreement:**

* NS\_01: 6 MHz shall be added to the list of considered channel BW for the NS.
* NS\_100: No update needed.

## 2.4 NS\_06, NS\_14, NS\_15, NS\_43/43U

**Agreement:**

* Conduct MPR evaluation (if needed) for
* NS\_06 for n12 (PC3)
* For information: Current spec states “For power class 3 operation on bands n12, n13, n14, n85 and n110, no A-MPR is applicable.
* NS\_06 for n85 (PC3 and PC2)
* For information: Current spec states “For power class 3 operation on bands n12, n13, n14, n85 and n110, no A-MPR is applicable.
* NS\_14 for n5 (PC3 and PC2)
* For information: A-MPR is not defined for 7MHz for n5 PC3 and PC2
* NS\_15 for n5 (PC3 and PC2)
* [NS\_43/43U for n8: A-MPR evaluation not needed as only 5, 10 or 15 MHz channel bandwidths are expected in Japan] → Check with SB
* Additional requirements for NS\_06 for 6MHz is defined as

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ΔfOOB (MHz) |  | Channel bandwidth (MHz) / Spectrum emission limit (dBm) | | | | Measurement bandwidth |
|  | 3 | 5 | 6 | 10 | 15 |  |
| ± 0 – 0.1 | -13 | -15 | -15 | -18 | -20 | 30 kHz |
| ± 0.1 – 1 | -13 | -13 | -13 | -13 | -13 | 100 kHz |
| ± 1 – 5 | -13 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 5 – 6 | -25 | -13 | -13 | -13 | -13 | 1 MHz |
| ± 6 – 10 |  | -25 | -25 |  |  |  |
| ± 10 – 11 |  |  |  | -25 |  |  |
| ± 11 – 15 |  |  |  |  |  |  |
| ± 15 – 20 |  |  |  |  | -25 |  |

* FFS whether 6 MHz channel bandwidth needs to be added in the Additional requirements for “NS\_15” table
* [6 MHz channel bandwidth shall be updated in the Additional requirements for “NS\_43” and “NS\_43U” table.]

## 2.5 Minimum Output power, Transmit Off power, Occupied bandwidth, ACLR, general spurious

**Agreement:**

* The requirement for 6 MHz is the same requirement with the requirement of 5/7/10MHz. 6 MHz shall be added to:
* Table 6.3.1-1 (minimum output power).
* Table 6.3.2-1(Transmit Off power).
* Table 6.5.1-1 (occupied bandwidth).
* Table 6.5.2.4.1-1 (ACLR).
* Table 6.5.3.1-1 (general spurious).
* Other Tx requirements are not impacted by the introduction of 6 MHz channel BW.

## 2.6 REFSENS and UL configuration for FDD bands

**Agreement:**

| Operating Band | SCS kHz | 3  MHz (dBm) | 5  MHz (dBm) | 6  MHz  (dBm) | 7  MHz  (dBm) | 10  MHz (dBm) | 15  MHz (dBm) | 20  MHz (dBm) | 25  MHz (dBm) | 30 MHz (dBm) | 35 MHz (dBm) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n5 | 15 | -100.2 | -98.0 | -97.2 | -96.5 | -94.8 | -93.0 | -86.8 | -84.8 |  |  |
| 30 |  |  |  |  | -95.1 | -93.1 | -88.6 | -84.9 |  |  |
| n8 | 15 |  | -97.0 | -96.2 |  | -93.8 | -91.4 | -85.8 | -83.6 | -81.3 | -78.4 |
| 30 |  |  |  |  | -94.1 | -91.7 | -87.2 | -84.7 | -81.4 | -78.5 |
| n12 | 15 | -99.2 | -97.0 | -96.2 |  | -93.8 | -84.0 |  |  |  |  |
| 30 |  |  |  |  | -94.1 | -84.1 |  |  |  |  |
| n85 | 15 | -99.2 | -97.0 | -96.2 |  | -93.8 | -84.0 |  |  |  |  |
|  | 30 |  |  |  |  | -94.1 | -84.1 |  |  |  |  |

| **Operating Band** | **SCS** | **3** | **5** | **6** | **7** | **10** | **15** | **20** | **25** | **30** | **35** | **Duplex Mode** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n5 | 15 | 15 | 25 | 251 | 251 | 251 | 201 | 201 | Note 5 |  |  | FDD |
|  | 30 |  |  |  |  | 121 | 101 | 101 | Note 5 |  |  |  |
| n8 | 15 |  | 25 | 251 |  | 251 | 201 | 201 | Note 5 | Note 5 | Note 5 | FDD |
|  | 30 |  |  |  |  | 121 | 101 | 101 | Note 5 | Note 5 | Note 5 |  |
| n12 | 15 | 15 | 201 | 201 |  | 201 | 201 |  |  |  |  | FDD |
|  | 30 |  |  |  |  | 101 | 101 |  |  |  |  |  |
| n85 | 15 | 15 | 201 | 201 |  | 201 | 201 |  |  |  |  | FDD |
|  | 30 |  |  |  |  | 101 | 101 |  |  |  |  |  |

## 2.7 REFSENS for SDL band n29

**Agreement:**

* Add 6MHz for n29 in Table 7.3.2-1b

## 2.8 Maximum input level

**Agreement:**

* The requirement for 6 MHz is the same requirement than the requirement for 3-20 MHz. 6 MHz shall be added to Table7.4-1.

## 2.9 ACS, In-band blocking, Out of band blocking, Narrow Band blocking, Intermodulation, Spurious response

**Agreement:**

* The requirement for 6 MHz is the same requirement with the requirement for 5,7 and10 MHz. 6 MHz shall be added to:
* Tables 7.5-1, 7.5-3 and 7.5-4 (ACS).
* Table 7.6.2-1 (In-band blocking).
* Table 7.6.3-1, and power in transmission bandwidth configuration as REFSENS + 6.0 (Out of band blocking).
* Table 7.6.4-1, and Pw =15 (Narrow band blocking).
* Table 7.7-1(Spurious response).
* Table 7.8.2-1(Intermodulation).
* Other Rx requirements are not impacted.

# 3. General for BS

## 3.1 NB-IoT support

**Agreement:**

* NB-IoT operating in NR in-band is supported for 6 MHz channel bandwidth.

## 3.2 Multi-carrier and CA

**Agreement:**

* Muti-carrier (including MSR) and CA related requirements are considered for new added 7MHz WID but no new BCS is specified within this WI.

## 3.3 IAB and NCR

**Agreement:**

* 6 MHz should not be supported by IAB and NCR

# 4. BS RF

## 4.1 ACLR

**Agreement:**

* Add 6 MHz to the list of NR channel bandwidths for ACLR/CACLR.

## 4.2 Total power dynamic range

**Agreement:**

* The total power dynamic range is 14.7dB for core requirement

## 4.3 EVM

**Agreement:**

* Annex B.5.3 should be updated to include EVM window length for 6 MHz channel BW, which is same with 5 and 7MHz channel BW.

## 4.4 Occupied bandwidth test requirement

**Agreement:**

* For the Occupied bandwidth test requirement, define Span as 12 MHz, with Minimum number of measurement points as 400.

## 4.5 RFC for Rx dynamic range

**Agreement:**

* For RF Rx dynamic range requirement, reuse FRC G-FR1-A2-1

## 4.6 REFSENS

**Agreement:**

* REFSENS for 6 MHz channel BW is same with 5, 7, 10, 15MHz, assuming FRC G-FR1-A1-1

## 4.7 Dynamic range (conducted core)

**Agreement:**

* Dynamic Range limit and Interfering signal level for 6 MHz channel BW.
* Wanted signal is:
* WA BS: -70.7 dB
* MR BS: -65.7 dB
* LA BS: -62.7 dB
* Interfering signal is:
* WA BS: -81.7 dB (Huawei, Nokia, ZTE) or -81.6 dB (Ericsson, CATT)
* MR BS: -76.7 dB (Huawei, ZTE) or -76.6 dB (Ericsson, CATT)
* LA BS: -73.7 dB (Huawei, ZTE) or -73.6 dB (Ericsson, CATT)

## 4.8 Dynamic range for NB-IoT operation in NR in-band

**Agreement:**

* Add 6MHz CBW to Table 6.2.4.2-1, reuse legacy NB-IoT RB power dynamic range for 3, 5, 7, 10MHz CBW.

4.9 Other impacted Rx requirements

**Agreement:**

* The following Rx requirements should also be updated to include 6 MHz channel BW. FFS the listed options for ACS, Narrowband blocking, Receiver intermodulation and ICS in future meetings.
* ACS. Define the value of Interfering signal centre frequency offset from the lower/upper Base Station RF Bandwidth edge or sub-block edge inside a sub-block gap as:
* Option 1: ±2.5125 MHz (Ericsson, ZTE, Huawei)
* Option 2: ±2.5050 MHz (Nokia)
* General blocking. Same requirements with 5, 7, 10 MHz channel BW.
* Narrowband blocking.
* Option 1: ±(355+m\*180), m=0, 1, 2, 3, 4, 9, 14, 19, 24 (Nokia)
* Option 2: ±(360+m\*180) kHz, with m=0, 1, 2, 3, 4, 9, 14, 19, 24. (Ericsson, ZTE)
* Receiver intermodulation.

**Table: Interfering signals for intermodulation requirement**

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Interfering signal centre frequency offset from the lower/upper *Base Station RF Bandwidth* edge (MHz) | Type of interfering signal (Note 3) |
| 3 | ±4.5 | CW |
| ±10.5 | 3 MHz DFT-s-OFDM NR signal |
| 5 | ±7.5 | CW |
|  | ±17.5 | 5 MHz DFT-s-OFDM NR signal (Note 1) |
| 6 | ±7.475 (Nokia, ZTE);  ±7.52 (Ericsson); | CW |
| ±17.5 | 5 MHz DFT-s-OFDM NR signal (Note 1) |

**Table: Interfering signals for narrowband intermodulation requirement in FR1**

|  |  |  |
| --- | --- | --- |
| *BS channel bandwidth* of the *lowest/highest carrier* received (MHz) | Interfering RB centre frequency offset from the lower/upper *Base Station RF Bandwidth edge* or *sub-block* edge inside a *sub-block gap* (kHz) (Note 3) | Type of interfering signal |
| 3 | ±360 | CW |
| ±960 | 3 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 5 | ±360 | CW |
|  | ±1420 | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |
| 6 | ±425 (Nokia, ZTE);  ±630 (Ericsson); | CW |
| ±1240 (Nokia, ZTE);  ±1560(Ericsson); | 5 MHz DFT-s-OFDM NR signal, 1 RB (Note 1) |

* ICS.

**Table: Wide Area BS in-channel selectivity**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *BS channel bandwidth* (MHz) | Subcarrier spacing (kHz) | Reference measurement channel | Wanted signal mean power (dBm) | Interfering signal mean power (dBm) | Type of interfering signal |
| 3 | 15 | G-FR1-A1-20 | -102.8 | -83.6 | DFT-s-OFDM NR signal, 15 kHz SCS,  6 RBs |
| 5 | 15 | G-FR1-A1-7 | -100.6 | -81.4 | DFT-s-OFDM NR signal, 15 kHz SCS,  10 RBs |
| 6 | 15 | G-FR1-A1-7 | -100.6 | Option1: -79.6(Nokia, ZTE, Huawei);  Option 2:-80.6(Huawei);  Option3: -81.4 (Ericsson,Huawei); | DFT-s-OFDM NR signal, 15 kHz SCS,  Option1: 15 RBs(Nokia, ZTE, Huawei);  Option 2: 12RBs (Huawei)  Option3: 10RBs (Ericsson, Huawei); |

# 5. Annex: Information for CR splitting

|  |  |
| --- | --- |
| **Technical specification** | **Companies** |
| **TS 38.104** | Nokia |
| **TS 38.141-1** | Ericsson |
| **TS 38.141-2** | [Huawei] |
| **TS 38.101-1** | [Apple, Qualcomm, T-mobile USA, Skyworks, Huawei]  Note: big CR is led by Apple |
| **TS 38.101-4** | [Qualcomm] |
| **TS 38.133** | [ZTE] |
| **TS 38.307** | Nokia |
| **TS 37.104** | [Nokia] |
| **TS 37.141** | [ZTE] |
| **TS 38.106 (\*)** | Ericsson |
| **TS 38.115-1 (\*)** | [CATT] |
| **TS 38.115-2 (\*)** | [CATT] |
| **~~TS 38.174 (\*)~~** | ~~Nokia~~ |
| **~~TS 38.176-1 (\*)~~** | ~~Nokia~~ |
| **~~TS 38.176-2 (\*)~~** | ~~[Huawei]~~ |
| **TS 38.113** | [ZTE] |
| **TS 37.113** | Ericsson |
| **TS 37.105** | [Huawei] |
| **TS 37.145-1** | [Huawei] |
| **TS 37.145-2** | [Huawei] |
| (\*) The NCR and IAB specs would need to be updated to clarify 6 MHz channel BW is not supported. | |