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Harmonized European Standard (Telecommunications series)

Broadband Radio Access Networks (BRAN); 60 GHz Multiple-Gigabit WAS/RLAN Systems; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

Reference

DEN/BRAN-0070000

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.4] (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 [3] 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").

Technical specifications relevant to Directive 1999/5/EC [3] are given in annex A.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	18 months after doa

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive. The modular structure is shown in EG 201 399 [i.8].

1 Scope

The present document applies to radio equipment types for wireless access systems (WAS)/radio local area networks (RLAN) operating at multiple-gigabit data rates in the 60 GHz frequency range. These applications may also be referred to as wireless personal area network (WPAN) or wireless local area network (WLAN) systems and are primarily for short-range, predominantly indoor use by consumer devices operating on license-exempt radio frequencies. Economic benefits of this usage apply to a variety of markets including communications, computing, and consumer electronics by enabling the transfer of large amounts of information in a short amount of time (for example, from a kiosk to a mobile phone) or the continuous streaming of uncompressed data (for example, the external video interfaces of a computer or high definition disc player).

These networks operate over a short range with very wideband communications using a variety of directional medium and high gain antennas to enable a high degree of spectrum reuse, and may use a flexible bandwidth scheme under which they normally operate in a wideband mode, and periodically reduce their bandwidth (e.g. for antenna training and other activities).

The technical characteristics of these applications are described in TR 102 555 [i.1], where the 60 GHz band is described from 59 GHz to 66 GHz. On the basis of the sharing study in ECC Report 114 [i.2], ECC Report 113 [i.3], and the input of national bodies, the 60 GHz band is now described from 57 GHz to 66 GHz to support harmonization with additional geographies.

Equipment in this frequency range intended for outdoor Fixed Local Area Network Extension (FLANE) are not in the scope of the present document.

The present document is intended to support specifications such as those addressed in IEEE 802.15.3c [i.5], Ecma TC48 [i.6], and other international bodies.

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1.

Table 1: Radiocommunications service frequency bands

	Radiocommunications service frequency bands
Transmit	57 GHz to 66 GHz
Receive	57 GHz to 66 GHz

The present document is intended to cover the provisions of Directive 1999/5/EC [3] (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 may 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

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.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
    - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
    - for informative references.

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

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] Void.

[2] ERC/REC 74-01 (2005): "Unwanted Emissions in the Spurious Domain".

[3] 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).

[4] ETSI TR 100 028 (V1.4.1 - all parts): "Electromagnetic compatibility and Radio spectrum matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

[5] Void.

[6] ITU-R Recommendation SM.1539-1 (2002): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ETSI TR 102 555: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Technical characteristics of multiple gigabit wireless systems in the 60 GHz range System Reference Document".

[i.2] ECC Report 114: "Compatibility studies between Multiple Gigabit Wireless Systems in frequency range 57-66 GHz and other services and systems (except ITS in 63-64 GHz)".

[i.3] ECC Report 113: "Compatibility studies around 63 GHz between Intelligent Transportation Systems (ITS) and other systems".

[i.4] 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.

[i.5] IEEE 802.15.3c: "EEE Standard for Information Technology - Specific Requirements - Part 15: Wireless Personal Area Networks with Millimeter Wave Alternative Physical Task Group 3c (TG3c)".

[i.6] Ecma TC48, High Rate Short Range Wireless Communications.

[i.7] ERC/REC 70-03: "Related to the Use of Short Range Devices (SRD)".

[i.8] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum matters (ERM); A guide to the production of candidate Harmonized Standards for application under the R&TTE Directive".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions given in the R&TTE Directive [3] and the following apply:

60 GHz range or 60 GHz band: one of the variously permitted frequencies of operation, typically from 57 GHz to 66 GHz

activity factor: percentage over any one minute time period when equipment is operating under a given set of conditions

channel separation: minimum separation (in MHz) between the centre frequencies of two adjacent channels in the channel plan of the radio equipment

environmental profile: declared range of environmental conditions under which equipment within the scope of the present document is required to be compliant

integral antenna: antenna which is declared to be part of the radio equipment by the supplier

NOTE 1: In some cases, it may not be possible to remove an integral antenna or expose an antenna connector without changing the output characteristics of the radio equipment.

NOTE 2: Even with an integral antenna, it might still be possible to separate the antenna from the equipment using a special tool.

mean power: when applied to a modulated signal, this is the power (transmitted or received) in a bandwidth

occupied bandwidth: frequency bandwidth of the signal power at the -6 dBc points

smart antenna systems: equipment that combines multiple transmit and/or receive antenna elements with a signal processing function to increase its radiation and/or reception capabilities

NOTE: This includes techniques such as spatial multiplexing, beam forming, cyclic delay diversity, etc.

3.2 Symbols

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

dBc	spectral density relative to the maximum spectral power density of the transmitted signal
dBm	decibel relative to one milliwatt
dBr	decibel relative to a given maximum power level
GHz	thousand millions of cycles

kHz thousands of cycles
µs millionths of seconds

3.3 Abbreviations

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

BW	BandWidth
ChS	Channel Separation
EIRP	Equivalent Isotropically Radiated Power
FLANE	Fixed Local Area Network Extension
OBw	Occupied Bandwidth
PHY	PHYsical networking layer
RF	Radio Frequency
RLAN	Radio Local Area Network
R&TTE	Radio equipment and Telecommunications Terminal Equipment
SNR	Signal to Noise Ratio
UUT	Unit Under Test
WAS	Wireless Access System
WLAN	Wireless Local Area Network
WPAN	Wireless Personal Area Network

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

4.2 Conformance requirements

4.2.1 Spectral power density

4.2.1.1 Definition

The spectral power density is the mean Equivalent Isotropically Radiated Power (EIRP) density in Watts per Hertz during a transmission burst.

4.2.1.2 Limit

The maximum spectral power density is applicable to the system as a whole when operated at the highest stated power level. For a smart antenna system, the limit applies to the configuration that results in the highest EIRP.

The maximum spectral power density for normal wideband (greater than 100 MHz occupied bandwidth) operation shall be limited to 13 dBm (20 mW) per MHz EIRP.

For narrowband (less than 100 MHz occupied bandwidth) activities (e.g. link setup, device discovery, antenna training), there shall be no specific spectral power density limit. These narrowband activities shall have an activity factor of less than 2 %.

4.2.2 RF output power

4.2.2.1 Definition

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

4.2.2.2 Limit

The maximum RF output power is applicable to the system as a whole when operated at the highest stated power level. For a smart antenna system, the limit applies to the configuration that results in the highest EIRP.

The maximum RF output power in normal wideband operation shall be limited to 40 dBm (10 W). This value is lowered proportionally for transmissions with a nominal channel bandwidth less than 500 MHz.

The maximum output power during narrowband activity shall not exceed that of wideband operation.

4.2.3 Transmitter unwanted emissions

4.2.3.1 Definition

These are unwanted emissions in the spurious domain as noted in ERC/REC 74-01 [2] while the equipment is transmitting. The boundary where the spurious domain begins as given by ITU-R Recommendation SM.1539-1 [6] is considered to be the offset from the nominal centre frequency of the transmission by ±250 % of the relevant occupied bandwidth (OBw) for OBw $\leq$ 500 MHz and ± (500 MHz + 1,5 × OBw) for OBw > 500 MHz.

4.2.3.2 Limit

The level of unwanted emissions in the spurious domain shall conform to the ERC/REC 74-01 [2] limits for Land Mobile Services as given in table 2 for radiated measurements with 0dBi antenna gain. The requirements refer to average power levels measured at distances with respect to the UUT.

Table 2: Transmitter spurious emissions

Frequency band	Measurement bandwidth	Field Strength at 3 m (dBµV / m)
30 MHz to 1 GHz	100 kHz	59
1 GHz to 132 GHz	1 MHz	65

4.2.4 Receiver unwanted emissions

4.2.4.1 Definition

These are unwanted emissions in the spurious domain as noted in ERC/REC 74-01 [2] while the equipment is receiving a transmission. The boundary where the spurious domain begins is given by ITU-R Recommendation SM.1539-1 [6] and in clause 4.2.3.

4.2.4.2 Limit

The level of unwanted emissions in the spurious domain shall conform to ERC/REC 74-01 [2] for Land Mobile Services as given in table 3 for radiated measurements with 0 dBi antenna gain. The requirements refer to average power levels measured at distances with respect to the UUT.

Table 3: Receiver spurious emissions

Frequency band	Measurement bandwidth	Field Strength at 3 m (dBµV / m)
30 MHz to 1 GHz	100 kHz	38
1 GHz to 132 GHz	1 MHz	48