3GPP TSG-RAN WG4 Meeting #111 R4-2409513

Fukuoka City, Fukuoka, Japan, 20th – 24th May, 2024

**Source:** Huawei

**Title:** TP to TR 37.829: Clarification on the Rx requirements for PC1 cab-radio

**Agenda Item:** 6.14.2

**Document for:** Approval

# Introduction

In this TP to TR 37.829 we provide clarification on the Rx requirements for PC1 cab-radio.

# Conclusions

**Proposal 1**: Approve tha attached TP to TR 37.829.

# TP to TR 37.829

*------------------------------ Modified section ------------------------------*

## 5.2 Bands n100 and n101

### 5.2.1 REFSENS exception

No band specific REFSENS exception is needed.

### 5.2.2 A-MPR and MPR

General MPR can be used and no A-MPR is necessary are there are not additional regional requirements which are more stringent than current 3GPP requirements.

### 5.2.3 ECC requirements

From ECC Decision (20)02 [2] has 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) we can find relevant requirements for UE Tx in ECC Decision (20)02 [2] annex 2.2 for n100, and ECC Decision (20)02 [2] annex 3.2 for n101, see below.

**A 2.2 Technical conditions for RMR cab-radio using wideband technologies for n100**

For radio access technologies other than GSM-R, the following parameters apply:

- Maximum output power: higher than 23 dBm and up to 31 dBm;

- ACLR: 37 dB minimum;

- Uplink power control is mandatory and shall be activated.

**A 3.2 Technical conditions for RMR cab-radio using wideband technologies for n101**

The following parameters apply:

- Maximum output power: 31 dBm;

- ACLR: 37 dB minimum;

- Unwanted output power in 1920-1980 MHz:

- -25 dBm/MHz maximum in 1920-1925 MHz;

- -30 dBm/MHz maximum in 1925-1980 MHz;

- Uplink power control is mandatory and shall be activated.

NOTE: For related PC1 cab‑radio Rx characteristics for bands n100 and n101 refer to related ETSI TC RT work.

#### 5.2.3.1 n100 compliance

ECC Decision (20)02 [2] mentions two technical Tx conditions for RMR-HPUE radio using wideband technologies and those are:

- Maximum output power: higher than 23 dBm and up to 31 dBm

- ACLR: 37 dB minimum

which both are aligned with 3GPP specification therefore no additional requirements are needed for 3GPP specifications for PC1 Tx operation on bands n100 and n101.

#### 5.2.3.2 n101 compliance

ECC Decision (20)02 [2] mentions four technical Tx conditions for RMR-HPUE - radio using wideband technologies and those are:

- Maximum output power: 31 dBm;

- ACLR: 37 dB minimum;

- Unwanted output power in 1920-1980 MHz:

- -25 dBm/MHz maximum in 1920-1925 MHz;

- -30 dBm/MHz maximum in 1925-1980 MHz;

- Uplink power control is mandatory and shall be activated.

Maximum output power, ACLR and power control are all aligned with 3GPP specifications inherently but unwanted output power in 1920-1980 MHz needs some investigation.

In Figure 5.2.3.2-1 we compare ECC Decision (20)02 [2] unwanted output power in 1920-1980 MHz requirement to 3GPP general emission mask and can observe that both 5 MHz and 10 MHz channel bandwidth 3GPP general emission mask inherently guarantees compliance to ECC Decision (20)02 [2] requirement therefore no additional 3GPP requirements are needed for PC1 Tx operation on bands n100 and n101.



Figure 5.23.2-1: Comparison of ECC Decision (20)02 unwanted output power requirement to 3GPP general emission mask

### 5.2.4 ECC Report 318

It is stated in the Executive Summary of the ECC Report 318 [6] that:

*For both 900 MHz and 1900 MHz bands, Monte Carlo studies based on SEAMCAT have been conducted and show that the interference from FRMCS cab-radio of 31 dBm output power to MFCN uplink is acceptable when uplink power-control is implemented and activated and with unwanted emissions as described in Annex 10.*

*Annex 9 provides a worst-case analysis based on an MCL calculation for the case without FRMCS cab-radio uplink power control. It concludes that this could result in harmful interferences unless unwanted emissions from cab-radio would be reduced to -53 dBm/MHz in the 880-915 MHz and 1920-1980 MHz frequency ranges.*

*FRMCS cab-radios shall therefore implement and activate uplink power control in the 900 MHz and 1900 MHz band. FRMCS high-power cab-radios are not permitted to operate without uplink power control.*

From ECC Report 318 [6] it can be seen that ECC has performed Monte Carlo studies that show that the interference from FRMCS cab-radio of 31 dBm output power to MFCN uplink is acceptable when uplink power-control is implemented and activated.

*------------------------------ End of modified section -------------------------*