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**Wideband Data Transmission Systems (WDTs)  
for Mobile and Fixed Radio Equipment  
operating in the 57 - 71 GHz band;  
Harmonised Standard for access to radio spectrum**

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# Foreword

This draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Broadband Radio Access Networks (BRAN), and is now submitted for the combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission Implementing Decision C(2015) 5376 final [i.1] 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.2].

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.

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

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## 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

Radio equipment operating in the 60 GHz band are capable of supporting data rates of multiple-gigabit per second.

The spectrum usage conditions for this equipment are set in ERC Recommendation 70-03 [i.3], annex 3 frequency band c2, frequency band c3 and Commission Decision 2019/1345/EU [i.4] bands 75a and 75b.

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# 1 Scope

The present document specifies technical characteristics and methods of measurements for Wideband Data Transmission Systems (WDTS) fixed equipment installations intended for mobile network applications and mobile equipment operating indoor and outdoor in the 57 GHz to 71 GHz frequency range.

The scope of the present document includes equipment in this frequency range in compliance with ERC Recommendation 70-03 [i.3], annex 3 frequency band c2, frequency band c3 and Commission Decision 2019/1345/EU [i.4] bands 75a and 75b.

Radio equipment within the scope of the present document are capable of operating in all or any part of the frequency bands given in table 1.

**Table 1: Radiocommunications service frequency band**

Transmit/Receive	Radiocommunications service frequency band
Transmit	57 GHz to 71 GHz
Receive	57 GHz to 71 GHz

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU is given in annex A.

## 2 References

### 2.1 Normative 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.

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

Not applicable.

### 2.2 Informative references

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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] [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.2] [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.3] [ERC Recommendation 70-03 \(Tromsø 1997 and subsequent amendments\)](#): "Related to the Use of Short Range Devices (SRD)".
- [i.4] [Commission Implementing Decision \(EU\) 2019/1345 of 2 August 2019](#) amending Decision 2006/771/EC updating harmonised technical conditions in the area of radio spectrum use for short-range devices.
- [i.5] [ERC Recommendation 74-01 \(Approved 1998 and subsequent amendments\)](#): "Unwanted emissions in the spurious domain".
- [i.6] ETSI TS 138 141-2 (V16.10.0) (2022-03), "5G; NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing (3GPP TS 38.141-2 version 16.10.0 Release 16)".
- [i.7] [ECC Report 288 \(approved 25 January 2019\)](#): "Conditions for the coexistence between Fixed Service and other envisaged outdoor uses/applications in the 57 - 66 GHz range".

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the terms given in Directive 2014/53/EU [i.2] and the following apply:

**60 GHz band:** the frequency range from 57 GHz to 71 GHz

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

NOTE 1: This term (antenna assembly) refers to an antenna connected to one transmit chain.

NOTE 2: The gain of an antenna assembly does not include the additional gain that may result out of beamforming.

**beamforming gain:** additional (antenna) gain realized by using beamforming techniques in smart antenna systems

NOTE: Beamforming gain as used in the present document does not include the gain of the antenna assembly.

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

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

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:** (transmitted or received) power averaged during the On Time of the signal

**nominal channel bandwidth:** bandwidth assigned to a single channel

NOTE: The nominal channel bandwidth is part of the product information as outlined in clause 5.3.0a.

**occupied bandwidth:** bandwidth of the signal containing 99 % of the transmitted mean power

NOTE: Both below the lower and above the upper frequency limits, the mean power emitted is equal to 0,5 % of the total mean power of the emission.

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

## 3.2 Symbols

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

D	directivity
dB	decibel
dBc	decibels relative to the maximum power spectral density of the transmitted signal
dBi	decibels relative to the gain of an isotropic antenna
dBm	decibel relative to one milliwatt
dBr	decibel relative to a given maximum power level
G	gain of the antenna assembly
GHz	thousand millions of cycles per second
kHz	thousands of cycles per second
MHz	Mega Hertz
$\eta$	antenna efficiency
$\mu$ s	millionths of seconds
W	Watt

## 3.3 Abbreviations

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

AAS	Active Antenna Systems
ACM	Adaptive Code and Modulation
ALA	Automatic Link Adaptation
ATPC	Automatic Transmit Power Control
BW	BandWidth
CW	Continuous Wave
DC	Duty Cycle
EFTA	European Free Trade Association
EIRP	Equivalent Isotropically Radiated Power
EIRP <sub>0</sub>	Equivalent Isotropically Radiated Power Spectral Density
ERP	Effective Radiated Power
EUT	Equipment Under Test FER Frame Error Rate
MCS	Modulation and Coding Scheme
OTA	Over The Air
PSD	Power Spectral Density
RBW	Resolution BandWidth
RF	Radio Frequency
RMS	Root Mean Square
SRD	Short Range Devices
TP	ThroughPut TRP Total Radiated Power
UUT	Unit Under Test
VBW	Video BandWidth
WDTS	Wideband Data Transmission Systems

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# 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 in accordance with its intended use. The equipment shall comply with all the technical requirements of the present document at all times when operating within the boundary limits of the operational environmental profile defined by its intended use. Conformance tests shall be carried out under environmental conditions as defined in clause 5.1.

## 4.2 Conformance requirements

### 4.2.1 Occupied channel bandwidth

#### 4.2.1.1 Definition

The occupied channel bandwidth is the bandwidth containing 99 % of the power of the signal.

#### 4.2.1.2 Limit

The occupied channel bandwidth shall be less than the nominal channel bandwidth for any transmission. The device shall support a mode of transmission with a necessary bandwidth at least 70 % of the nominal channel bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.

When equipment has simultaneous transmissions in adjacent channels, these transmissions may be considered as one signal with a nominal channel bandwidth of "n" times the individual nominal channel bandwidth where "n" is the number of adjacent channels. When equipment has simultaneous transmissions in non-adjacent channels, each power envelope shall be considered separately.

#### 4.2.1.3 Conformance

Conformance tests as defined in clause 5.3.1 shall be carried out and result compared to the limit.

### 4.2.2 RF output power

#### 4.2.2.1 Definition

The RF output power is defined by the mean Equivalent Isotropically Radiated Power (EIRP) and Total Radiated Power (TRP) for the equipment during a transmission burst.

#### 4.2.2.2 Limit

The maximum RF output power shall not exceed the applicable limit indicated in table 2. The limit applies to a device including its antenna assembly. For a smart antenna system, the limit applies to any supported antenna configuration. In case of multiple (adjacent or non-adjacent) channels the total RF output power of all channels shall be less than or equal to the applicable limit in table 2.

**Table 2: RF output power limit**

Maximum power level EIRP	Maximum power level TRP	Additional conditions
40 dBm	25 dBm	
55 dBm	25 dBm	Only fixed outdoor installations with $\geq 30$ dB transmit directivity

NOTE: Radiated measurements are used in all cases given the use of integral antennas and the lack of suitable methods for conducted measurements for this type of equipment. As a consequence, the requirement at antenna port or ports is verified with the test metric of TRP, and the requirement of transmit antenna gain with the test metric of directivity. See annex E for information regarding the relationship between conducted power and TRP, and transmit antenna gain and directivity.

#### 4.2.2.3 Conformance

Conformance tests as defined in clause 5.3.2 shall be carried out and results compared to the limits.

## 4.2.3 Power Spectral Density

### 4.2.3.1 Definition

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

### 4.2.3.2 Limit

The maximum power spectral density shall not exceed the applicable limit indicated in table 3. The limit applies to a device including its antenna assembly. For a smart antenna system, the limit applies to any supported antenna configuration.

**Table 3: Power Spectral Density limit**

Maximum power spectral density (EIRP)	Additional conditions
23 dBm/MHz	
38 dBm/MHz	Only fixed outdoor installations with $\geq 30$ dB transmit directivity

### 4.2.3.3 Conformance

Conformance tests as defined in clause 5.3.3 shall be carried out and result compared to the limit.

## 4.2.4 Transmitter unwanted emissions

### 4.2.4.1 Transmitter unwanted emissions in the out-of-band domain

#### 4.2.4.1.1 Definition

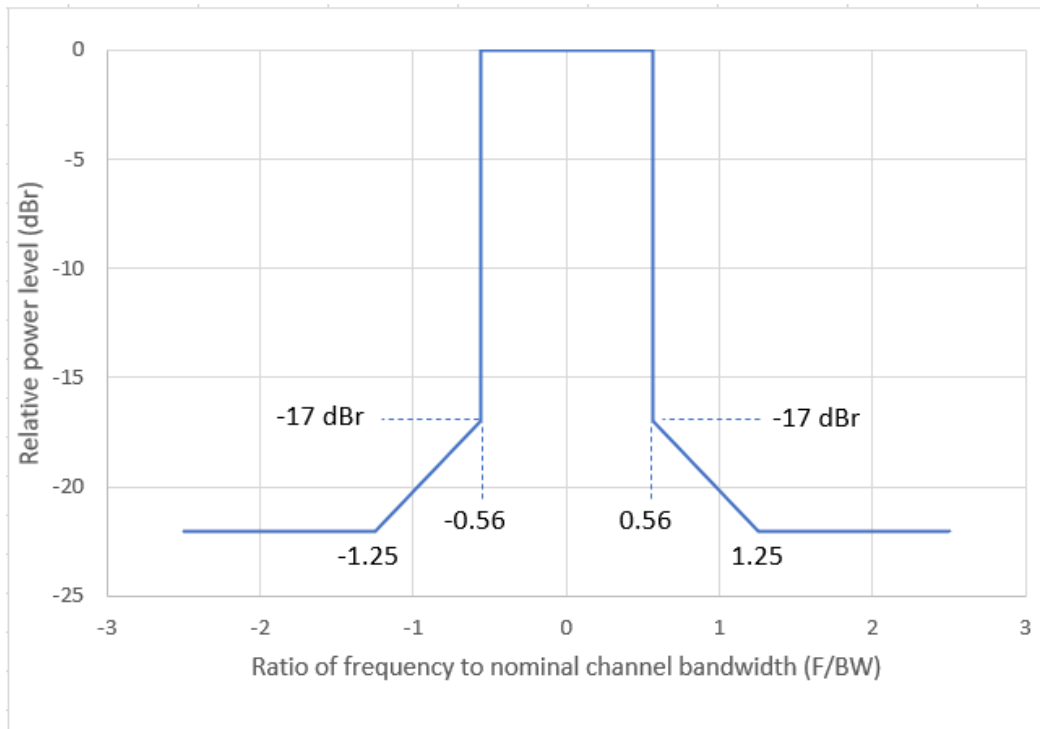
Transmitter unwanted emissions in the out-of-band domain are emissions when the equipment is in transmit mode, on frequencies immediately outside the nominal bandwidth which results from the modulation process but excluding spurious emissions.

#### 4.2.4.1.2 Limit

The mean power level of transmitter unwanted emissions in the out-of-band domain as measured with a 1 MHz reference bandwidth shall be less than or equal to the relative limits specified in figure 1 or an absolute TRP level of -30 dBm, whichever is greater. The abscissa is the ratio of relative frequency ( $F - f_C$ ) to nominal channel BandWidth (BW), where  $f_C$  is the nominal centre frequency of the transmission.

In case of multiple adjacent channels, the transmit spectrum mask in figure 1 shall apply for the nominal channel bandwidth of the multiple adjacent channels.

The boundary between the out-of-band domain and spurious emission domain shall be as specified in clause 4.2.4.2.2.



**Figure 1: Transmit spectral power mask**

#### 4.2.4.1.3 Conformance

Conformance tests as defined in clause 5.3.4.1 shall be carried out and result compared to the limit.

#### 4.2.4.2 Transmitter unwanted emissions in the spurious domain

##### 4.2.4.2.1 Definition

Transmitter unwanted emissions in the spurious domain are emissions when the equipment is in transmit mode, on frequencies below  $F_L$  and above  $F_H$  defined in clause 4.2.4.2.2.

##### 4.2.4.2.2 Limit

The level of unwanted emissions in the spurious domain shall be less than or equal to the limits specified in table 4.

The lower boundary between the spurious domain and the out-of-band domain shall be at frequency

$$F_L = \min \{ 57\,000; f_C - \min(2,5 \times \text{nominal channel bandwidth}, 1,5 \times \text{nominal channel bandwidth} + 500) \} [\text{MHz}]$$

and the upper boundary between the spurious domain and the out-of-band domain shall be at frequency

$$F_H = \max \{ 71\,000; f_C + \min(2,5 \times \text{nominal channel bandwidth}, 1,5 \times \text{nominal channel bandwidth} + 500) \} [\text{MHz}]$$

where  $f_C$  is the nominal centre frequency of the transmission and with all notions in units of MHz.