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Fixed Radio Systems; Conformance testing; Part 1: Point-to-point equipment -
Definitions, general requirements and test procedures

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Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Transmission and Multiplexing (TM).

The present document defines the type approval testing requirements for radio specific parameters required directly by the relevant radio relay standard. Harmonized test methods, and test report format, for these parameters are also contained herein.

In addition to the main body of the present document there are two annexes, namely the Supplier Declaration (annex A) and the Test Report (annex B). The parameters in the two annexes are according to the main body of the present document.

The purpose of the test report form is to achieve uniform and comprehensive presentations of suppliers declarations and tests results.

The test report includes forms for presenting the measurement results, measurement uncertainty, limits for the measured values, references to the relevant test procedures and space for declaring the test equipment used. At the beginning of the test report the status of the test are summarized. Regarding the humidity conditions, this parameter is not to be controlled during the tests. However it has to be within the range given by the relevant specification. The initial value at each measurement should be registered.

The main body of the present document contains definitions, general requirements and test procedures for conformance testing of Digital Radio-Relay Systems (DRRS).

It is recommended that where a clarification of a test procedure or an agreed test procedure is required, this should be described on the final page of the test report titled "Additional information supplementary to the test report".

The present document is part 1 of a multi-part EN covering the Fixed Radio System; Conformance testing, as identified below:

Part 1: "Point-to-point equipment - Definitions, general requirements and test procedures";

Part 2-1: "Point-to-Multipoint equipment - Definitions and general requirements";

Part 2-2: "Point-to-Multipoint equipment - Test procedures for FDMA systems";

Part 2-3: "Point-to-Multipoint equipment - Test procedures for TDMA systems";

Part 2-4: "Point-to-Multipoint equipment - Test procedures for FH-CDMA systems";

Part 2-5: "Point-to-Multipoint equipment - Test procedures for DS-SS-CDMA systems";

Part 3-1: "Point-to-Point antennas - Definitions, general requirements and test procedures";

Part 3-2: "Point-to-Multipoint antennas - Definitions, general requirements and test procedures".

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Date of adoption of this EN:	10 September 1999
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1 Scope

The present document details standardized procedures for conformance testing of equipment for point to point Digital Radio-Relay Systems (DRRS).

Standardized procedures are required in order to fulfil ERC/DEC/(97)10 [1] on the mutual recognition, within CEPT, of the results of conformance tests on equipment carried out in individual CEPT countries.

The present document reflects the principles and definitions set out in the generic wordings for Standards on DRRS characteristics TR 101 036-1 [2] which defines the generic format for the editorial and technical content for all individual equipment standards relating to digital fixed point to point radio relay systems. The present document describes harmonized test objectives and test procedures for the parameters detailed in TR 101 036-1 [2]. Thus, it is intended to be applied in conjunction with the individual equipment standards and will enable commonality of test results, irrespective of the accredited body carrying out the test.

The conformance tests described in the present document are those related to radio specific parameters required directly by the relevant radio relay standards. Conformance tests to other boundary standards (e.g. those for system input/output interfaces and related baseband process) are outside the scope of the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

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- [1] ERC/DEC/(97)10: "ERC Decision on the mutual recognition of conformity assessment procedures including marking of radio equipment and radio terminal equipment".
- [2] TR 101 036-1: "Transmission and Multiplexing (TM); Digital Radio Relay Systems (DRSS); Generic wordings for standards on DRRS characteristics; Part 1: General aspects and point-to-point equipment parameters".
- [3] ETS 300 019 Parts 1 and 2: "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1: Classification of environmental conditions; Introduction; Part 2: Specification of environmental tests; Introduction".
- [4] ETS 300 132 Part 1 and Part 2: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 1: Operated by alternating current (ac) derived from direct current (dc) sources; Part 2: Operated by direct current (dc)".
- [5] ETS 300 385: "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for digital fixed links and ancillary equipment with data rates at around 2 Mbit/s and above".
- [6] IEC 60835: "Methods of measurement for equipment used in digital microwave radio transmission systems".
- [7] ITU-R Recommendation F. 746-3: "Radio-frequency channel arrangements for radio-relay systems".

- [8] ITU-R Recommendation F.1191-1: "Bandwidths and unwanted emissions of digital radio-relay systems".
- [9] EN 45001: "General criteria for the operation of testing laboratories".
- [10] EN 45002: "General criteria for the assessment of testing laboratories".
- [11] ISO/IEC Guide 25: "General requirements for the competence of calibration and testing laboratories".
- [12] ISO/IEC Guide 28: "General rules for a model third party certification system for products".
- [13] EN 300 339: "Electromagnetic compatibility and Radio spectrum Matters (ERM); General ElectroMagnetic Compatibility (EMC) for radio communications equipment".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

accreditation: Formal recognition that a testing laboratory is competent to carry out specific tests or specific types of test.

accreditation body: Body that conducts and administers a laboratory accreditation system and grants accreditation.

accreditation system: System that has its own rules of procedure and management for carrying out laboratory accreditation.

accredited laboratory: Testing laboratory to which accreditation has been granted in accordance with the ISO/IEC guides 25 [11] and 28 [12] or EN 45001 [9] and 45002 [10].

approval testing: Approval of the Implementation Under Test (IUT) by the appropriate authority for regulatory purposes. In this context approval implies that the IUT has met the essential requirements of the standard against which it has been tested.

complementary requirements: All those requirements not part of the essential requirements.

conformance testing: Type testing process to verify to what extent the IUT conforms to the standard.

essential requirements: The basic set of parameters and functions which are necessary to meet any regulatory obligations imposed for radio frequency co-ordination and ElectroMagnetic Compatibility (EMC).

full conformance: Status of the IUT when it has successfully passed all the requirements of the conformance testing process and therefore meets all the mandatory requirements of the standard.

mandatory requirements: Requirement is one which the IUT shall meet. To achieve full conformance all standard requirements are mandatory.

optional requirements: Used in a standard with two different meanings:

- 1) optional in the sense that the parameter or function itself is mandatory but there is more than one possible value or configuration which may be chosen (e.g. class of output power, baseband interface, etc.). Once an option is selected it becomes mandatory;
- 2) optional in the sense that the feature is not mandatory (e.g. Automatic Transmit Power Control (ATPC), service channels, etc.). However, once such an option has been implemented it becomes mandatory that it conforms to the requirements of the present document.

supplier: Organization requesting the approval.

Supplier's Declaration (SD): Declaration is the procedure by which a supplier gives written assurance that a parameter or function conforms to the present document.

type approval authority: National regulatory/licensing authority.

type approval testing: Process of type testing for approval. A type test is to be carried out successfully in order to achieve approval.

type testing: Type testing is when a representative sample of equipment is tested. The test result is considered to be applicable and representative for all other pieces of equipment manufactured identically.

3.2 Symbols

For the purposes of the present document, the following symbols apply:

dB	decibel
dBm	decibel relative to 1 mW

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ATPC	Automatic Transmit Power Control
BB	Baseband
BBER	Background BER
BER	Bit Error Rate
BWe	evaluation BandWidth
C/I	Carrier to Interference
CC	Co-channel
CR	Complementary Requirement
CT	Conformance Test
CW	Continuous Wave
DRRS	Digital Radio Relay Systems
EMC	ElectroMagnetic Compatibility
ER	Essential Requirement
Ext.	Extreme conditions
IF	Intermediate Frequency
IUT	Implementation Under Test
LO	Local Oscillator
Max.	Maximum
Min.	Minimum
Nom.	Nominal
OR	Optional requirement
Ref	Reference conditions
RF	Radio Frequency
RFC	Radio Frequency Channel
RSL	Received Signal Level
RTPC	Remote Transmit Power Control
SD	Supplier Declaration
TMN	Telecommunications Management Network
TR	Test Required
Tx	Transmit
XPIC	Cross-Polar Interference Canceller

4 Requirements related to DRRS equipment conformance test

Table 1: "Generic requirements" classification

Function or parameter description	Status for conformance			Requirement for conformance test			Power supply conditions		Climatic conditions for test		Limiting values	Test methods	
	ER	CR	OR	SD	TR	SD + TR (note 1)	Ref	Ref + Ext	Ref.	Ref. + Ext.		Clause Ref.	IEC 60835 [6] or other Ref.
Channel plan/operating frequency range	X			X								annex A.	ITU-R Recommendation F.746-3 [7]
Duplex frequency separation	X			X							xx MHz	annex A.	ITU-R Recommendation F.746-3 [7]
Centre gap	X			X							xx MHz	annex A	ITU-R Recommendation F.746-3 [7]
Co-polar channel spacing	X			X							xx MHz	annex A	ITU-R Recommendation F.746-3 [7]
Innermost channel spacing	X			X							xx MHz	annex A	ITU-R Recommendation F.746-3 [7]
Compatibility requirement between systems		X	X	X								annex A	
Performance and availability requirements													
Environmental conditions													
Weather protected locations	X (note 2)		X	X							(note 3)	4.4.2 (note 4)	ETS 300 019 [3]
Non-weather protected locations	X (note 2)		X	X							(note 3)	4.4.2 (note 4)	ETS 300 019 [3]
Power supply		X	X	X							(note 5)	annex A	ETS 300 132 [4]
EMC	X			X (note 6)								annex A (note 7)	ETS 300 385 [5]
System block diagram													
TMN interface		X	X	X								annex A (note 8)	
Branching/feeder/antenna requirements													
Waveguide flanges (or other connectors)		X		X								annex A	
Return loss		X		X							[xx dB]	annex A	
Intermodulation products		X		X							[-xxx dBW]	annex A	
Parameters for digital Systems													
Transmission capacity	X (note 9)			X							xx Mbit/s	annex A	

Function or parameter description	Status for conformance			Requirement for conformance test			Power supply conditions		Climatic conditions for test		Limiting values	Test methods	
	ER	CR	OR	SD	TR	SD + TR (note 1)	Ref	Ref + Ext	Ref.	Ref. + Ext.		Clause Ref.	IEC 60835 [6] or other Ref.
Baseband parameters		X (note 10)	X (note 10)			X (note 11)	X		X		(note 10)	annex A	
Transmitter characteristics													
Transmitter power range													
Maximum power (declared value) (note 12)	X					X		X		X	≤xx dBm	annex A + 5.2.1	IEC 60835 [6]
Minimum power (note 13) (declared value) (note 12)		X	X			X		X		X	≥xx dBm	annex A + 5.2.2	IEC 60835 [6]
Automatic Tx. Power Control, (ATPC) (note 13)		X	X			X	X		X		range: xx dB upper limit ≤xx dB	5.2.3	
Remote Tx. Power Control, (RTPC) (note 13)		X	X			X	X		X		range: xx dB upper limit ≤xx dB	5.2.4	
Remote frequency control (note 13)		X	X			X	X		X		[MHz]	5.2.7	
Tx. output power tolerance	X					X		X		X	≤xx dB	5.2.1	
Tx. local oscillators frequency arrangements		X				X					± MHz	annex A	
RF spectrum mask -normal channels	X					X		X		X	mask(s) of relevant standard (note 14)	5.2.6	IEC 60835-2-4 [6]
Innermost channels		X	X			X		X		X		annex A + 5.2.6	IEC 60835-2-4 [6]
Spectral lines at the symbol rate	X				X			X		X	≤xx dBm or Atten ≥xx dBc	5.2.8	IEC 60835-1-2 [6] clause 4
Spurious emissions (TX.) -External	X				X		X (note 15)		X (note 15)		≤xx dBm and the frequency range	5.2.9	IEC 60835-1-2 [6] clause 4
Spurious emissions (TX.) -Internal		X (note 16)		X							≤xx dBm or Atten ≥xx dBc	annex A	
Radio Frequency tolerance short-term portion	X					X (note 17)		X		X	± xx ppm (=δf/f ₀ × 10 ⁶)	5.2.5	IEC 60835-1-2 [6] clause 3
Radio Frequency tolerance long-term portion	X			X							± xx ppm (=δf/f ₀ × 10 ⁶)	annex A	

Function or parameter description	Status for conformance			Requirement for conformance test			Power supply conditions		Climatic conditions for test		Limiting values	Test methods	
	ER	CR	OR	SD	TR	SD + TR (note 1)	Ref	Ref + Ext	Ref.	Ref. + Ext.		Clause Ref.	IEC 60835 [6] or other Ref.
Receiver Characteristics													
Input level range		X			X		X		X		- xx dBm to - xx dBm vs. BER threshold	5.3.1	IEC 60835-2-4 [6] clause 5 IEC 60835-1-4 [6] clause 3
Rx local oscillators frequency arrangements		X		X							± MHz	annex A	
Spurious emissions (Rx) External	X				X		X (note 15)		X (note 15)		as Tx.	annex A	IEC 60835-1-2 [6] subclause 3.2
Spurious emissions (Rx) Internal		X (note 16)		X							≤xx dBm or Atten ≥xx dBc	annex A	
Rx intermediate frequency		X	X	X							xx MHz	annex A	
Receiver image rejection		X		X							(note 18)	annex A	
Innermost channel selectivity		X		X							(note 18)	annex A	IEC 60835-2-4 [6] subclause 4.5
System performance without diversity													
BER vs. Rx signal level	X (note 19)			X			X		X		≤ mask in relevant ETS	5.3.3.1	IEC 60835-2-4 [6] subclause 5.2
Equipment background BER		X		X							≤xx errors /period	annex A	IEC 60835-1-4 [6] clause 2
Interference Sensitivity													
Co-channel interference sensitivity External	X				X		X		X (note 15)		comply with ETS	5.3.3.2	IEC 60835-2-10 [6] subclause 3.3
Co-channel interference sensitivity Internal (note 20)		X		X							comply with ETS	annex A	IEC 12E (Sec.) 255
Adjacent channel interference sensitivity	X				X		X		X		comply with ETS	5.3.3.3	IEC 60835-2-10 [6] subclause 3.3
CW spurious interference	X				X		X		X		comply with C/I threshold degradation in ETS	5.3.3.4	