



SLOVENSKI STANDARD

SIST ETS 300 836-1 E1:2006

01-februar-2006

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Broadband Radio Access Networks (BRAN); High Performance Radio Local Area Network (HIPERLAN) Type 1; Standard testing specification; Part 1: Radio type approval and Radio Frequency (RF) conformance test specification

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Ta slovenski standard je istoveten z: ETS 300 836-1 Edition 1

ICS:

33.060.01	Radijske komunikacije na splošno	Radiocommunications in general
35.110	Omreževanje	Networking

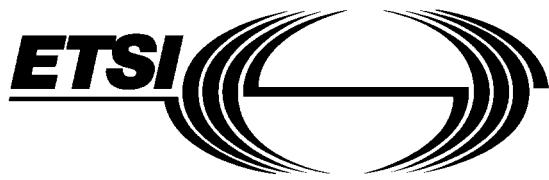
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EUROPEAN
TELECOMMUNICATION
STANDARD

ETS 300 836-1

May 1998

Source: BRAN

Reference: DE/BRAN-10-02D

ICS: 33.020

Key words: HIPERLAN, LAN, radio, testing

**Broadband Radio Acces Networks (BRAN);
High PErformance Radio Local Area Network (HIPERLAN)
Type 1;
Conformance testing specification;
Part 1: Radio type approval and Radio Frequency (RF)
conformance test specification**

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Foreword

This European Telecommunication Standard (ETS) has been produced by the ETSI Project Broadband Radio Access Networks (BRAN) of the European Telecommunications Standards Institute (ETSI).

This ETS has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 83/189/EEC (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

This ETS, together with ETS 300 826 [3], is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility ("the EMC Directive") (89/336/EEC as amended).

Technical specifications relevant to the EMC Directive are given in annex D.

This ETS consists of 4 parts as follows:

- Part 1: "Radio type approval and Radio Frequency (RF) conformance test specification";
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification";
- Part 4: "Abstract Test Suite (ATS) specification".

Transposition dates	
Date of adoption of this ETS:	1 May 1998
Date of latest announcement of this ETS (doa):	31 August 1998
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	28 February 1999
Date of withdrawal of any conflicting National Standard (dow):	28 February 1999

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1 Scope

This European Telecommunication Standard (ETS) specifies the radio type approval and Radio Frequency (RF) conformance testing of the High Performance Radio Local Area Network (HIPERLAN) functional specification as specified in ETS 300 652 [1].

HIPERLAN is confined to the lowest two Open Systems Interconnection (OSI) layers, namely the physical layer and the data link layer. Functions of higher layers are required for operation and interworking of a complete system and are outside the scope of HIPERLAN.

This ETS applies only to Units Under Test (UUT) operating in the band 5,15 GHz to 5,30 GHz. The use of the band 17,1 GHz to 17,3 GHz is covered by other HIPERLAN standards.

2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- [1] ETS 300 652 (1996) and prA1 (1996): "Radio Equipment and Systems (RES); High Performance Radio Local Area Network (HIPERLAN); Type 1; Functional specification".
- [2] ETS 300 836-2: "Radio Equipment and Systems (RES); High Performance Radio Local Area Network (HIPERLAN) Type 1; Conformance testing specification; Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".
- [3] ETS 300 826: "Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for 2,4 GHz wide band transmission systems and High Performance Radio Local Area Network (HIPERLAN) equipment in the 5,2 and 17,2 GHz bands".
- [4] ETR 02876: "Radio Equipment and Systems (RES); Uncertainties in the measurement of mobile radio equipment characteristics".
- [5] ISO/IEC 8802: "Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements".
- [6] CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply, in addition to those given in ETS 300 652 [1].

all conditions: Normal and extreme conditions.

antenna diversity: A plurality of RF input ports to a HIPERLAN receiver, or output ports of a transmitter. For reception, it is implied that the set of signals from the set of ports can have low cross-correlation. For transmission, it is implied that transmitted signals from the set of ports can have low cross-correlation at a general point in space. It is also allowed that a HIPERLAN node can select different antenna properties such as gain, polarization, coverage pattern, or other feature(s) that can affect the practical coverage. A typical example is space diversity.

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

combined HIPERLAN equipment: A combination of a radio equipment part and a specific type of host equipment which may be used for testing according to this ETS.

default carriers: The carriers whose centre frequencies are within the frequency band 5,15 GHz to 5,25 GHz.

defer threshold: A received signal level above which a channel is deemed to be busy for the purposes of channel access.

Effective Isotropic Radiated Peak Envelope Power (EIRPEP): The peak envelope power radiated by a UUT and its antenna at any time.

high carrier number range: Carrier 4.

Local Area Network (LAN): A group of user stations each of which can communicate with at least one other using a common transmission medium commonly managed.

low carrier number range: Carrier 0.

Medium Access Control (MAC): The sub-layer of the ISO/IEC 8802 [5] reference model between the physical layer and the Logical Link Control (LLC).

mid carrier number range: Carrier 2.

normal burst: Burst containing Low Bit Rate part (LBR-part) followed by High Bit Rate part (HBR-part) data.

Normal Transmitted Power (NTP): The transmitted power averaged from the centre of the first transmitted bit of the burst to the centre of the last bit of the burst.

packet: A transmitted burst containing modulated information. A packet may be either an LBR data burst or an LBR-HBR data burst.

physical layer: Layer 1 of the ISO/OSI reference model. The mechanism for transfer of bits between HIPERLAN nodes.

Radio Frequency (RF) carrier: The centre frequency occupied by a HIPERLAN transmission.

System Simulator (SS): Test equipment that interacts with the UUT.

useful bits: All data bits in one burst (including synchronization and training sequences). Defined for normal bursts as being from 340 ns before the centre of the first LBR-part bit to the centre of the last bit of HBR-part data. Defined for ACK bursts as being from 340 ns before the centre of the first LBR-part bit to 340 ns after the centre of the last LBR-part bit.

useful HBR-part bits: All HBR-part data bits in burst (including training sequences). Defined from the centre of the first HBR-part bit to the centre of last bit of HBR-part data.

useful LBR-part bits: All LBR-part data bits in burst (including synchronization sequence). Defined from 340 ns before the centre of the first LBR-part bit to 340 ns after the centre of the last LBR-part bit.

user manual: The end user documentation to be included with the UUT.

3.2 Symbols

For the purposes of this ETS, the following symbol applies, in addition to those given in ETS 300 652 [1]:

ppm parts per million

3.3 Abbreviations

For the purposes of this ETS, the following abbreviations apply, in addition to those given in ETS 300 652 [1]:

ADT	Adaptive Defer Threshold
AK-HCPDU	AcKnowledgeMENT HIPERLAN CAC Protocol Data Unit
ATS	Abstract Test Suite
CW	Continuous Wave
EIRPEP	Effective Isotropic Radiated Peak Envelope Power
EMC	ElectroMagnetic Compatibility
FER	Frame Error Ratio
FS	Field Strength
HBR-part	High Bit Rate part
HID	HIPERLAN IDentifier
HIPERLAN	High PErformance Radio Local Area Network
LAN	Local Area Network
LBR-part	Low Bit Rate part
LLC	Logical Link Control
MAC	Medium Access Control
MADT	Maximum Adaptive Defer Threshold
NTP	Normal Transmitted Power
OSI	Open Systems Interconnection
PDU	Protocol Data Unit
PICS	Protocol Implementation Conformance Statement
RF	Radio Frequency
SLN	Search List Number
SS	System Simulator
TSS&TP	Test Suite Structure and Test Purposes
Tx	Transmit, Transmitter
UUT	Unit Under Test

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4 General

4.1 Supplier declarations

Where parameters, capabilities, etc., are subject to suppliers declaration and not a specific test, it shall be the suppliers responsibility to:

- supply equipment conforming to ETS 300-652 [1];
- include a completed copy of the PICS (see ETS 300 836-2 [2]) with the appropriate application form and a copy of the user manual for the HIPERLAN UUT;
- be prepared to submit upon request supporting design information, including test methods (additional to this document), circuit designs and software source code, demonstrating the implementation of the said capabilities.

The supplier shall declare the following specific characteristics of the equipment:

- a) the type of UUT, either combined or plug-in (see subclause 4.2.2);
- b) where extreme operating conditions apply to the equipment offered for testing that are more stringent than those specified in subclause 5.4, these shall be declared;

- c) where the radio equipment is capable of different transmitter power settings, the supplier shall declare the intended combination(s) of the radio equipment power settings and one or more antenna assemblies. For each combination, the gain and polarization of the antenna assembly, i.e. the transfer function between the conducted RF power and EIRPEP, shall be declared;
- d) in the case of plug-in devices, the nominal voltages of the combined radio equipment or the nominal voltages of the host equipment.

4.2 Presentation of equipment for type testing

4.2.1 Choice of model

The supplier shall offer one or more production models or equivalent preliminary models, as appropriate, for type testing.

Software fitted to production models should be substantially the same as that used during type testing.

Due to the low levels of RF signal and the wideband modulations used in this type of equipment, radiated RF power measurements are imprecise. Conducted measurements are much more precise. In combination with the declared antenna assembly gain(s) adequate assurance of the RF characteristics can be achieved. Therefore, equipment offered for testing should provide a suitable connector for conducted RF power measurements. If such a connector is not provided, radiated measurements shall be performed (see annexes A and B).

4.2.2 Presentation

Combined equipment shall be offered complete with all equipment needed for testing.

Plug-in HIPERLAN equipment is intended for use with a variety of host systems. The supplier of plug-in equipment shall supply a suitable test configuration consisting of either a host system intended for normal use or a test jig that is representative of the range of host systems in which the UUT may be used. The test jig shall allow the UUT to be powered and stimulated in a way similar to the way it would be powered and stimulated when connected to or inserted into host equipment.

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4.3 Design

4.3.1 General

The equipment submitted by the supplier, shall be designed, constructed and manufactured in accordance with good engineering practice, and with the aim of minimizing harmful interference to other equipment and services.

4.3.2 Controls

There shall be no controls or software accessible to the end user which, if maladjusted, might increase the radio interfering potential of the equipment. This does not apply to test harnesses and software supplied solely for the purposes of testing.

4.4 Recording of measurement results

The test results shall be recorded in the appropriate test report form.

The recorded value of the measurement uncertainty for each measurement shall be equal to or lower than the figures in table 5.

5 Test conditions

5.1 Normal and extreme test conditions

Tests shall be made under the test conditions as specified in the test purposes (see also subclause 4.1 regarding supplier declarations).

5.2 Power sources

During type tests, the normal power source of the equipment shall be replaced by a test power source capable of producing normal and extreme test voltages as specified in subclauses 5.3.2 and 5.4.2. For the purpose of tests, the voltage of the power source shall be measured as close as possible to the input terminals of the UUT. However, the measurement uncertainty limits in table 5 shall apply.

5.3 Normal test conditions

5.3.1 Normal temperature and humidity

The normal temperature and humidity conditions for tests shall be any convenient combination of temperature and humidity within the following ranges:

- temperature: +15°Celsius to +35°Celsius;
- relative humidity: 20 % to 75 %.

The actual values during the tests shall be recorded in the appropriate test report form.

5.3.2 Normal power source

5.3.2.1 Mains voltage

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage and frequency. For the purpose of this ETS, the nominal voltage shall be the declared voltage or any of the declared voltages for which the equipment was designed.

5.3.2.2 Lead-acid battery power sources used on vehicles

When radio equipment is intended for operation from the usual, alternator fed lead-acid battery power source used on vehicles, then the normal test voltage shall be 1,1 times the nominal voltage of the battery (6V, 12V, etc.).

5.3.2.3 Other power sources

For operation from other power sources or types of battery (primary or secondary), the nominal test voltage shall be as declared by the equipment supplier. This shall be recorded in the appropriate test report form.

5.4 Extreme test conditions

If the supplier declares test conditions more extreme than those specified in subclause 5.4.1 then the suppliers declaration shall be substituted.

5.4.1 Extreme temperatures

For tests at extreme temperatures, measurements shall be made in accordance with the procedures specified in subclause 5.4.3, at the upper and lower temperatures of the range as follows:

- temperature: - 20°Celsius to + 55°Celsius.

Where the suppliers declared operating range does not include the range of - 20°Celsius to + 55°Celsius, the equipment shall be tested over the following temperature ranges:

- a) 08°C to + 35°C for equipment intended for indoor use only, or intended for use in areas where the temperature is controlled within this range;
- b) over the extremes of the operating temperature range(s) of the declared host equipment(s) in case of plug-in radio devices.