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Railway Telecommunications (RT);
ER-GSM frequencies;
Part 2: ER-GSM additional radio conformance testing

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Contents

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Foreword

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

The present document is part 2 of a multi-part deliverable covering the Railway Telecommunications; specifying the extended GSM-R frequencies, as identified below:

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

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

1 Scope

The present document describes the technical characteristics and methods of testing the improved receiver performance for professional mobile stations (professional MS), base stations (BS) and repeaters for the Pan European digital cellular communications system and Personal Communication Systems (PCS) operating in the 900 MHz band (GSM 900), standardized by ETSI Special Mobile Group (SMG).

The present document is valid for equipment implemented according Phase2+ R99 onwards.

The present document covers the conformance testing of radio equipment supporting the extended frequency range ER-GSM. Equipment not supporting the extended frequency range ER-GSM is not covered in this document. It does not necessarily include all the characteristics which may be required by a user or subscriber, nor does it necessarily represent the optimum performance achievable. It should be noted that a receiver with improved parameters is specified in TS 102 933-1 [7]

The present document is part of the GSM-series of technical specifications. The present document neither replaces any of the other GSM technical specifications or GSM related ETSs or ENs, nor is it created to provide full understanding of (or parts of) the GSM 900 system. The present document lists the additional test procedures for testing the extended frequency band for ER-GSM.

For a full description of the system, reference should be made to all the GSM technical specifications or GSM related ETSs or ENs. Clause 2 provides a complete list of the GSM technical specifications, GSM related ETSs, ENs and ETRs, on which this conformance test specifications is based.

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.2] providing also recommendations for the application of mitigation techniques.

The present document applies to the unit which includes the hardware to establish a connection across the radio interface.

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.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

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

[1] 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)".

[2] ETSI TS 100 910: "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 05.05 Release 1999)".

[3] ETSI TS 101 087: "Digital cellular telecommunications system (Phase 2 and Phase 2+); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 11.21 Release 1999)".

[4] ETSI TS 102 933-2: "Railway Telecommunications; GSM-R improved receiver parameters; Part 2: Radio conformance testing".

[5] ETSI TS 102 932-1: "Railway Telecommunications; ER-GSM frequencies; Part 1: ER-GSM additional radio aspects".

[6] ETSI TS 151 026: "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Part 4: Repeaters (3GPP TS 51.026 version 10.0.0 Release 10)".

[7] ETSI TS 102 933-1: "Railway Telecommunications; GSM-R improved receiver parameters; Part 1: Requirements for radio reception".

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 version 8.0.0 Release 1999)".

[i.2] 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 General test conditions

The relevant MS, BTS and repeaters transmit bands for the present document are the MS and BTS transmit bands as defined in TS 100 910 [2] and TS 102 932-1 [5].

The manufacturer shall declare:

- which of the frequency bands defined in TS 102 933-2 [4] are supported by the BSS and the MS. This frequency range comprises the transmit and receive operating bands.

Many tests in the present document are performed with appropriate frequencies in the bottom, middle and top of the operating frequency band of the BTS and MS. These are denoted as RF channels B (bottom), M (middle) and T (top).

Table 1: ARFCN

	Term		
Band	**Low ARFCN range**	**Mid ARFCN range**	**High ARFCN range**
E-GSM 900	975 to 980	60 to 65	120 to 124
R-GSM 900	955 to 960 (R-GSM) and 975 to 980 (E-GSM)	60 to 65	120 to 124
ER-GSM 900	940 to 945 (ER-GSM) 975 to 980 (E-GSM)	60 to 65	120 to 124

When a test is performed by a test laboratory, the ARFCNs to be used for RF channels B, M and T shall be specified by the laboratory. The laboratory may consult with operators, the manufacturer or other bodies.

When a test is performed by a manufacturer, the ARFCNs to be used for RF channels B, M and T may be specified by an operator.

The channel numbering and the channel allocation can be calculated from tables 1 and 2.

Table 2: Channel Numbering: Frequencies are in MHz

E-GSM900	Fl(n)=890+0,2*n Fl(n)=890+0,2*(n-1 024)	0≤n≤124 975<=n<=1 023	Fu(n)=Fl(n)+45
R-GSM900	Fl(n)=890+0,2*n Fl(n)=890+0,2*(n-1 024)	0≤n≤124 955<=n<=1 023	Fu(n)=Fl(n)+45
ER-GSM900	Fl(n)=890+0,2*n Fl(n)=890+0,2*(n-1 024)	0≤n≤124 940≤n≤1 023	Fu(n)=Fl(n)+45

If not otherwise stated in this document the test procedures and limits of the underlying standard for BSS and MS conformance testing are valid.

4.1 Base Station System (BSS)

The frequency bands for the Base Station System are given in table 3.

Table 3: Frequency bands for ER-GSM Base Station Systems

	TX:	**RX:**
E-GSM900	925 MHz to 960 MHz	880 MHz to 915 MHz
R-GSM900	921 MHz to 960 MHz	876 MHz to 915 MHz
ER-GSM900	918 MHz to 960 MHz	873 MHz to 915 MHz

NOTE 1: It is up to the operator to choose any subset of these bands (or the complete band) on a location basis within a frequency band assigned to the operator by the authority responsible for frequency management issues.

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.

4.1.1 Transmitter

Transmitter characteristics shall be the same as specified in TS 101 087 [3] with the exceptions that the requirements are applicable to the entire ER-GSM band.

4.1.2 Receivers

Receiver characteristics shall be the same as specified in TS 101 087 [3] with the exceptions that the requirements are applicable to the entire ER-GSM band.

4.2 Mobile Station (MS)

The frequency bands for the Mobile Stations are given in table 4.

Table 4: Frequency bands for ER-GSM Mobile Station

	TX:	**RX:**
E-GSM900	880 MHz to 915 MHz	925 MHz to 960 MHz
R-GSM900	876 MHz to 915 MHz	921 MHz to 960 MHz
ER-GSM900	873 MHz to 915 MHz	918 MHz to 960 MHz

4.2.1 Transmitter

Transmitter characteristics shall be the same as specified in TS 100 607-1 [1] with the exceptions that the requirements are applicable to the entire ER-GSM band.

4.2.2 Receivers

Receiver characteristics shall be the same as specified in TS 100 607-1 [1] and TS 102 933-2 [4] with the exceptions that the requirements are applicable to the entire ER-GSM band.

4.3 Repeaters

A repeater, as a bi-directional amplifier, can amplify and transmit a received MS signal in the MS transmit band, simultaneously it can amplify and transmit a received BTS signal in the BTS transmit band.

NOTE: In some circumstances, for instance when an operator (or more than one operator who co-ordinate the use of repeaters), is not allocated a complete band, it may be necessary to restrict the frequency range of operations of repeaters. In these circumstances, the test of "Gain outside operating band" may be used to verify the performance of the repeater.

4.3.1 Transmitter

Transmitter characteristics shall be the same as specified in TS 151 026 [6] with the exceptions that the requirements are applicable to the entire ER-GSM band.

4.3.2 Receivers

Receiver characteristics shall be the same as specified in TS 151 026 [9] with the exceptions that the requirements are applicable to the entire ER-GSM Band.

5 Other requirements

Equipment supporting the extended band shall also fulfill the requirements for equipment operating in the current R-GSM band to guarantee the compatibility between the equipment.

Test cases which are not explicitly described in the present document shall be taken from the corresponding standards.

Annex A (informative): Bibliography

ETSI TS 102 933-1: "Railway Telecommunications; GSM-R improved receiver parameters Part 1: Requirements for radio reception".

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".

ETSI EN 300 919: "Digital cellular telecommunications system (Phase 2+) (GSM); Types of Mobile Stations (MS) (GSM 02.06)".

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

History

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