**3GPP TSG-RAN Meeting #103 TD DocNumber**

**Maastricht, Netherlands, 18-21st March 2024.**

Title: [DRAFT] LS on Introduction of 1900MHz NR band n101 for Rail Mobile Radio (RMR) ) in CEPT countries subject to the ECC Decision (20)02

Response to:

Release: Release 18

Work Item: Introduction of 1900MHz NR band for Europe for Rail Mobile Radio (RMR) (NR\_RAIL\_EU\_1900MHz\_TDD)

CAB-radio - High Power UE support for band n100 and n101 for Rail Mobile Radio (RMR) in Europe (RAIL\_HPUE\_n100\_n101)

Source: TSG RAN

To: ETSI TC RT

Cc: ECC WG FM, ECC WG FM56, ECC PT1, ETSI TC ERM

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Attachments: DocNumber(s) [Description i.e. Draft TS 29.414 v0.1.0].
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**1. Overall Description:**

3GPP TSG RAN and WG RAN4 have recently discussed and updated the 3GPP RAN4 requirements in relation to the 1900MHz NR band n101 for Rail Mobile Radio (RMR) in CEPT countries subject to the ECC Decision (20)02.

A number of mobile network operators have raised concerns on co-existence of existing mobile networks operating in band n1 with FRMCS deployments in band n101. RAN4 have discussed the topic and made the following observations and conclusions:

Observation 1: The technical conditions specified in ECC Decision (20)02 [5], i.e. EIRP limits were analysed accordingly and the necessary conclusions for an uncoordinated operational approach were derived. These include the BS rated output power using corresponding assumptions, the resulting emission values of the transmitter and the specifications of the receiver.

Observation 2: The technical conditions specified in ECC Decision (20)02 [5], i.e. the BS rated output power using corresponding assumptions to convert from the EIRP limits, the resulting emission values of the transmitter and the specifications of the receiver have been transferred to the 3GPP specifications.

Observation 3: In the Commission Implementing Decision (EU) 2021/1730, ECC Decision(20)02, CEPT Report 76 as well as ECC Report 318 [7] it is clearly stated that the regulation has assumed that the harmonised technical conditions for RMR (FRMCS) base stations operating in the 1900-1910MHz band assume that base stations providing electronic communications services, which use frequencies above 1920MHz for reception under Commission Implementing Decision (EU) 2020/667(4), have enhanced selectivity compared to the current Harmonised European Standards. Base stations providing electronic communications services, which are located in the vicinity of a RMR base station and do not meet the enhanced selectivity criterion, should, where necessary, be adapted, in order to mitigate harmful interference.

Observation 4: The ECC in Report 318 has considered that additional mitigation techniques need to be implemented on a case-by-case basis, such as adjustments of antenna directivity, azimuth, tilt, or improve the selectivity of the MFCN BS in the vicinity of the railway tracks. Such site engineering solutions have been considered by RAN 4 for TDD and FDD coexistence scenarios as described in TR 25.942 [11] section 8.4.

Observation 5: From CEPT report 76, ECC DEC(20)02 and ECC Report 318 it is clear that operators of mobile networks in 1920-1980 MHz should have, sufficiently far in advance, information on the rollout of a new RMR BS in 1900-1910 MHz.

Observation 6: In response to the EC/CEPT regulation for the 1900-1910MHz band ETSI has specified enhanced selectivity requirements for protection of Band 1 BSs.

Observation 7: The number of MFCN sectors that may be interfered by n101 BS will be less than around 7% of the MFCN sectors that are near railways due to the coupling loss expected to be higher than calculated, e.g. due to ground occupancy and other factors.

Observation 8: Operators have concerns about the ECC analysis, for example the in-band blocking analysis was not conducted by the ECC analysis which will lead to more severe interferences. Also, operator’s view is that the 7% is based on 50.7dBm/10 MHz BS EIRP. But this was increased to 65dBm/10MHz which will result in more than 7%. Furthermore, the analyses are based on a theoretical model where recent results of a measurement campaign show 10dB lower pathlosses between UE and BS compared to the theoretical model. This demonstrates differences between the theoretical model and the real world situation for the BS to BS pathlosses.

Observation 9: Regarding the change from 50.7dbm/10 MHz to 65dBm/10MHz, the ECC Report 318 states that this increase “may result in interference to some MFCN BS located near an FRMCS radio site” and that “if 65 dBm e.i.r.p. uncoordinated FRMCS base stations is desired, then these MFCN BS may need to be adapted when an FRMCS BS is rolled out in its proximity, so that it does not suffer interference from FRMCS”.

Observation 10: Railways note that in actual deployment cases, the effects of clutter, ground occupancy In urban areas, the temporal nature due to train speed and the uplink orientation of the FRMCS TDD frame are expected to limit the number of interference cases.

Observation 11: From ECC Report 318 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.

Observation 12: Both the Commission Implementing Decision (EU) 2021/1730 and the ECC Decision(20)02 state that uplink power control is mandatory and shall be activated.

Observation 13: The Commission Implementing Decision (EU) 2021/1730, the ECC Decision(20)02, The ECC Report 318 and the CEPT report 76 all have been subject to their regular consultation phases. These have not amended the assumption that base stations providing electronic communications services, which use frequencies above 1 920MHz for reception under Commission Implementing Decision (EU) 2020/667(4), have enhanced selectivity compared to the current Harmonised European Standards. Base stations providing electronic communications services, which are located in the vicinity of a RMR base station and do not meet the enhanced selectivity criterion, should, where necessary, be adapted, in order to mitigate harmful interference.

**Conclusion 1:** The text in the 3GPP Work Item description RP-211542 (Introduction of 1900MHz NR band for Europe for Rail Mobile Radio (RMR)) objective states:

NOTE: The introduction of the 1900 MHz band for use by Rail Mobile Radio is intended to ensure coexistence with adjacent spectrum ranges in Europe in compliance with the applicable regulations, to avoid causing interference on already established networks.

In observation 2, it is mentioned that the requirements of ECC DEC(20)02 have been transferred to the 3GPP specifications for band n101. And, as mentioned in ECC Decision(20)02 (in considering k) and confirmed by the results presented in RP-233879, band n101 will harm already deployed MFCN BS located near an RMR radio site unless they get adapted so that they do not suffer interference.

**Conclusion 2:** In addition to the measures in observation 6, technical measures (e.g. as mentioned in TR 25.942) can be applied to mitigate such interference cases. RAN4 recommends to handle such potential interference cases using coordination between the involved operators. This may for example modify the orientation of band n101 BS antennas and in some cases of MFCN band 1 antennas, reduce transmit power, etc.

**Conclusion 3:** RAN4 wants to highlight the importance of compliance to the additional spurious requirements of table 6.6.5.2.3-12 in TS 38.104 in band n101 for coexistence.

**Conclusion 4:** RAN4 wants to inform RAN about the agreement made in the RAN4#110 meeting, where the UE external antenna gain should be taken into account for some Tx requirements (TS 38.101-1) for bands n101 and n100.

**Conclusion 5:** RAN4 want to note that ECC Decision (20)02 clearly states that operators of mobile networks in 1920-1980 MHz should have, sufficiently far in advance, information on the rollout of a new RMR BS in 1900-1910 MHz.

Considering that ETSI TC RT has created a specification TS 103 793 for the FRMCS radio characteristics including 1900MHz RMR band n101, 3GPP RAN would like to draw attention especially to conclusions 3 and 4 above, with the need to update content of the TS 103 793 accordingly.

3GPP would also like to draw attention to conclusions 1 and 2 above and the following consideration:

Modifying as indicated in conclusion 2 already deployed MFCN band 1/n1 Base Stations to avoid interference from FRMCS band n101 is not an easy operational task and in specific cases may need additional coordination measures. and additional coordination measures need to be taken in order to mitigate the interference from band n101 to already deployed band 1/n1 BSs.

**2. Actions:**

**To ETSI TC RT group.**

**ACTION:** 3GPP TSG RAN kindly asks ETSI TC RT to consider the following for TS 103 793 on FRMCS radio characteristics ~~and any future FRMCS radio Harmonized Standards~~:

* The importance of the additional spurious requirements for band n101 for coexistence in table 6.6.5.2.3-12 in TS 38.104 and table 6.6.5.5.1.3-12 in TS 38.141-1.
* Updates made recently in the RAN4 specifications (see e.g. R4-2403694) in which the UE external antenna gain is taken into account for some Tx requirements (TS 38.101-1 and TS 38.101-3, Rel-17/18) for bands n101 and n100.

**3. Date of Next TSG-RAN Meetings:**

TSG-RAN Meeting #104 17th – 20th June 2024 Shanghai, China.

TSG-RAN Meeting #105 9th – 12th September 2024 Melbourne, Australia.