3GPP RAN WG4 Meeting #112 R4-2414300

Maastricht, Netherlands, 19th – 23th August 2024 (revision of R4-2411141)

Agenda item: 8.2.3

Source: Apple, Qualcomm

Title: TP for 38.922 on UE IMT parameters for 7125-8400MHz

WI/SI: FS\_NR\_IMT\_4400\_7125\_14800MHz

Release: Rel-19

Document for: Discussion

# 1 Introduction

The WRC-23 conference identified three frequency ranges as potential IMT candidates and tasked ITU-R WP5D to conduct the corresponding sharing and compatibility studies. In turn, the ITU-R WP5D sent the LS to a number of bodies, including 3GPP, asking to provide technical parameters for the candidate frequencies [1]. In response to that LS from WP5D and based on the technical input from RAN WG4 [2], the 3GPP RAN#103 meeting approved a new SI [3], purpose of which will be to study and provide the corresponding IMT technical parameters.

During the RAN4#110bis meeting an initial discussion took place and RAN WG4 made several agreements to adopt existing FR1 parameter values and requirements from the FR1 range (e.g. 3GPP band n104) for the 7.1-8.4GHz range. In this document we present a text proposal to capture UE IMT parameters for the 7.1-8.4GHz range based on previous studies captured in [4].

# 2 Text proposal

-------------------------------------------- TP BEGIN --------------------------------------------

# 5 7125 - 8400 MHz frequency range

## 5.1 General parameters

### 5.1.1 Duplex mode

There is no defined 3GPP band for the 7125 - 8400 MHz frequency range up to the current release, however, it is adjacent to existing TDD band n104 (6425 – 7125 MHz). Similar to the 4400 – 4800 MHz frequency range, SBFD can be a candidate duplexing method for this frequency range. The core requirements for Rel-19 SBFD work item can be tracked through the list of impacted specs captured in [6]. To provide a timely response to WP5D regarding the requested RF parameters, RAN4 assumed TDD as a baseline duplexing for the 7125 – 8400 MHz frequency range.

### 5.1.2 Channel Bandwidth

While a number of channel bandwidths will be specified for this frequency range, 100 MHz is considered as a typical channel bandwidth. Since the 71425 – 8400 MHz is not in the currently defined FR1 frequency range, higher channel bandwidths compared to 100MHz is not precluded for this range at this stage, as wider channel bandwidths could be enabled with increasing frequency following the same approach as FR1 (3 to 100 MHz) to FR2 (50 to 400 MHz).

An important aspect to consider is the implications of higher channel bandwidth on the adjacent channel coexistence findings. Accordingly, simulation studies were conducted to compare the throughput loss% as a function of ACIR for both downlink and uplink transmissions in UMa deployments for both 100MHz and 200MHZ, as shown in Figure 1. Note that all the network, BS, and UE parameters follow the adjacent channel coexistence simulations conducted in TR 38.921. It can be observed that the ACIR required to meet the 5% throughput loss degradation target is nearly identical for the 100 MHz and 200 MHz channel bandwidths.

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**Figure 1 TP loss for UMa scenario for CHBW 100MHz (black) and 200MHz dBm (magenta)**

### 5.1.3 Signal Bandwidth

The signal bandwidth for a 100 MHz channel bandwidth signal is calculated based on the NR spectrum utilization for 30 kHz SCS:

 Signal bandwidth = NRB x SCS x 12

with NRB: Number of Resource block for 100 MHz channel bandwidth and 30kHz SCS, as specified in TS 38.104 [x].

## 5.2 BS parameters

### 5.2.1 Transmitter characteristics

#### 5.2.1.1 Power dynamic range

#### 5.2.1.2 Spectral mask

#### 5.2.1.3 ACLR

#### 5.2.1.4 Spurious emissions

#### 5.2.1.5 Maximum output power

#### 5.2.1.6 Average output power

### 5.2.2 Receiver characteristics

#### 5.2.2.1 Noise figure

#### 5.2.2.2 Sensitivity

#### 5.2.2.3 Blocking response

#### 5.2.2.4 ACS

## 5.3 UE parameters

### 5.3.1 Transmitter characteristics

#### 5.3.1.1 Power dynamic range

The minimum controlled output power of the UE is defined as the power in the channel bandwidth for all transmit bandwidth configurations (resource blocks), when the power is set to a minimum value. For existing FR1 bands, the minimum output power is -33 dBm for 100 MHz channel bandwidth. The minimum output power can be reused for 7.125 – 8.4 GHz, i.e. power dynamic range is 56 dB for 100 MHz channel bandwidth.

#### 5.3.1.2 Spectral mask

#### 5.3.1.3 ACLR

According to the previous studies and simulation results in TR 38.922 sub-clause 4.3, it was concluded that 26 dB ACLR would be sufficient for 6.425 - 7.125 GHz. Thus, ACLR of 26dB can be considered for the frequency range 7.125 – 8.4 GHz.

#### 5.3.1.4 Spurious emissions

The general spurious emissions defined in TS 38.101-1 [x] clause 6.5.3.1 can apply to the frequency range 7.125 – 8.4 GHz.

#### 5.3.1.5 Maximum output power

The UE maximum output power for the considered frequency ranges could be 23 dBm. Other UE power classes, e.g. 20dBm, 26dBm and 29dBm, are not precluded.

In order to ensure that the adjacent channel coexistence (i.e., BS and UE ACLR/ACS) derived for 23 dBm is not impacted when considering higher UE maximum output power (i.e., 26 dBm), we compare the throughput loss % as a function of ACIR for both downlink and uplink transmissions in UMa deployments for both PC3 and PC2, as shown in Figure 2. Note that all the network, BS, and UE parameters follow the adjacent channel coexistence conducted in TR 38.921. It can be observed that the ACIR required to meet the 5% throughput loss degradation mark is nearly the same for both 23 dBm and 26 dBm.



Figure 2 TP loss for UL UMa scenario for 23 dBm (magenta) and 26 dBm (black) UE maximum output power

#### 5.3.1.6 Average output power

NOTE: This parameter was not mentioned in the previous response to ITU-R WP5D.

### 5.3.2 Receiver characteristics

#### 5.3.2.1 Noise figure

A noise figure in the [9, 13] dB interval was agreed for 6.425 - 7.125 GHz in the previous response to ITU-R WP5D sharing studies. The noise figure of 12 dB was assumed for the 3GPP band n104. For the frequency range 7.125 – 8.4 GHz noise figure of 13dB can be assumed.

The actual noise figure to be used to define RF requirements should be further studied in the WI phase.

#### 5.3.2.2 Sensitivity

The sensitivity is not a critical parameter for sharing and compatibility studies. It was agreed to not mention any value for this parameter.

#### 5.3.2.3 Blocking response

The blocking characteristic specified in clause 7.6 of TS 38.101-1 [x] for frequency larger than 3300 MHz could be applied for the frequency range 7.125 – 8.4 GHz.

#### 5.3.2.4 ACS

According to the previous studies and simulation results in TR 38.922 sub-clause 4.3, adjacent channel selectivity (ACS) is agreed as 32 dBc for 6425 – 7125 MHz. Thus, ACS of 32dB can be considered for the frequency range 7.125 – 8.4 GHz.

## 5.4 Antenna characteristics

### 5.4.1 BS antenna characteristics

#### 5.4.1.1 Antenna model

#### 5.4.1.2 Antenna parameters

### 5.4.2 UE antenna characteristics

The outcome of the RAN WG4 study in TR 38.820 for collecting technical background information relevant for the frequency range 7 to 24 GHz indicated that the frequency range 7.125-[10-13] GHz would have "FR1 like" requirements. Therefore, a UE implementing the frequency range 7.125 – 8.4 GHz range will have a conducted interface with an assumed isotropic radiation pattern antenna and no analog beamforming.

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# 3 References

1. RP-240024, "LS on Parameters of terrestrial component of IMT for sharing and compatibility studies in the frequency bands 4400-4800 MHz, 7125-8400 MHz and 14.8-15.35 GHz", ITU-R WP5D
2. R4-2102840, "LS on Parameters of terrestrial component of IMT for sharing and compatibility studies in preparation for WRC-23 (6.425 to 10.5 GHz)", RAN WG4.
3. RP-240765, "Study on IMT parameters for 4400 to 4800 MHz, 7125 to 8400 MHz and 14800 to 15350 MHz"
4. 3GPP TR 38.921, "Study on International Mobile Telecommunications (IMT) parameters for 6.425-7.025GHz, 7.025-7.125GHz and 10.0-10.5 GHz", v17.1.0