SLOVENSKI STANDARD
SIST EN 301 893 V1.3.1:2006

01-februar-2006

Širokopasovna radijska dostopovna omrežja (BRAN) – Zelo zmogljivo radijsko lokalno omrežje (RLAN) na 5 GHz – Harmonizirani evropski standard (EN), ki zajema bistvene zahteve člena 3.2 direktive R&TTE

Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive

Ta slovenski standard je istoveten z: **EN 301 893 Version 1.3.1**

ICS:

33.060.01	Radijske komunikacije na splošno	Radiocommunications in general
35.110	Omreževanje	Networking

SIST EN 301 893 V1.3.1:2006 **en**

ETSI EN 301 893 V1.3.1 (2005-08)

Candidate Harmonized European Standard (Telecommunications series)

Broadband Radio Access Networks (BRAN); 5 GHz high performance RLAN; Harmonized EN covering essential requirements of article 3.2 of the R&TTE Directive

Reference
REN/BRAN-0020002-2R1

Keywords
access, broadband, HIPERLAN, LAN, layer 1,
radio, testing

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Sous-Préfecture de Grasse (06) N° 7803/88

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Foreword

This Candidate Harmonized European Standard (Telecommunications series) has been produced by ETSI Project Broadband Radio Access Networks (BRAN).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (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 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 are given in annex A.

National transposition dates	
Date of adoption of this EN:	29 July 2005
Date of latest announcement of this EN (doa):	31 October 2005
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 April 2006
Date of withdrawal of any conflicting National Standard (dow):	30 April 2007

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.

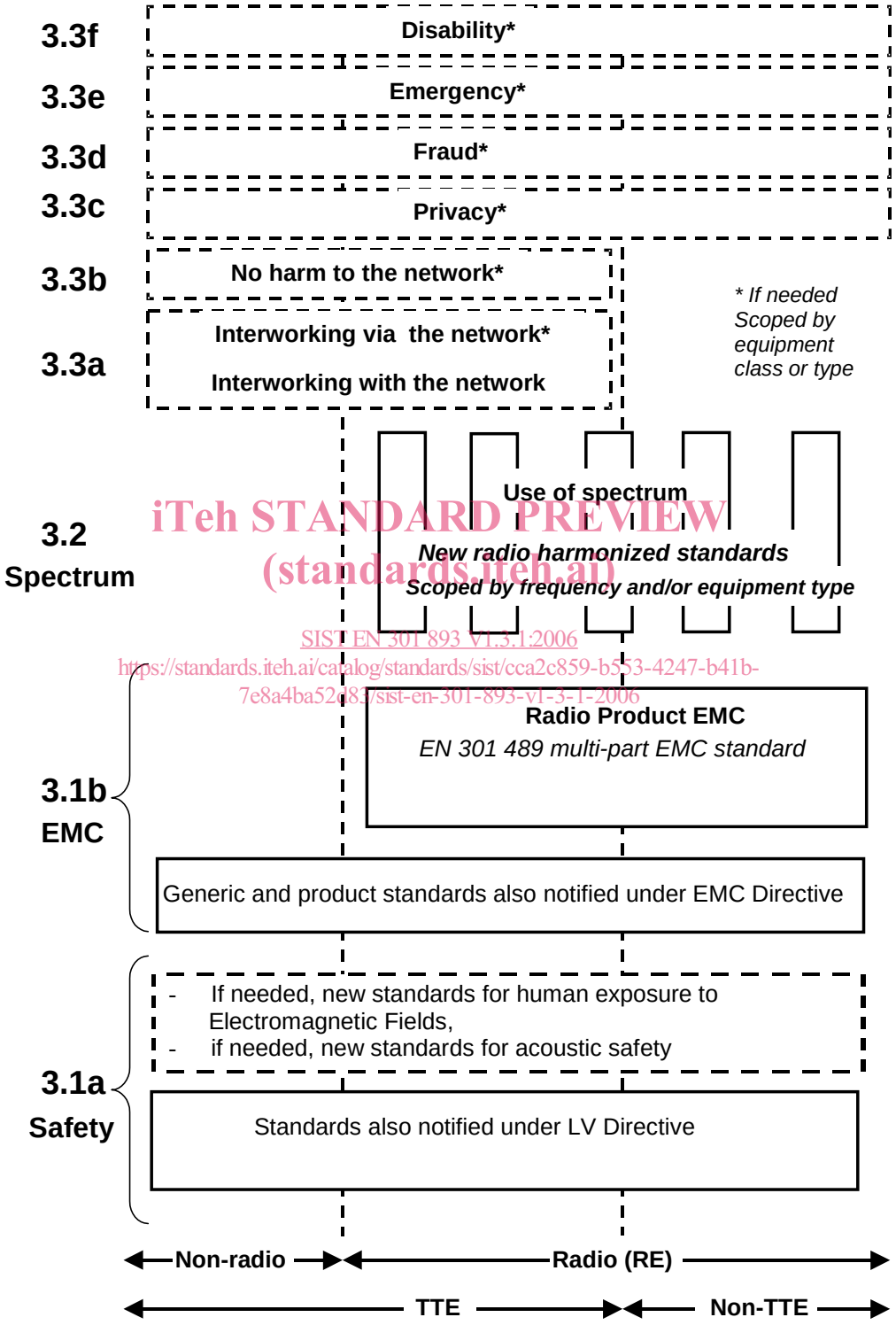

Figure 1: Modular structure for the various standards used under the R&TTE Directive [1]

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 diagram shows EN 301 489 [8], the multi-part product EMC standard for radio used under the EMC Directive [2].

For article 3.1a the diagram 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 5 GHz high performance RLAN equipment that is intended to operate in the frequency ranges 5 150 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz on any of the carrier frequencies as per table 1. Specific requirements are described for (equipment having the capability of) avoiding occupied channels by employing a Dynamic Frequency Selection (DFS) mechanism and implementing Transmit Power Control (TPC), as required in ECC/DEC(04)08 [7].

NOTE 1: This mechanism is also required and described in ITU-R Recommendation M.1652 (see bibliography).

Table 1: Nominal carrier frequency allocations

Carrier centre frequency f_c
5 180 MHz
5 200 MHz
5 220 MHz
5 240 MHz
5 260 MHz
5 280 MHz
5 300 MHz
5 320 MHz
5 500 MHz
5 520 MHz
5 540 MHz
5 560 MHz
5 580 MHz
5 600 MHz
5 620 MHz
5 640 MHz
5 660 MHz
5 680 MHz
5 700 MHz

The present document is intended to cover the provisions of article 3.2 of R&TTE Directive [1], 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 2: 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] ETSI TR 100 028-2: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".

[6] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".

[7] ECC/DEC(04)08: "ECC Decision of 12 November 2004 on the harmonised use of the 5 GHz frequency bands for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs)".

[8] ETSI EN 301 489: "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:

5 GHz RLAN bands: total frequency range that consists of 2 sub-bands:

- 5 150 MHz to 5 350 MHz; and
- 5 470 MHz to 5 725 MHz.

ad-hoc mode: operating mode in which an RLAN device establishes a temporary wireless connection with other RLAN devices without a controlling network infrastructure

Available Channel: channel identified as available for use as an *Operating Channel* without having to perform a *Channel Availability Check* first

burst: period during which radio waves are intentionally transmitted, preceded and succeeded by periods during which no intentional transmission is made

channel: amount of spectrum used by a single RLAN device operating on one of the carrier frequencies listed in table 1 of EN 301 893

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

environmental profile: range of environmental conditions under which equipment within the scope of EN 301 893 is required to comply with the provisions of EN 301 893

host equipment: 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

master mode: mode which relates to the DFS functionality where the RLAN device uses a Radar Interference Detection function and controls the transmissions of RLAN devices operating in slave mode

NOTE: In this mode it is able to select a channel and initiate a network by sending enabling signals to other RLAN devices. An RLAN network shall always have at least one RLAN device operating in master mode when operating in the bands 5 250 MHz to 5 350 MHz and 5 470 MHz to 5 725 MHz.

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

Operating Channel: *Available Channel* on which the RLAN has started transmissions. An *Operating Channel* becomes again an *Available Channel* if the RLAN stopped all transmissions on that channel and no radar signal was detected by the *In-Service Monitoring*

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

simulated radar burst: series of periodic radio wave pulses for test purposes

slave mode: mode which relates to the DFS functionality where the transmissions of the RLAN are under control of a RLAN device operating in master mode

NOTE: An RLAN device in slave mode may use a Radar Interference Detection function.

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

Transmit Power Control (TPC): technique in which the transmitter output power is controlled resulting in reduced interference to other systems

Unavailable Channel: channel which can not be considered by the RLAN for a certain period of time *(Non-Occupancy Period)* after a radar signal was detected on that channel

Usable Channel: any channel from table 1 of EN 301 893, which can be considered by the RLAN for possible use, unless it is precluded by either:

1) the intended outdoor usage of the RLAN; or

2) previous detection of a radar on the channel (*Unavailable Channel*); or

3) national regulations; or

4) the restriction to only operate in the band 5 150 MHz to 5 250 MHz for RLAN devices without a radar detection capability.

3.2 Symbols

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

A	Measured power output (dBm)
B	Radar burst period
Ch_f	Channel free from radars
Ch_r	Channel occupied by a radar
D	Measured power density
E	Field strength
E_o	Reference field strength
f_c	Carrier frequency
G	Antenna gain (dBi)
L	Radar burst length
n	Number of channels
P_H	Calculated EIRP at highest power level
P_L	Calculated EIRP at lowest power level
PD	Calculated power density
R	Distance
R_o	Reference distance
S0	Signal power
T0	Time instant
T1	Time instant
T2	Time instant
T3	Time instant
W	Radar pulse width
x	Observed duty cycle

3.3 Abbreviations

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

DFS	Dynamic Frequency Selection
EIRP	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
ERP	Effective Radiated Power
LV	Low Voltage
ppm	parts per million
PRF	Pulse Repetition Frequency
R&TTE	Radio and Telecommunications Terminal Equipment
TPC	Transmit Power Control
Tx	Transmit, Transmitter
UUT	Unit Under Test

4 Technical requirements 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 stated by the manufacturer. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the stated operational environmental profile.

4.2 Carrier frequencies

4.2.1 Definition

The equipment is required to operate on the applicable specific carrier centre frequencies that correspond to the nominal carrier frequencies f_c defined in table 1.

4.2.2 Limits

The actual carrier centre frequency for any given channel given in table 1 shall be maintained within the range $f_c \pm 20$ ppm.

4.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out.

4.3 RF output power, Transmit Power Control (TPC) and power density

4.3.1 Definitions

4.3.1.1 RF output power

The RF output power is the mean equivalent isotropically radiated power (EIRP) during a transmission burst.

4.3.1.2 Transmit Power Control (TPC)

Transmit Power Control (TPC) is a mechanism to be used by the UUT to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices. This requires the UUT to have a TPC range from which the lowest value is at least 6 dB below the values for mean EIRP given in table 2. TPC is not required in the band 5 150 MHz to 5 250 MHz.

4.3.1.3 Power density

The power density is the mean Equivalent Isotropically Radiated Power (EIRP) density during a transmission burst.

4.3.2 Limits

4.3.2.1 RF output power and power density at the highest power level

For devices with TPC, the RF output power and the power density when configured to operate at the highest stated power level of the TPC range shall not exceed the levels given in table 2.

For devices without TPC, the limits in table 2 shall be reduced by 3 dB, except when operating in the band 5 150 MHz to 5 250 MHz.

Table 2: Mean EIRP limits for RF output power and power density at the highest power level

Frequency range	Mean EIRP limit	Mean EIRP density limit
5 150 MHz to 5 350 MHz	23 dBm	10 dBm/MHz
5 470 MHz to 5 725 MHz	30 dBm	17 dBm/MHz