SLOVENSKI STANDARD
SIST EN 300 328 V1.6.1:2005

01-april-2005

Elektromagnetna združljivost in zadeve v zvezi z radijskim spektrom (ERM) ï Širokopasovni prenosni sistemi ï Oprema za prenos podatkov v frekvenčnem pasu 2,4 GHz ISM, ki uporablja širokopasovne modulacijske tehnike ï Harmonizirani EN, ki zajema bistvene zahteve člena 3.2 direktive R&TTE

Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive

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Candidate Harmonized European Standard (Telecommunications series)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [5] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [1] of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity ("the R&TTE Directive [1]").

Technical specifications relevant to Directive 1999/5/EC [1] are given in annex A.

National transposition dates	
Date of adoption of this EN:	5 November 2004
Date of latest announcement of this EN (doa):	28 February 2005
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2005
Date of withdrawal of any conflicting National Standard (dow):	31 August 2006

Introduction

The present document is part of a set of standards designed to fit in a modular structure to cover all radio and telecommunications terminal equipment under the R&TTE Directive [1]. Each standard is a module in the structure. The modular structure is shown in figure 1.

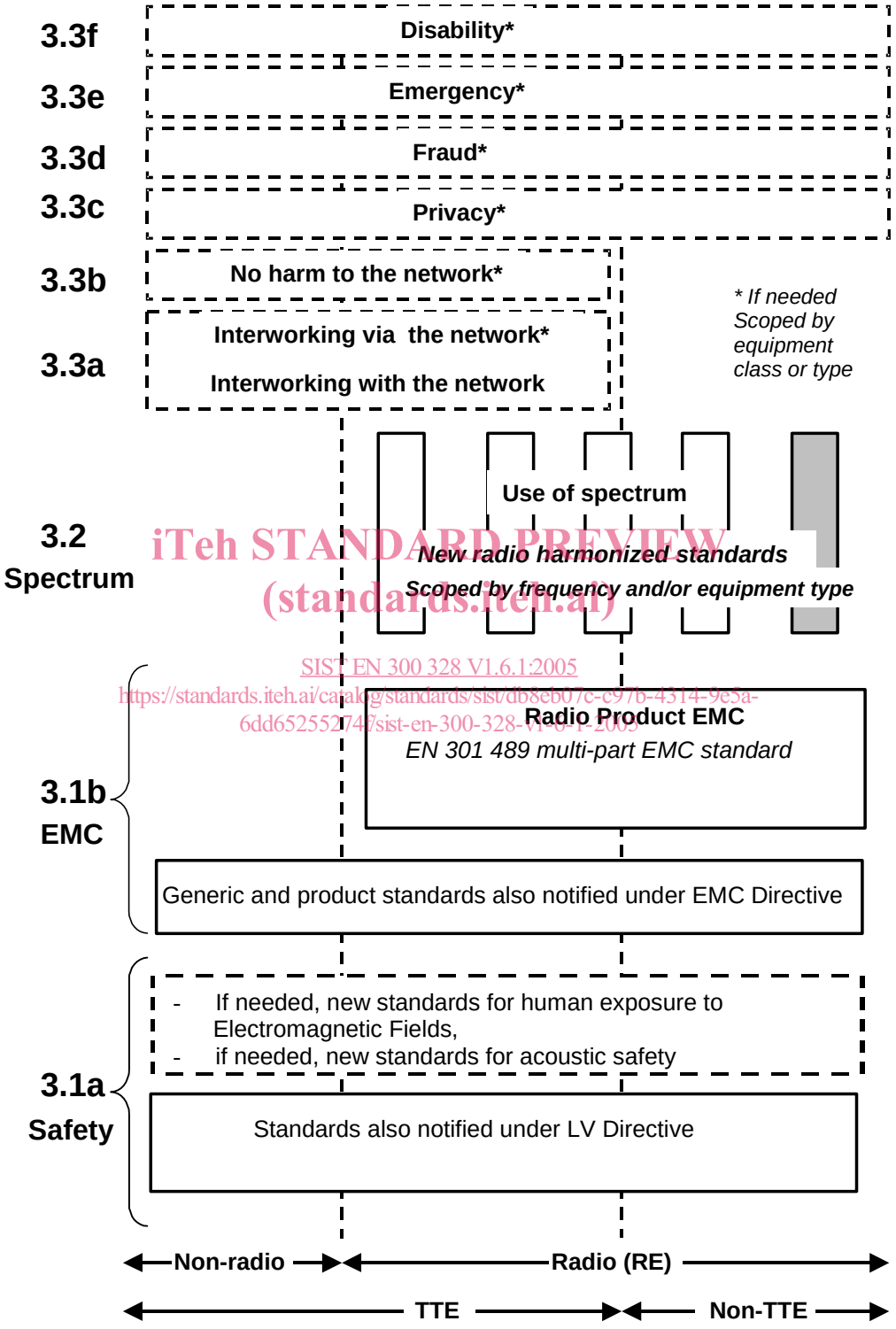

Figure 1: Modular structure for the various standards used under the R&TTE Directive

The left hand edge of the figure 1 shows the different clauses of article 3 of the R&TTE Directive [1].

For article 3.3 various horizontal boxes are shown. Dotted lines indicate that at the time of publication of the present document essential requirements in these areas have to be adopted by the Commission. If such essential requirements are adopted, and as far and as long as they are applicable, they will justify individual standards whose scope is likely to be specified by function or interface type.

The vertical boxes show the standards under article 3.2 for the use of the radio spectrum by radio equipment. The scopes of these standards are specified either by frequency (normally in the case where frequency bands are harmonized) or by radio equipment type.

For article 3.1b the figure shows EN 301 489 [6], the multi-part product EMC standard for radio used under the EMC Directive [2].

For article 3.1a figure 1 shows the existing safety standards currently used under the LV Directive [3] and new standards covering human exposure to electromagnetic fields. New standards covering acoustic safety may also be required.

The bottom of the figure shows the relationship of the standards to radio equipment and telecommunications terminal equipment. A particular equipment may be radio equipment, telecommunications terminal equipment or both. A radio spectrum standard will apply if it is radio equipment. An article 3.3 standard will apply as well only if the relevant essential requirement under the R&TTE Directive [1] is adopted by the Commission and if the equipment in question is covered by the scope of the corresponding standard. Thus, depending on the nature of the equipment, the essential requirements under the R&TTE Directive [1] may be covered in a set of standards.

The modularity principle has been taken because:

- it minimizes the number of standards needed. Because equipment may, in fact, have multiple interfaces and functions it is not practicable to produce a single standard for each possible combination of functions that may occur in an equipment;
- it provides scope for standards to be added:
  - under article 3.2 when new frequency bands are agreed; or
  - under article 3.3 should the Commission take the necessary decisions

  without requiring alteration of standards that are already published;
- it clarifies, simplifies and promotes the usage of Harmonized Standards as the relevant means of conformity assessment.

1 Scope

The present document applies to the following transceivers, transmitters and receivers including IEEE 802.11 (see bibliography), HomeRF™ and Bluetooth™ wireless technologies.

Fixed, mobile or portable applications, e.g.:

- stand-alone radio equipment with or without their own control provisions;
- plug-in radio devices intended for use with or within a variety of host systems, e.g. personal computers, hand-held terminals, etc.;
- plug-in radio devices intended for use within combined equipment, e.g. cable modems, set-top boxes, access points, etc.;
- combined equipment or a combination of a plug-in radio device and a specific type of host equipment.

The present document applies to equipment which utilizes wideband radio modulation techniques and which has an effective radiated power of up to -10 dBW (100 mW) and a power density of up to -10 dBW (100 mW) e.i.r.p. per 100 kHz for frequency hopping spread spectrum modulation or a power density of up to -20 dBW (10 mW) e.i.r.p. per 1 MHz for other forms of modulation.

This radio equipment is capable of operating in all or any part of the frequency band shown in table 1.

Table 1: Industrial, Scientific and Medical (ISM) frequency band

Direction of transmission	Industrial, Scientific and Medical (ISM) frequency band
Transmit/Receive	2,4 GHz to 2,4835 GHz

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (R&TTE Directive) article 3.2, which states that "… radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as to avoid harmful interference".

In addition to the present document, other ENs that specify technical requirements in respect of essential requirements under other parts of article 3 of the R&TTE Directive [1] will apply to equipment within the scope of the present document.

NOTE: A list of such ENs is included on the web site http://www.newapproach.org.

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 and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

[1] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).

[2] Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (EMC Directive).

[3] Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

[4] ETSI TR 100 028-1: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".

[5] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.

[6] ETSI EN 301 489 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [1] and the following apply:

adaptive frequency hopping: mechanism that allows a frequency hopping device to adapt to its environment by identifying channels that are being used and excluding them from the list of available channels

chip: unit of modulation used in direct sequence spread spectrum modulation

chip rate: number of chips per second

chip sequence: sequence of chips with defined length and defined chip polarities

combined equipment: any combination of non-radio equipment that requires a plug-in radio device to offer full functionality

direct sequence spread spectrum modulation: form of modulation where a combination of data to be transmitted and a known code sequence (chip sequence) is used to directly modulate a carrier, e.g. by phase shift keying

NOTE: The transmitted bandwidth is determined by the chip rate and the modulation scheme.

environmental profile: range of environmental conditions under which equipment within the scope of EN 300 328 is required to comply with the provisions of EN 300 328

fixed station: equipment intended for use in a fixed location and fitted with one or more antennae

NOTE: The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

frequency hopping spread spectrum modulation: spread spectrum technique in which the transmitter signal occupies a number of frequencies in time, each for some period of time, referred to as the dwell time

NOTE: Transmitter and receiver follow the same frequency hop pattern. The frequency range is determined by the lowest and highest hop positions and the bandwidth per hop position.

frequency range: range of operating frequencies over which the equipment can be adjusted

hand-portable station: equipment normally used on a stand-alone basis and to be carried by a person or held in the hand

NOTE: The equipment may be fitted with one or more antennae. The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

host: host equipment is any equipment which has complete user functionality when not connected to the radio equipment part and to which the radio equipment part provides additional functionality and to which connection is necessary for the radio equipment part to offer functionality

integral antenna: antenna designed to be connected to the equipment without the use of a standard connector and considered to be part of the equipment

NOTE: An integral antenna may be fitted internally or externally to the equipment.

mobile station: equipment normally used in a vehicle or as a transportable station

NOTE: The equipment may be fitted with one or more antennae. The equipment may be fitted with either antenna socket(s) or integral antenna(e) or both.

multi-radio equipment: radio, host or combined equipment using more than one radio transceiver

operating frequency: nominal frequency at which the equipment can be operated; this is also referred to as the operating centre frequency

NOTE: Equipment may be adjustable for operation at more than one operating frequency.

plug-in radio device: radio equipment module intended to be used with or within host, combined or multi-radio equipment, using their control functions and power supply

power envelope: frequency/power contour within which the useful RF power is generated

spread spectrum modulation: modulation technique in which the energy of a transmitted signal is spread throughout a relatively large portion of the frequency spectrum

stand-alone radio equipment: equipment that is intended primarily as communications equipment and that is normally used on a stand-alone basis

wide band modulation: wide band modulation is considered to include FHSS or DSSS modulation as well as other forms of modulation that meet the emission requirements as defined in EN 300 328

3.2 Symbols

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

dBm	dB relative to 1 milliwatt
dBW	dB relative to 1 Watt
GHz	GigaHertz
Hz	Hertz
kHz	kiloHertz
MHz	MegaHertz
mW	milliWatt

3.3 Abbreviations

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

AC	Alternating Current
AFH	Adaptive Frequency Hopping
BW	Band Width
DSSS	Direct Sequence Spread Spectrum
e.i.r.p.	equivalent isotropically radiated power
EMC	Electro-Magnetic Compatibility
FHSS	Frequency Hopping Spread Spectrum
ISM	Industrial, Scientific and Medical
LV	Low Voltage
OFDM	Orthogonal Frequency Division Multiplexing
R&TTE	Radio and Telecommunications Terminal Equipment
RF	Radio Frequency
Tx	Transmitter

4 Technical specifications

4.1 Environmental profile

The technical requirements of the present document apply under the environmental profile for operation of the equipment, which shall be determined by the environmental class of the equipment. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the required operational environmental profile.

4.2 Modulation

The manufacturer shall state the modulation characteristics of the equipment to be tested. For the purpose of deciding which level of power density applies to the equipment, the present document defines two categories of equipment: equipment conforming to the stated characteristics of FHSS modulation (see clause 4.2.1) and equipment not conforming to these characteristics. The latter category includes equipment using DSSS modulation (see clause 4.2.2).

4.2.1 FHSS modulation

FHSS modulation shall:

either:

a) make use of at least 15 well defined, non-overlapping channels or hopping positions separated by the channel bandwidth as measured at 20 dB below peak power;

or if capable of adaptive frequency hopping:

b) at least be capable of operating over a minimum of 90 % of the band specified in table 1, from which at any given time a minimum of 20 channels or hopping positions shall be used.

For both cases, the minimum channel separation shall be 1 MHz, while the dwell time per channel shall not exceed 0,4 s.

While the equipment is operating (transmitting and/or receiving) each channel of the hopping sequence shall be occupied at least once during a period not exceeding four times the product of the dwell time per hop and the number of channels. Systems that meet the above constraints shall be tested according to the requirements for FHSS modulation.

4.2.2 DSSS and other forms of modulation

For the purposes of the present document, other forms of modulation which do not satisfy the constraints of the specification given in clause 4.2.1, shall be considered equivalent to DSSS modulation. Systems using these other forms of modulation shall be considered equivalent to DSSS systems and shall be tested according to the requirements for DSSS modulation.

4.3 Technical requirements

4.3.1 Equivalent isotropic radiated power

4.3.1.1 Definition

The equivalent isotropic radiated power is defined as the total power of the transmitter.

4.3.1.2 Limit

The equivalent isotropic radiated power shall be equal to or less than -10 dBW (100 mW) e.i.r.p. This limit shall apply for any combination of power level and intended antenna assembly.