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| Working Group FM | SE(18)048  Doc. FM(18)059 Annex 022 |

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| To |  | |
| Mr Karl Loew  Chairman of WG SE  Mail: [karl.loew@bnetza.de](mailto:karl.loew@bnetza.de)  **Cc:**  Mr Steve Green  Chairman of ECC PT1  Mail: [steve.green@ofcom.org.uk](mailto:steve.green@ofcom.org.uk) | | |
| Date | Enclosures | |
| 09 February 2018 | --- | |
| Our reference | Your reference | |
| WGFM#90 | --- | |
| Subject |  | |
| Studies needed on RMR systems in the 900 MHz range as well as in the 1900-1920 MHz band | |  |

Dear Karl,

Further to the progress of FM56's work, WG FM would like to request WG SE to perform some technical studies related to Railway Mobile Radio (RMR)[[1]](#footnote-1) systems in the 900 MHz range as well as in the 1900-1920 MHz band.

With regard to the 900 MHz range, WG SE is invited to study the following cases:

* Impact of MFCN base stations transmitting above 925 MHz on LTE/5G-based RMR terminals receiving below 925 MHz (Note 1)
* In-band coexistence of Defence and RMR systems (Note 2)
* Adjacent band compatibility between Defence systems and RMR systems (Note 2)
* In-band coexistence of aeronautical navigation systems (in accordance with footnote 5.323 in the RR) and RMR systems
* Adjacent band compatibility between SRD and RMR systems (Note 3)

RFID, including minimal frequency separation between RFID interrogator channels and RMR, in 915-921 MHz

M2M/IoT, e.g. NBN, UNB and CSS in the 870-876 MHz range and operating within the RFID interrogator channels in 915-921 MHz

wideband data transmission (WBN) in the 915-921 MHz range

25mW non-specific SRD (bandwidth ≤ 600 kHz and DC ≤ 1%) in the 915-921 MHz range

When defining the harmonised technical conditions for RMR, WG FM is going to consider the results from PT1, also taking into account other aspects such as defence usage. With this respect, the outcome of WG SE related to RMR will also be considered.

Noting that ECC at its 46th meeting agreed on a process to withdraw ECC/DEC/(15)02 on BB-DA2GC in 1900-1920 MHz, WG SE is also invited to study the possibility to introduce FRMCS in the 1900-1920 MHz band (Note 4), as one of the options, which includes the following cases:

* Impact of MFCN UE transmitting above 1920 MHz on LTE/5G-based RMR base stations and terminals receiving below 1920 MHz (Note 5)
* Review the compatibility study performed in CEPT Report 39 Annex 3 with DECT below 1900 MHz
* Compatibility between LTE/5G-based RMR in 1900-1920 MHz and new alternative usages (e.g. governmental usages and/or professional drones and/or DECT-based microphones and home/industrial automation that should be described in an upcoming SRdoc)

WG FM invites WG SE to take note that, during its 87th meeting in February 2017, WG FM established the new project team FM56 to work on spectrum issues related to railway applications, especially GSM-R and its successor.

When performing the studies where RMR is the victim system, WG SE has to take into account the railway specificities.

* RMR and MFCN operators have very different approaches regarding quality of service. MFCN have a global statistical approach which aims at an overall satisfaction of their customers: call drops and call setup failures are acceptable as long as their occurrence remain below a given threshold. While railways require a high quality for each single user: nearly no call drop or call setup failure.
* Specific simulation methodology and/or protection criteria may be required to reflect this high level of requirements. Here are two examples:

For GSM, 3GPP defines a minimum C/Ic of 9 dB for voice, for which the reference performance is met. This corresponds to an RxQual of 5 which is not acceptable for railway systems. GSM-R must comply with an RxQual strictly below 4 which means a minimum C/Ic of 12 dB for voice.

In studies where LTE-based MFCN are the victim system, typical Seamcat simulations consider the LTE throughput loss. The throughput loss criterion alone may not be applicable to FRMCS for which an outage criterion needs to be defined.

* ETSI TC RT has been requested to provide QoS criteria for FRMCS.
* LTE/5G-based RMR UE may have a transmit power of up to 31 dBm. The feasibility of such a transmit power needs to be assessed with regard to compatibility with adjacent services.

WG SE would be very kind to inform WG FM on progress of its work and when ECC Reports can be made available. Results would be needed by February 2019 so that WG FM can make further development on the basis of WG SE results. Furthermore, WG FM invites WG SE to keep PT1 informed on the progress of their studies so that they can be taken into account in PT1 work.

Yours sincerely,

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Note 1:

As per ECC Report 229, in order to sustainably mitigate interferences due to blocking and intermodulation, the standard for GSM-R radios has been improved, compared to 3GPP specifications, with respect to the receiver characteristics (see ETSI TS 102 933-1 v1.3.1 onwards). GSM-R radios compliant with this new specification are robust against MFCN emissions above 925 MHz.

Similarly, it is expected that FRMCS radios will need to be improved with respect to the receiver characteristics as currently defined by 3GPP for E-UTRA band 8, in order to ensure a sustainable coexistence with MFCN emissions above 925 MHz.

Note 2: Defence systems to be considered are unmanned systems (aircraft and terrestrial ones) and TRR as in ECC Report 200.

Note 3: Compatibility between GSM-R and SRD may need to be reviewed (based on ECC Report 200) for alignment with LTE/5G-based RMR rollout assumptions and to take into account EIRP restrictions on RMR base stations below 921 MHz, which are under study by PT1. Furthermore, it is noted that compatibility study between GSM-R and wideband data transmission SRD was not performed.

Note 4: RMR may not use the whole 1900-1920 MHz band and some possibilities for sharing may exist. A 5 MHz channel and a 10 MHz channel should be considered.

Note 5: Similarly to Note 1, it should be assessed whether an improvement of the receiver characteristics as currently defined by 3GPP for E-UTRA band 33, in order to ensure a sustainable coexistence with MFCN emissions above 1920 MHz is needed for FRMCS in 1900-1920 MHz.

1. RMR is an umbrella term used for any railway mobile radio system, including GSM-R and FRMCS. [↑](#footnote-ref-1)