



**IMT cellular networks;  
Harmonised Standard covering the essential requirements  
of article 3.2 of the Directive 2014/53/EU;  
Part 22: OFDMA TDD WMAN (Mobile WiMAX™)  
FDD Base Stations (BS)**

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## Foreword

This final draft Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG), and is now submitted for the Vote phase of the ETSI standards EN Approval Procedure.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.7] 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.

The present document is part 22 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.8].

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
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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).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

## Introduction

The present document is part of a set of standards developed by ETSI that are designed to fit in a modular structure to cover radio equipment within the scope of the Radio Equipment Directive [i.2]. The present document is produced following the guidance in ETSI EG 203 336 [i.3] as applicable.

# 1 Scope

The present document applies to the following radio equipment type:

- Mobile WiMAX™ FDD Base Stations for IMT-OFDMA TDD WMAN This radio equipment type is capable of operating in all or any part of the frequency bands given in table 1-1.

**Table 1-1: Base Station WiMAX™ FDD Operating frequency bands**

Mobile WiMAX™ Band Class Index	Direction of transmission	Mobile WiMAX™ FDD frequency bands
7G	Transmit	925 MHz to 960 MHz
	Receive	880 MHz to 915 MHz
6C	Transmit	1 805 MHz to 1 880 MHz
	Receive	1 710 MHz to 1 785 MHz

The present document contains requirements to demonstrate that Radio equipment both effectively uses and supports the efficient use of radio spectrum in order 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 Radio Equipment Directive 2014/53/EU [i.2] 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

### 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.

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

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 necessary for the application of the present document.

- [1] WMF-T25-002-R010v06 (2012): "WiMAX Forum® Test Procedures - Mobile Radio Conformance Tests" - Release 1 v06.
- [2] CEPT/ERC/Recommendation 74-01E (Siófok 98, Nice 99, Sesimbra 02, Hradec Kralove 05, Cardiff 11) (01-2011): "Unwanted emissions in the spurious domain".

### 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] Recommendation ITU-R SM.329-12 (2012): "Unwanted emissions in the spurious domain".

- [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 Text with EEA relevance.
- [i.3] ETSI EG 203 336: "Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide for the selection of technical parameters for the production of Harmonised Standards covering article 3.1(b) and article 3.2 of Directive 2014/53/EU".
- [i.4] ETSI TR 102 215 (V1.3.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Recommended approach, and possible limits for measurement uncertainty for the measurement of radiated electromagnetic fields above 1 GHz".
- [i.5] ETSI EN 300 019-1-0: "Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-0: Classification of environmental conditions; Introduction".
- [i.6] 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".
- [i.7] 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.8] ETSI EN 301 908-1 (V11.1.1): "IMT cellular networks; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 1: Introduction and common requirements".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

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

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

**Eval\_BW1:** test condition where the pass band of a rectangular filter with a bandwidth of 4,75 MHz for 5 MHz equipment and 9,5 MHz for 10 MHz equipment is used for measurement centred on an operating channel or a victim channel

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

NOTE: 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 this multi-part deliverable may be done separately.

**maximum output power:** mean power level per carrier of the base station or user equipment measured at the antenna connector in a specified reference condition

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

NOTE: The term "mean" here is used to exclude the amplitude fluctuation related to those theoretical variations present in signal for example due to amplitude modulation, pulse shaping, pre-equalization, etc. Time averaging should be applied to estimate mean power with the effect of the theoretical variations. The duty cycle corresponding to burst activity within a frame should be also incorporated for "mean" power estimation.



**nominal maximum output power:** maximum nominal mean power level measured over total allocated channel bandwidth of the Base Station available at the antenna connector declared by the manufacturer; for equipment implementing dynamic change of modulation format, it is intended as the maximum nominal mean power associated to the modulation format delivering the highest power

**receiver thermal noise power:** equal to  $k \times T \times BW \times F$

**WiMAX™:** trademarked name for the OFDMA TDD WMAN IMT technology

NOTE: WiMAX™ is an example of a suitable technology available commercially. This information is given for the convenience of users of the present document and does not constitute an endorsement by ETSI of this technology.

## 3.2 Symbols

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

$A_{BS}$	Base Station Interface A
$A_{MS}$	Mobile Station Interface A
$A_{UUT}$	Unit Under Test Interface A
BW	Assigned channel bandwidth
dB	decibel
dBc	decibel relative to $P_{nom}$ carrier power measured in Eval_BW1
dBm	decibel relative to 1 milliwatt
f	Frequency of measurement
$F_c$	centre frequency of the assigned channel
F	Receiver noise figure
$F_{UL\_low}$	The lowest frequency of the uplink operating band
NOTE:	See table 4.2.2.2.2-1.
$F_{UL\_high}$	The highest frequency of the uplink operating band
NOTE:	See table 4.2.2.2.2-1.
k	Boltzmann's constant
$M_{BS}$	Base Station Interface M
$M_{MS}$	Mobile Station Interface M
N	Maximum number of antennas in a multiple antenna configuration
$N_{th}$	Receiver thermal noise power expressed in dBm
$P_{SENS}$	Receiver sensitivity level at $BER \leq 10^{-6}$ (or equivalent PER) performance for an AWGN channel, corresponding to the most robust modulation and coding rate supported by the technology declared nominal maximum output Power
$P_{nom}$	declared nominal maximum output Power
$P_{SENS5}$	sensitivity levels at $BER \leq 10^{-6}$ , for a 5 MHz channel, corresponding to the most robust modulation and coding rate supported by the technology
$P_{SENS10}$	sensitivity levels at $BER \leq 10^{-6}$ , for a 10 MHz channel, corresponding to the most robust modulation and coding rate supported by the technology
T	Ambient temperature in Kelvin

## 3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage power Ratio
ACS	Adjacent Channel Selectivity
AWGN	Additive White Gaussian Noise
BER	Bit Error Ratio
BS	Base Station
BW	BandWidth
CW	Continuous Wave

EFTA	European Free Trade Association
ERM	Electromagnetic compatibility and Radio spectrum Matters
EUT	Equipment Under Test
FDD	Frequency Division Duplexing
GHz	GigaHertz
IMT	International Mobile Telecommunications
ITU-R	International Telecommunications Union - Radiocommunications sector
MHz	MegaHertz
MS	Mobile Station
MSG	Mobile Standards Group
OFDMA	Orthogonal Frequency Division Multiple Access
PER	Packet Error Ratio
RED	Radio Equipment Directive
RF	Radio Frequency
RMS	Root Mean Square
TDD	Time Division Duplex
TFES	Task Force for European Standards for IMT
TPC	Transmit Power Control
UL	Uplink
UUT	Unit Under Test
WMAN	Wireless Metropolitan Area Network

## 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 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 Introduction

To meet the essential requirement under article 3.2 of the Directive 2014/53/EU [i.2] (Radio Equipment Directive) for IMT Base Stations (BS), a set of essential parameters in addition to those in ETSI EN 301 908-1 [i.8] have been identified. Table 4.2.1-1 provides a cross reference between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document. To fulfil an essential parameter the compliance with all the corresponding technical requirements in table 4.2.1-1 shall be verified.

**Table 4.2.1-1: Cross references**

Essential parameter	Corresponding technical requirements	Corresponding test suite
Transmitter spectrum mask	4.2.2 Transmitter Spectrum emissions mask	5.4.1
Transmitter unwanted emissions in the out of band domain	4.2.3 Transmitter adjacent channel leakage power ratio	5.4.2
Transmitter unwanted emissions in the spurious domain	4.2.4 Transmitter spurious emissions	5.4.3
Transmitter power limits	4.2.5 Transmitter maximum output power	5.4.4
Transmitter power accuracy		
Transmit intermodulation attenuation	4.2.6 Transmitter intermodulation	5.4.5
Receiver unwanted emissions in the spurious domain	4.2.7 Receiver spurious emissions	5.4.6
Receiver blocking	4.2.9 Receiver Blocking characteristics	5.4.8
Receiver desensitization		
Receiver radio-frequency intermodulation	4.2.10 Receiver Intermodulation characteristics	5.4.9
Receiver adjacent signal selectivity	4.2.8 Receiver Adjacent Channel Selectivity (ACS)	5.4.7
Receiver sensitivity	4.2.11 Receiver Reference Sensitivity level	5.4.10

## 4.2.2 Spectrum emission mask

### 4.2.2.1 Definition

Spectrum emission mask defines an out of band emission requirement for the transmitter. These out of band emissions are unwanted emissions outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions.

### 4.2.2.2 Limits

A Base Station device transmitting on a single RF carrier configured in accordance with the manufacturer's specification shall meet the requirement. Emissions shall not exceed the maximum level specified in tables 4.2.2.2.1-1 and 4.2.2.2.2-1 for the appropriate BS maximum output power and nominal channel bandwidths of 5 MHz and 10 MHz.

#### 4.2.2.2.1 Requirements for 5 MHz channel bandwidth

The out-of-channel emission is specified as power level measured over the specified measurement bandwidth but relative to dBc centred in the 5 MHz channel.

The power of any BS emission shall not exceed the levels specified in table 4.2.2.2.1-1.

**Table 4.2.2.2.1-1: Spectrum emission mask requirement**

Segment number	Offset $\Delta f$ from channel centre (MHz)	Integration bandwidth (kHz)	Allowed emission level within the integration bandwidth (dBm)
1	2,5 to < 2,7	30	-14
2	2,7 to < 3,5	30	-14 - 15 ( $\Delta f - 2,715$ )
3	3,5 to < 4,0	30	-26
4	7,5 to $\leq$ 12,5	1 000	-13

#### 4.2.2.2.2 Requirements for 10 MHz channel bandwidth

The out-of-channel emission is specified as a power level relative to dBc centred in the 10 MHz channel.

The power of any BS emission shall not exceed the levels specified in table 4.2.2.2.2-1.

**Table 4.2.2.2.2-1: Spectrum emission mask requirement**

Segment number	Offset $\Delta f$ from channel centre (MHz)	Integration bandwidth (kHz)	Allowed emission level within the integration bandwidth (dBm)
1	5,0 to < 5,2	30	-14
2	5,2 to < 6,0	30	-14 - 15 ( $\Delta f - 2,715$ )
3	6,0 to < 6,5	30	-26
4	6,5 to < 15,0	1 000	-13
5	15,0 to $\leq$ 25,0	1 000	-15

NOTE: As an exception, in the band 925 MHz to 960 MHz, the maximum extent to which the emission mask Segment 5 extends above the downlink band is limited to +10 MHz outside the upper downlink band edge. Beyond this point, the spurious emission requirements of clause 4.2.4 shall be applied.

### 4.2.2.3 Conformance

Conformance tests described in clause 5.4.1 shall be carried out.

## 4.2.3 Transmitter Adjacent Channel Leakage power Ratio (ACLR)

### 4.2.3.1 Definition

Adjacent Channel Leakage power Ratio (ACLR) is the ratio of the mean power measured through a filter pass band centred on the assigned channel frequency to the mean power measured through a filter pass band centred on the first adjacent channel. The filter pass band, response and nominal bandwidth are set according to Eval\_BW 1.