**3GPP TSG-RAN WG4 Meeting #101-e *R4-2120036***

Electronic meeting, November 1st – 12th, 2021

**Source:** Ericsson

**Title:** RMR 900MHz band – TP to TR 38.853

**Agenda item:** 7.3.4

**Document for:** Approval

# Introduction

The 900MHz NR band for European RMR WI ([1]) has been revised in RAN#92e meeting to introduce a new 900MHz band for Railway in Europe.

In last RAN4#100-e meeting, the TR skeleton was approved. This contribution is a text proposal to TR focusing on the Regulatory aspects.

# Text proposal

<Start of changes>

# References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] ECC Decision (20)02: "Harmonised use of the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio (RMR) ".

[2] European Commission implementing Decision (EU) 2021/1730 on the harmonised use of the paired frequency bands 874,4-880,0 MHz and 919,4-925,0 MHz and of the unpaired frequency band 1 900-1 910 MHz for Railway Mobile Radio, 28 September 2021.

<End of changes>

<Start of changes>

# 3 Definitions of terms, symbols and abbreviations

## 3.1 Terms

For the purposes of the present document, the terms given in 3GPP TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in 3GPP TR 21.905 [1].

## 3.2 Symbols

For the purposes of the present document, the following symbols apply:

<symbol> <Explanation>

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in 3GPP TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in 3GPP TR 21.905 [1].

AAS Advanced Antenna Systems

CEPT Conférence Européenne des administrations des Postes et Télécommunications

EC European Commission

ECC Electronic Communications Committee

EIRP Effective Isotropic Radiated Power

RMR Rail Mobile Radio

<End of changes>

<Start of changes>

# 4 Regulatory background

## 4.1 EC Decision 2021/1703

On September 28th 2021, the European Commission Decision 2021/1703 ([2]) establishes the harmonised conditions for the availability and efficient use of radio spectrum for the Railway Mobile Radio (RMR) in the bands 874.4-880.0 MHz, and 919.4-925.0 MHz. By 1 January 2022, Member States shall designate and make available on a non-exclusive basis the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz for Railway Mobile Radio, in accordance with the technical conditions listed in subclause 4.3

## 4.2 ECC Decision(20)02

The ECC Decision(20)02 addresses the designation of the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz to be used for Railway Mobile Radio (RMR) on a CEPT wide basis.

By this Decision, the CEPT administrations shall designate the paired frequency bands 874.4-880.0 MHz and 919.4-925.0 MHz for Railway Mobile Radio (RMR) on a non-exclusive basis, according to the technical conditions listed in subclause 4.3.

This Decision entered into force on November 20th, 2020.

## 4.3 Technical conditions

### 4.3.1 Base stations using wideband technologies

Only non AAS Base Stations are considered.

The lower edge of the lowest Resource Block shall be ≥ 919.6 MHz

Table 3: Specific in-block requirements for 5.6 MHz and 5 MHz channels mandatory for uncoordinated deployment

|  |  |
| --- | --- |
| RMR channel BW | Maximum EIRP |
| 5.6 MHz | 62 dBm/5.6 MHz |
| 5 MHz | 64.5 dBm/5 MHz + (fDL – 922.1)×40/3 dB |
| fDL is the centre frequency in MHz.  NB-IoT in-band operation mode without power boost is allowed. NB-IoT guard-band operation mode and in-band operation mode with power boost are not allowed. | |

Table 4: Specific in-block requirements for 1.4 MHz and 200 kHz channels mandatory for uncoordinated deployment

|  |  |
| --- | --- |
| RMR channel BW | Maximum EIRP |
| 1.4 MHz | 56 dBm/1.4 MHz + (fDL – 920.2)×40/3 dB (Note 1) |
| 200 kHz | 70.5 dBm/200 kHz + (fDL – 921)×40/3 dB (Note 3) |
| fDL is the centre frequency in MHz.  Note 1: Formula applicable to fDL ≤ 921.7 MHz. No specific e.i.r.p. restriction above.  Note 2: Applicable to NB-IoT standalone operation mode, which is made of one Resource Block.  Note 3: Formula applicable to fDL ≤ 921.0 MHz. No specific e.i.r.p. restriction above. | |

Table 5: Out of band requirements

|  |  |
| --- | --- |
| MHz from block edge  (919.4-925 MHz) | EIRP limit |
| 0 ≤ Δf < 0.2 | 32.5 dBm/200 kHz |
| 0.2 ≤ Δf < 1 | 14 dBm/800 kHz |
| 1 ≤ Δf < 10 | 5 dBm/MHz |
| On a case-by-case basis, at a national level, higher OOB limits may be applied. | |

Table 6: Baseline requirement

|  |  |
| --- | --- |
| Frequency Range | EIRP limit |
| 880-915 MHz | -49 dBm/5 MHz |
| This requirement prevails over out-of-band requirements. | |

Table 7: Requirements on wideband RMR BS receiver characteristics

|  |  |
| --- | --- |
| Parameter | Value |
| Level of the wanted signal | RefSens + 3 dB |
| Maximum interfering signal in 870-874.4 MHz (Note 1) | -34 dBm |
| The antenna connector of the radio module is the reference point. The reference sensitivity (RefSens) is the minimum mean power received at the antenna connector at which a specified minimum performance shall be met.  These requirements cover both blocking and third-order intermodulation.  Note 1: A bandwidth of 200 kHz for the interfering signal is assumed. | |

### 4.3.2 Terminals other than cab-radios using wideband technologies

|  |  |
| --- | --- |
| Maximum output power | 23 dBm |
| ACLR | 30dB minimum |
| Other | Uplink power control is mandatory and shall be activated. |

<End of changes>

<Start of changes>

# 5 Frequency band arrangement

The new RMR band is within the range of FR1 and is proposed as a FDD band (Table 5-1).

Table 5-1: New NR RMR band in FR1

|  |  |  |  |
| --- | --- | --- | --- |
| Band number | UL | DL | Duplex mode |
| [RMR\_900] | 874.4 MHz – 880 MHz | 919.4 MHz – 925 MHz | FDD |

# 6 NR system parameters

The following system parameters are defined for RMR 900MHz band:



Table 6-1: RMR 900 - Channel bandwidth

| NR Band | SCS (kHz) | *BS channel bandwidth* (MHz) | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|  | 15 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| n100 | 30 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 60 |  |  |  |  |  |  |  |  |  |  |  |  |  |

Table 6-2: RMR 900 - applicable NR-ARFCN

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | ΔFRaster  (kHz) | Uplink  range of NREF  (First – <Step size> – Last) | Downlink  range of NREF  (First – <Step size> – Last) |
| n100 | 100 | 174880 – <20> – 176000 | 183880 – <20> – 185000 |

Table 6-3: RMR 900 - applicable SS raster entries

|  |  |  |  |
| --- | --- | --- | --- |
| NR *operating band* | SS Block SCS | SS Block pattern (NOTE 1) | Range of GSCN  (First – <Step size> – Last) |
| n100 | 15 kHz | Case A | 2303 – <1> – 2307 |

<End of changes>