SLOVENSKI STANDARD
SIST EN 300 408 V1.2.1:2003

01-december-2003

Fiksni radijski sistemi ï Oprema tipa toļ ka-toļ ka ï Parametri radiorelejnih sistemov za prenos digitalnih signalov in analognih video signalov, ki delujejo na frekvenci okrog 58 GHz in ne zahtevajo koordiniranega frekvenļ nega planiranja

Fixed Radio Systems; Point-to-point equipment; Parameters for digital radio systems for the transmission of digital signals and analogue video signals operating at around 58 GHz, which do not require co-ordinated frequency planning

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33.040.20	Prenosni sistem	Transmission systems
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ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

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

National transposition dates	
Date of adoption of this EN:	7 July 2000
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1 Scope

The present document specifies the minimum performance requirements for terrestrial fixed service radiocommunications equipment operating in the 58 GHz frequency band which do not require co-ordinated frequency planning.

The frequency band is proposed to be used by various technologies for uncoordinated use of the band. It also benefits from the high and stable atmospheric attenuation which suppresses efficiently distant interferers (about 10 to 15 dB/km at sea level, refer to ITU-R Recommendation P.676 [16]).

For the purposes of the present document two equipment Classes are specified depending on the network requirements:

- Class A: Digital equipment for High Density Fixed Service (HDFS) applications typically connected to public networks, which apply the RF-channel selection procedure (see subclause 4.1.3), error performance and availability requirements (see subclause 5.2).

- Class B: Equipment without requirements for quality of service, typically private network connections.

Typical applications for Class A equipment are e.g. interconnection between cellular networks where there, in some cases, is a need for short length connections (up to about 500 meters). The RF channel selection procedure shall be used to protect existing systems from a new system being commissioned. However, the channel selection procedure may not guarantee interference free installation or operation in all cases due to limitations in the procedure with respect to the variety of systems.

Typical applications for Class B equipment are in private networks, such as video surveillance systems.

The present document does not contain aspects related to test procedures and test conditions, however they are to be found in EN 301 126-1 [6].

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Safety aspects are outside the mandate of ETSI and they will not be considered in the present document. However compliance to CENELEC EN 60950 [17] will be required to comply with 99/5/EC [18] Directive (R&TTE).

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Technical background for the parameters and requirements referred in the present document may be found in TR 101 036-1 [15].

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.

[1] ETSI ETS 300 132-1: "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".

[2] ETSI ETS 300 132-2: "Equipment Engineering (EE); Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (dc)".

[3] ETSI ETS 300 019 (all parts): "Equipment Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment".

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[4] ETSI EN 301 489-4: "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 4: Specific conditions for fixed radio links and ancillary equipment and services".

[5] CEPT/ERC Recommendation 12-09: "Radio frequency channel arrangement for fixed service systems operating in the band 57,0 GHz to 59,0 GHz which do not require frequency planning".

[6] ETSI EN 301 126-1: "Fixed Radio Systems; Conformance testing; Part 1: Point-to-Point equipment - Definitions, general requirements and test procedures".

[7] ITU-R F.ANPER: "Availability objectives for real digital radio-relay links forming part of the national portion constant bit rate digital path at or above the primary rate".

[8] ITU-T Recommendation G.703: "Physical/electrical characteristics of hierarchical digital interfaces".

[9] CEPT/ERC Recommendation 74-01: "Spurious emissions".

[10] ITU-R Recommendation F.1191: "Bandwidths and unwanted emissions of digital radio-relay systems".

[11] ITU-T Recommendation G.826: "Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate".

[12] ITU-R Recommendation F.1189: "Error performance objectives for constant bit rate digital paths at or above the primary rate carried by digital radio-relay systems which may form part or all of the national portion of a 27 500 km hypothetical reference path".

[13] ETSI ETS 300 833 (1999): "Fixed Radio Systems; Point to Point Antennas; Antennas for point-to-point fixed radio systems operating in the frequency band 3 GHz to 60 GHz".

[14] ITU-R Recommendation F.697: "Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems".

[15] ETSI TR 101 036-1 (V1.3): "Fixed Radio Systems; Generic wording for standards on Digital Radio Equipment characteristics; Part 1: General aspects and point-to-point equipment parameters".

[16] ITU-R Recommendation P.676: "Attenuation by atmospheric gases".

[17] CENELEC, EN 60950: "Safety of information technology equipment".

[18] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications equipment and the mutual recognition of their conformity.

[19] ITU-T Recommendation O.151: "Error performance measuring equipment operating at the primary rate and above".

[20] Directive EMC 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility".

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3 Symbols and abbreviations

3.1 Symbols

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

dB	decibel
dBm	decibel relative to 1 milliWatt
dBW	decibel relative to 1 Watt
GHz	GigaHertz

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kHz	kiloHertz
km	kilometre
MHz	MegaHertz
ppm	parts per million
V	volts

3.2 Abbreviations

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

AC	Alternating current
BER	Bit Error Ratio
BW	Equivalent noise bandwidth
CW	Continuous Wave
DC	direct current
DRRS	Digital Radio Relay Systems
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EN	Euronorm
FDD	Frequency Division Duplex
HDFS	High Density Fixed Service
PDH	Plesiochronous Digital Hierarchy
Pi	Interference Power
RF	Radio Frequency
Rx	Receiver
TDD	Time Division Duplex
Tx	Transmitter

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4 General characteristics

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4.1 Frequency bands and channel arrangements

4.1.1 Frequency band

The frequency band is from 57 GHz to 59 GHz.

NOTE: The successful co-existence of Class A and Class B equipment may require the regulator to define exclusive spectrum for each equipment Class (see annex A).

4.1.2 Radio Channel Arrangements

The channel arrangements are specified in CEPT/ERC Recommendation 12-09 [5] with 50 MHz or 100 MHz channel rasters. For reader convenience, the basic parameters of the CEPT Recommendation are shown in informative annex A.

4.1.3 RF-channel Selection

RF-channel selection procedure is mandatory for Class A equipment only.

4.1.3.1 RF-channel selection procedure

The purpose of the RF-channel selection procedure is to detect and protect existing transmissions in order to avoid unacceptable interference situations.

At both transmission sites, radio-relay terminals shall measure during installation, the interference levels of both receive and transmit channels (Note). Only in the instance when an unoccupied channel is identified and selected as the transmission channel shall the transmit power be switched on. The interference avoidance requirements for the receiver to detect occupied channels are specified in subclause 4.1.3.2 below.

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The principle of protecting existing transmission shall be respected also during the antenna alignment (see annex A for examples of possible antenna alignment procedures)

NOTE: If the national regulatory rules allowes to change the frequency of the link during its operation, it may be considered, in order to decrease the possibility of undetected interference, to apply the RF channel selection procedure whenever appropriate (e.g. when restoring a link after a failure or by suitable automatic timed routine in conjunction with frequency agility as in subclause 4.1.3.3).

4.1.3.2 Interference avoidance requirements

4.1.3.2.1 Interference avoidance limit

The radio relay terminal shall consider the radio channel occupied when the level of the interference is above the following limit:

- Pi > -81 dBm + 10 log (BW/10 MHz).

Where:

- BW is the noise bandwidth of the receiver expressed in MHz.
- Pi is the interference power expressed in dBm measured within the receiver noise bandwidth (BW).

For the rationale of the interference limit formula see informative annex D.

4.1.3.2.2 Interference avoidance limit calibration

The interference avoidance limit of the radio relay terminal shall be calibrated with the CW test signal connected to the reference point D (antenna port) of the terminal at any frequency within the receiver noise bandwidth or at any frequency within the transmitter spectrum limits, containing 90% of the transmit power.

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4.1.3.3 Frequency agility

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Frequency agility is an optional feature.

If unacceptable interference which exceeds a predetermined duration is observed an automatic change of RF-channel can be initiated using the RF-channel selection procedure described above. If an automatic RF-channel change facility is implemented a means shall be provided to disable it. Unacceptable interference criteria shall be declared by the manufacturer (see informative annex D, clause D.3).

4.1.4 Transmit/receive frequency separation

No specific requirements for Tx/Rx –separation.

4.2 Environmental Conditions

The equipment shall be required to meet the environmental conditions set out in ETS 300 019 [3], which defines weather protected and outdoor environmental Classes and test severities. The manufacturer shall state which Class the equipment is designed to withstand.

4.2.1 Equipment within weather protected locations (indoor locations)

Equipment intended for operation within temperature controlled locations or partially temperature-controlled locations shall meet the requirements of ETS 300 019 [3] Classes 3.1 and 3.2 respectively.

Optionally, the more stringent requirements of ETS 300 019 [3] Classes 3.3 (non-temperature-controlled locations), 3.4 (sites with heat trap) and 3.5 (sheltered locations) may be applied.