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Wireless Access Systems (WAS);
5,8 GHz fixed broadband data transmitting systems;
Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Reference

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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.2] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

National transposition dates	
Date of adoption of this EN:	6 March 2017
Date of latest announcement of this EN (doa):	30 June 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 December 2017
Date of withdrawal of any conflicting National Standard (dow):	31 December 2018

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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Introduction

The present document covers 5,8 GHz high performance Broadband Fixed Wireless Access systems (BFWA) including equipment which is used in wireless local area networks. Such networks provide high speed data communications in between devices connected to the wireless infrastructure.

1 Scope

The present document specifies technical characteristics and methods of measurements for Fixed Broadband Data Transmitting Systems intended to operate in the 5,8 GHz band (5 725 MHz to 5 875 MHz). The present document is equally applicable to systems utilizing integral or dedicated antennas.

The present document covers the essential requirements of article 3.2 of Directive 2014/53/EU [i.1] under the conditions identified in annex A.

2 References

2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

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

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The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.2] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.

[i.3] ETSI EN 300 019-1-0 (V2.1.2) (09-2003): "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-0: Classification of environmental conditions; Introduction".

[i.4] ETSI TR 100 028-1 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".

[i.5] ETSI TR 100 028-2 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".

[i.6] CEPT/ECC Report 68 (Riga, June 2005): "Compatibility studies in the band 5725-5875 MHz between Fixed Wireless Access (FWA) systems and other systems".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in Directive 2014/53/EU [i.1] and the following apply:

antenna assembly: combination of the antenna (integral or dedicated), its coaxial cable and if applicable, its antenna connector and associated switching components

available channel: channel identified as usable as an *Operating Channel*

Broadband Fixed Wireless Access (BFWA): operation of fixed Point to Point or fixed Point to Multipoint wireless devices or systems used to connect fixed locations

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

dedicated antenna: antenna external to the equipment, using an antenna connector with a cable or a wave-guide

NOTE: The antenna has been designed or developed for one or more specific types of equipment. It is the combination of dedicated antenna and radio equipment that is expected to be compliant with the regulations.

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

in-service monitoring: mechanism to check a channel in use by the device for the presence of a radar signal with a level above the Interference Detection Threshold

integral antenna: antenna designed as a fixed part of the equipment, without the use of an external connector and as such which cannot be disconnected from the equipment by a user with the intend to connect another antenna

NOTE 1: An integral antenna may be fitted internally or externally. In the case where the antenna is external, a non-detachable cable or wave-guide can be used.

NOTE 2: Even when equipment with an integral antenna is concerned, it might still be possible to separate the antenna from the equipment using a special tool. In such cases the assessment of the radio equipment and of the antenna against requirements of the present document may be done separately.

operating channel: *Available Channel* on which the FWA device has started transmissions

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

operating nominal RF channel width: nominal amount of spectrum used by a single device operating on an identified centre frequency

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

Transmit Power Control range: power range over which the TPC is able to control the transmitter output power

unavailable channel: channel which cannot be considered by the FWA device for a certain period of time *(Non-Occupancy Period)* after a radar signal was detected on that channel

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
ChS	Nominal occupied channel bandwidth
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_{cond}	The conducted power level of the equipment
P_{cond_1}	The maximum useable conducted power level from the equipment
P_{cond_2}	The maximum conducted power level from the power range associated with the highest useable antenna assembly gain
P_{cond_3}	The minimum conducted power level from the equipment
P_{EIRP}	The EIRP of the equipment
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:

BFWA	Broadband Fixed Wireless Access
BW	Band Width
CW	Continuous Wave
DFS	Dynamic Frequency Selection
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
ERP	Effective Radiated Power
FWA	Fixed Wireless Access
IF	Intermediate Frequencies
PD	mean Power Density EIRP
PER	Packet Error Rate
ppm	parts per million
pps	pulses per second
PRF	Pulse Repetition Frequency
RF	Radio Frequency
TPC	Transmit Power Control
Tx	Transmit, Transmitter
UUT	Unit Under Test

4 Technical requirements specification

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 manufacturer. The equipment shall comply with all the technical requirements of the present document which are identified as applicable in annex A at all times when operating within the boundary limits of the declared operational environmental profile.

4.2 Conformance requirements

4.2.1 Designation of centre frequencies and frequency error

4.2.1.1 Definition

Frequency error is the difference between the nominal channel centre frequency and the actual channel centre frequency.

The nominal channel centre frequencies f_c, identified by the following expression:

5 725 + (n × 2,5) MHz, where either n = 2 to 58 for ChS = 10 MHz,

or n = 4 to 56 for ChS = 20 MHz.

4.2.1.2 Limits

The manufacturer shall declare the centre frequencies on which the equipment can operate. The equipment shall only operate in channels centred on any of those frequencies identified in clause 4.2.1.1.

The actual carrier centre frequency shall be maintained within the range f_c ± 20 ppm of the nominal channel centre frequency.

4.2.1.3 Conformance

Conformance tests as defined in clause 5.4.2 shall be carried out.

4.2.2 Transmitter RF output power, EIRP and EIRP spectral density

4.2.2.1 Definition

The RF output power is the mean conducted power applied to the antenna assembly, during a transmission burst.

The EIRP is the maximum radiated power of the equipment relative to an isotropic antenna.

The EIRP spectral density is the mean EIRP evaluated within a specified measurement bandwidth during a transmission burst.

4.2.2.2 Limits

The mean EIRP, RF power and EIRP spectral density when configured to operate at the highest stated power level (P_{cond_1}) shall not exceed the limits in table 1.

Table 1: Mean RF output power, EIRP and power density limits at the highest power level

Channel Width (MHz) ChS	Mean RF power into antenna (dBm)	mean EIRP (dBm)	Mean EIRP spectral density (dBm/MHz)
10	27	33	23
20	30	36	23

4.2.2.3 Conformance

Conformance tests as defined in clause 5.4.3 shall be carried out.

4.2.3 Transmitter unwanted emissions

4.2.3.1 Transmitter unwanted emissions outside the 5 725 MHz to 5 875 MHz band

4.2.3.1.1 Definition

These are radio frequency emissions outside the band 5 725 MHz to 5 875 MHz.

Equipment that, in addition to a transmit mode, also have a standby or idle mode, shall in these modes meet the requirements defined in clause 4.2.5.

4.2.3.1.2 Limits

The level of unwanted emission shall not exceed the limits given in table 2.

Table 2: Transmitter unwanted emission limits

Frequency range (MHz)	Limit (dBm)	Bandwidth (kHz)
30 to 1 000	-36	100
1 000 to 5 725	-30	1 000
5 875 to 26 500	-30	1 000

4.2.3.1.3 Conformance

Conformance tests as defined in clause 5.4.4.1 shall be carried out.

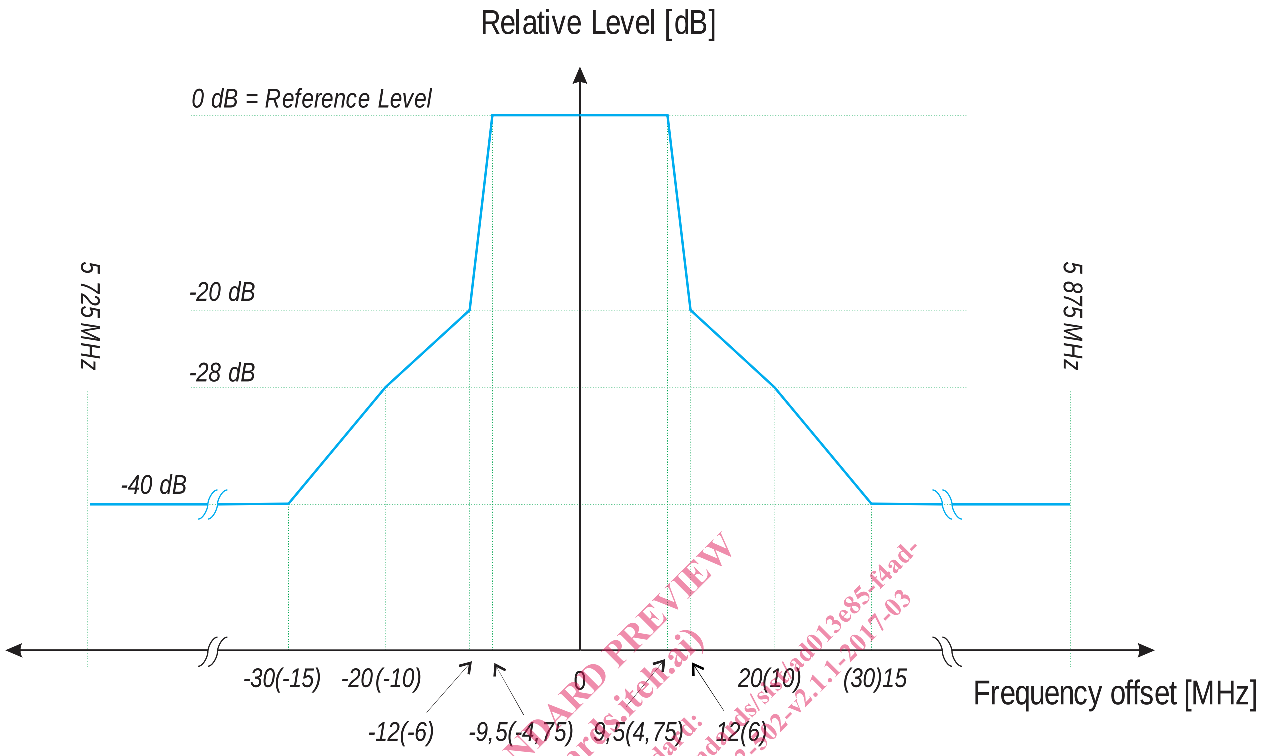
4.2.3.2 Transmitter unwanted emissions within the 5 725 MHz to 5 875 MHz band

4.2.3.2.1 Definition

These are radio frequency emissions within the band 5 725 MHz to 5 875 MHz.

4.2.3.2.2 Limits

The average level of the transmitted spectrum based on the declared ChS shall not exceed the limits given in figure 1 when operating under highest output power conditions.



NOTE 1: 0 dB Reference Level is the spectral density relative to the maximum spectral power density of the transmitted signal.
NOTE 2: On the Frequency Offset axis, the figures apply to ChS = 20 MHz whereas the figures in parentheses apply to ChS = 10 MHz.
NOTE 3: Emissions that fall outside the lower and upper band frequency limits of 5 725 MHz and 5 875 MHz respectively shall instead meet the unwanted emission limits of clause 4.2.3.1.

Figure 1: Emission Mask

4.2.3.2.3 Conformance

Conformance tests as defined in clause 5.4.4.2 shall be carried out.

4.2.4 Transmitter Power Control (TPC)

4.2.4.1 Definition

Transmit Power Control (TPC) is a mechanism to reduce the aggregate power from a large number of devices to improve the spectrum sharing conditions, see CEPT/ECC Report 68 [i.6].

4.2.4.2 Limit

The FWA device shall have the capability to reduce the operating mean EIRP level to a level not exceeding 24 dBm for ChS = 20 MHz and 21 dBm for ChS = 10 MHz.

4.2.4.3 Conformance

Conformance tests as defined in clause 5.4.3 shall be carried out.