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**Railway Telecommunications (RT);
ER-GSM frequencies;
Part 1: ER-GSM additional radio aspects**

Reference

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Keywords

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Railway Telecommunications (RT).

The present document is part 1 of a multi-part deliverable covering the Railway Telecommunications; ER-GSM frequencies, as identified below:

Part 1: "ER-GSM additional radio aspects";

Part 2: "ER-GSM additional radio conformance testing".

1 Scope

ECC Decision ECC/DEC/(04)06 [i.2] of the 19th March 2004 and amended on the 26th June 2009 provides a possibility for a GSM-R extension into the bands 873 MHz to 876 MHz and 918 MHz to 921 MHz on a national basis.

The present document defines the requirements for radio Transmission and Reception of mobile station (MS) and BTS for the pan-European digital cellular telecommunication system GSM-R.

Requirements are defined for two categories of parameters:

- Those that are required to provide compatibility between the radio channels, connected either to separate or common antennas, that are used in the system. This category also includes parameters providing compatibility with existing systems in the same or adjacent frequency bands.
- Those that define the transmission and reception requirements for the MS and base stations.

The present document defines some RF characteristics for the MS and base stations for the frequencies band R-GSM/ER-GSM. The precise measurement methods are specified in TS 102 932-2 [4] and TS 100 607-1 [2] and TS 151 026 [7].

Equipment may operate on more than one of the frequency bands specified in clause 4.

MS defined in EN 300 919 [1], are referred to as "Multi band MSs" in the present document.

Equipment operating at the edge of the transmit and receive band might be subject to regulatory restrictions in some geographical regions. In areas where systems coexist the received interference power might have to be limited. Coexistence scenarios have been investigated in ECC Report 162 [i.3] providing also recommendations for the application of mitigation techniques.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

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2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ETSI EN 300 919: "Digital cellular telecommunications system (Phase 2+) (GSM); Types of Mobile Stations (MS) (GSM 02.06)".
- [2] ETSI TS 100 607-1: "Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP 11.10-1 Release 1999)".
- [3] ETSI TS 100 910: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 05.05 Release 1999)".
- [4] ETSI TS 102 932-2: "Railway Telecommunications ER-GSM frequencies; Part 2: ER-GSM additional radio conformance testing".
- [5] ETSI EN 300 609-4: "Global System for Mobile communications (GSM); Part 4: Harmonized EN for GSM Repeaters covering the essential requirements of article 3.2 of the R&TTE Directive".

- [6] ETSI TS 102 933-1: "Railway Telecommunications; GSM-R improved receiver parameters; Part 1: Requirements for radio reception".
- [7] ETSI TS 151 026: "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Part 4: Repeaters (3GPP TS 51.026 Release 10)".

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TR 101 748: "Digital cellular telecommunications system (Phase 2+) (GSM); Abbreviations and acronyms (GSM 01.04)".
- [i.2] ECC/DEC/(04)06: "ECC Decision of 19 March 2004 on the availability of frequency bands for the introduction of Wide Band Digital Land Mobile PMR/PAMR in the 400 MHz and 800/900 MHz bands".
- [i.3] ECC Report 162: "Practical Mechanism to improve the Compatibility between GSM-R and Public Mobile Networks and Guidance on Practical Coordination".

3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 101 748 [i.1] apply.

4 Frequency bands and channel arrangement

- i) Railways GSM 900 Band, R-GSM (includes Standard and Extended GSM 900 Band):
 - for Railways GSM 900 band, the system is required to operate in the following frequency band:
 - 876 MHz to 915 MHz: mobile transmit, base receive;
 - 921 MHz to 960 MHz: base transmit, mobile receive.
- ii) Extended Railways GSM 900 Band, ER-GSM (includes Standard and Extended GSM 900 Band):
 - for Railways GSM 900 band, the system is required to operate in the following frequency band:
 - 873 MHz to 915 MHz: mobile transmit, base receive;
 - 918 MHz to 960 MHz: base transmit, mobile receive.

NOTE 1: The term GSM 900 is used for any GSM system, which operates in any 900 MHz band.

NOTE 2: The BTS may cover a complete band, or the BTS capabilities may be restricted to a subset only, depending on the operators needs.

The carrier spacing is 200 kHz.

The carrier frequency is designated by the absolute radio frequency channel number (ARFCN). If we call $F_l(n)$ the frequency value of the carrier ARFCN n in the lower band, and $F_u(n)$ the corresponding frequency value in the upper band, we have:

Table 1

Band	Frequency value of the carrier ARFCN in the lower band	Frequency channel number (ARFCN)	Frequency value of the carrier ARFCN in the upper band
R-GSM 900	$F_l(n) = 890 + 0,2 \times n$ $F_l(n) = 890 + 0,2 \times (n - 1\ 024)$	$0 \leq n \leq 124$ $955 \leq n \leq 974$	$F_u(n) = F_l(n) + 45$
ER-GSM 900	$F_l(n) = 890 + 0,2 \times n$ $F_l(n) = 890 + 0,2 \times (n - 1\ 024)$	$0 \leq n \leq 124$ $940 \leq n \leq 974$	$F_u(n) = F_l(n) + 45$
NOTE: Frequencies are in MHz.			

5 Transmitter characteristics

5.1 Base station System (BSS)

Transmitter characteristics shall be the same as specified in TS 100 910 [3] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

5.2 Mobile station (MS)

Transmitter characteristics shall be the same as specified in TS 100 910 [3] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

This apply to MSs defined in EN 300 919 [1] and in TS 102 933-1 [6].

5.3 Repeaters

Transmitter characteristics shall be the same as specified in EN 300 609-4 [5] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

6 Receiver characteristics

6.1 Base station System (BSS)

Receiver characteristics shall be the same as specified in TS 100 910 [3] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

6.2 Mobile station (MS)

Receiver characteristics shall be the same as specified in TS 100 910 [3] and TS 102 933-1 [6] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

This apply to MSs defined in EN 300 919 [1] and in TS 102 933-1 [6].

6.3 Repeaters

Receiver characteristics shall be the same as specified in TS 100 910 [3] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

7 Other requirements

RF characteristics which are not explicitly addressed in the present document shall be taken from TS 100 910 [3] and from TS 102 933-1 [7].

Unless otherwise stated, the environmental requirements defined in the corresponding standards to specified equipment shall apply.

Annex A (normative): Environmental conditions

Unless otherwise stated, the environmental requirements defined in the corresponding standards to specified equipment shall apply.

Annex B (informative): Bibliography

ETSI TS 102 281: "Railways Telecommunications (RT); Global System for Mobile communications (GSM); Detailed requirements for GSM operation on Railways".

History

Document history		
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