GSM-R and **Interferences:** Managing the co-existence

EUROPEAN UNION AGENCY FOR RAILWAYS

GSM-R and Interferences: Managing the co-existence

The interferences caused to GSM-R receivers have been a very strong concern for Railway operators over the last years. Several cases of interference have been reported in various Member States, causing non-acceptable operational and even safety issues.

WHAT IS THE ISSUE?

All the radio devices are susceptible to produce and to suffer from interferences, and it is not possible to guarantee an interference free radio environment. There can be many different signals with different power levels measured in a specific frequency range of the radio spectrum. The receiver terminals have their own sensitivity and capabilities to "listen" to the desired signal. When the discrimination of the desired signal is not possible, we speak of interferences.

Measurement campaigns performed during 2013-2014 concluded that current GSM-R receivers are affected by intermodulation products generated from wideband or narrowband signals from mobile network operators, even though both railway and public operators use their assigned radio spectrum in compliance with the relevant European and national regulations.

WHAT IS THE LEGAL FRAMEWORK?

The Railways Interoperability Directive and the Control, Command and Signaling Technical Specification of Interoperability are applicable in all Member States. There is an obligation to install GSM-R for all new railway lines under the scope of the TSI, and also for the renewals or upgrades.

GSM-R cabin radio and modems (ETCS Data Only Radios) meet the requirements specified for GSM equipment (R&TTE Directive 1999/5/EC); according to the TSI 2012/88/EU, cab radios are required to be able to listen to GSM-R band and to the public GSM. This is seen as an optional feature for the EDORs.

However, the competences over spectrum are kept within each Member State, and the radio licenses (establishing the rights of use of a radio band) for public operators and for GSM-R operators do not consider restrictions in general. The "Framework Directive" on a common regulatory framework for electronic communication networks and services (2002/21/EC), in its Article 20, covers the steps to be taken in case of a dispute between undertakings: the national regulatory authority shall arbitrate in case there is no agreement between the disputed parts. Also, in Article 3, it mentions that the Member States shall provide for proportionate restrictions when it is necessary to avoid harmful interferences.

Although all the equipment fulfils the requirements laid in the different regulations, and the legal framework is also set, there are issues that need action from all the involved parties.

WHAT CAN BE PROPOSED FOR THE AFFECTED AREAS?

Interferences between GSM-R and GSM have been found in many locations, they have been resolved on a case by case basis, either by the public operator or by the GSM-R operator. However, there are still numerous locations in Europe where interferences are present.

DG CONNECT is promoting the use of the spectrum available for any technology (Digital Agenda, efficient use of spectrum). The radio frequency bands immediately adjacent to the one used by GSM-R can also carry broadband

Technical:
In the CCS TSI, the obligation for railway vehicles to use the full GSM band has been limited only to the 4 MHz dedicated to GSM-R.

The next version of the CCS TSI (to be published in 2016) will make mandatory for all new and renewed GSM-R receivers to comply with the latest version of the ETSI specification on improved radio receivers (ETSI TS 102 933), be it by means of external filters or new radio receivers. In all other cases, it will not be possible to force the application of the specification.

Policy:
ECC FM 54 working group (frequency management), composed of railway and public operators supported by the Agency and UIC has issued a new Report 229 to provide guidance for improving coexistence; it is now up to the National spectrum regulators to ensure this report is effectively used in each Member State.

signals. These signals are transmitted over a wide set of frequencies, and they produce "repeated" images at equally spaced locations of the radio spectrum. The risk of having these unintended images in the GSM-R receiver is higher than for the narrow band signals.

In addition to the Report 96 and 162, respectively studying the compatibility between broadband technologies used in the 900 MHz and 1800 MHz radio bands and GSM-R and proposing a practical guide on coordination between GSM-R and public networks, the European Communication Committee published in May 2015 a new Report 229. This Report provides guidance to administrations as well as railway and public mobile operators to enable a better coexistence between GSM-R and Mobile/Fixed communications Networks. To this regard, it proposes a systematic approach based on a coordination/cooperation process and guidelines for the dialogue amongst administrations as well as GSM-R and MFCN licensees.

WHAT IS THE AGENCY DOING?

Spectrum is handled by each Member State, but the trains need to travel without technical limitations through the Trans-European Railway Network. This requires a careful study, to avoid individual solutions from Member States that could impose restrictions on the railway traffic.

The European Union Agency for Railways was set up to help creating the integrated railway area by reinforcing safety and interoperability. This is why it is continuously working in close cooperation with DG MOVE, DG CONNECT, ECC/CEPT and the sector to help on the understanding and to provide tools to resolve the cases where interferences appear.

In this respect, the work of the Agency is focused in two fields: technical and policy related.

Thanks to the coordination steered by the GSM-R Follow Up Group, chaired by DG MOVE, the Agency is working on increasing the awareness on the risks of planning new networks not taking into account the existing ones, on establishing coordination boards with different Member States between the transport authorities, radio regulators, companies involved (public network operators, GSM-R operators, railway undertakings) and the Commission, and on understanding the difficulties and to find a way to reach to an agreement between parties. A summary of the activities of this group has been reported in the Railway Interoperability and Safety Committee and the Radio Spectrum Committee end of 2015.

Status of information: May 2016

Further information on the Agency work can be found in the Agency WEB page:
http://www.era.europa.eu/Core-Activities/ERTMS/Pages/Interferences-information.aspx

European Union Agency for Railways
120 rue Marc Lefrancq
BP 20392
FR-59307 Valenciennes Cedex
Tel. +33 (0)327 09 65 00

era.europa.eu
Twitter @ERA_railways

*Following the entry into force of the technical pillar of the 4th EU Railway Package (Reg. 2016/796), the European Union Agency for Railways replaces and succeeds the European Railway Agency. The change of name requires also a new corporate design. The "Agency" refers as from now to the European Union Agency for Railways. However depending on the context, some parts of this brochure still refer to the former European Railway Agency.

Making the railway system work better for society.

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