

# ETSI EN 301 908-19 V6.3.1 (2016-05)



**IMT cellular networks;  
Harmonised Standard covering the essential requirements  
of article 3.2 of the Directive 2014/53/EU;  
Part 19: OFDMA TDD WMAN (Mobile WiMAX™)  
TDD User Equipment (UE)**

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## Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Mobile Standards Group (MSG).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.8] 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 19 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.9].

### National transposition dates

Date of adoption of this EN:	20 April 2016
Date of latest announcement of this EN (doa):	31 July 2016
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2017
Date of withdrawal of any conflicting National Standard (dow):	31 January 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).

"**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:

- User Equipment for IMT-2000 OFDMA TDD WMAN (Mobile WiMAX™) operating in TDD mode.

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: OFDMA TDD WMAN User Equipment frequency bands**

Mobile WiMAX™ Band Class Index	IMT-2000 OFDMA TDD WMAN service operating bands	Channel Bandwidth
1.B	2 300 MHz to 2 400 MHz	5 MHz and 10 MHz
3.A	2 500 MHz to 2 690 MHz	5 MHz and 10 MHz
5L.A	3 400 MHz to 3 600 MHz	5 MHz
5L.C	3 400 MHz to 3 600 MHz	10 MHz
5H.A	3 600 MHz to 3 800 MHz	5 MHz
5H.C	3 600 MHz to 3 800 MHz	10 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 v0.6.
- [2] CEPT/ERC/Recommendation 74-01E (Edition of January, 2011) (Siófok 98, Nice 99, Sesimbra 02, Hradec Kralove 05, Cardiff 11): "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 (V1.1.1) (2015): "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 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.7] Void.
- [i.8] 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.9] 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".

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## 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.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

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

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 the present document may be done separately.

**maximum output power:** mean power level per carrier of the base station 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

**nominal maximum output power:** maximum nominal mean power level per carrier of the user equipment 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 carrier
dBm	Decibel relative to 1 milliwatt
f	Frequency of measurement
$f_c$	Centre frequency of the assigned channel
F	Receiver noise figure
GHz	GigaHertz
k	Boltzmann's constant
$M_{BS}$	Base Station Interface M
MHz	MegaHertz
$M_{MS}$	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, corresponding to the most robust modulation and coding rate supported by the technology
$P_{SENS5}$	Receiver sensitivity level at BER $10^{-6}$ for a 5 MHz channelized system, corresponding to the most robust modulation and coding rate supported by the technology
$P_{SENS10}$	Receiver sensitivity level at BER $10^{-6}$ for a 10 MHz channelized system, corresponding to the most robust modulation and coding rate supported by the technology
$P_{nom}$	Declared nominal maximum output Power
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
BCI	Band Class Index
BER	Bit Error Ratio
BS	Base Station
CW	Continuous Wave
EFTA	European Free Trade Association
ERM	Electromagnetic compatibility and Radio spectrum Matters
EUT	Equipment Under Test
IMT	International Mobile Telecommunications
MSG	Mobile Standards Group
OFDMA	Orthogonal Frequency Division Multiple Access
PER	Packet Error Ratio / Rate
RED	Radio Equipment Directive
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root Raised Cosine
TDD	Time Division Duplexing
TFES	Task Force for European Standards for IMT

UE	User Equipment
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

#### 4.2.0 General

This clause describes the conformance requirements for OFDMA TDD WMAN User Equipment (UE).

#### 4.2.1 Introduction

To meet the essential requirement under article 3.2 of Directive 2014/53/EU [i.2] (Radio Equipment Directive) for IMT-2000 User Equipment (UE), a set of essential parameters in addition to those in ETSI EN 301 908-1 [i.9] 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.

**Table 4.2.1-1: Cross references**

Essential parameter	Corresponding technical requirements	Corresponding test suite
Transmitter spectrum mask	4.2.3 Transmitter Spectrum emission mask	5.4.2
Transmitter unwanted emissions in the out of band domain	4.2.11 Transmitter adjacent channel leakage power ratio	5.4.9
Transmitter unwanted emissions in the spurious domain	4.2.4 Transmitter spurious emissions	5.4.3
Transmitter power limits	4.2.2 Transmitter maximum output power	5.4.1
	4.2.5 Transmitter minimum output power	5.4.1
Receiver unwanted emissions in the spurious domain	4.2.10 Receiver spurious emissions	5.4.8
Receiver blocking Receiver desensitization	4.2.7 Receiver Blocking characteristics	5.4.5
Receiver spurious response rejection	4.2.8 Receiver spurious response	5.4.6
Receiver radio-frequency intermodulation	4.2.9 Receiver Intermodulation characteristics	5.4.7
Receiver adjacent signal selectivity	4.2.6 Receiver Adjacent Channel Selectivity (ACS)	5.4.4
Receiver sensitivity	4.2.12 Receiver reference sensitivity level	5.4.10
Antenna		

Unless otherwise stated, the transmitter and receiver characteristics are specified at the antenna connector(s) of the UE. For UE(s) with an integral antenna only, a reference antenna(s) with a gain of 0 dBi should be assumed for each antenna port(s). A UE with integral antenna(s) may be taken into account by converting these power levels into field strength requirements, assuming a 0 dBi gain antenna.

#### 4.2.2 Transmitter Maximum Output Power

##### 4.2.2.1 Definition

The UE maximum output power is measured over total allocated channel bandwidth available at the antenna connector.

#### 4.2.2.2 Limits

The UE maximum output power shall not exceed 26 dBm.

#### 4.2.2.3 Conformance

Conformance tests described in clause 5.4.1 shall be carried out.

### 4.2.3 Transmitter Spectrum Emission Mask

#### 4.2.3.1 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.

#### 4.2.3.2 Limits

A UE transmitting on a single RF carrier configured in accordance with the manufacturer's specification shall not exceed the allowed level specified in tables 4.2.3.2.1-1 to 4.2.3.2.2-4 for the relevant nominal channel bandwidth of 5 MHz or 10 MHz and the relevant BCI.

Integration bandwidth refers to the frequency range over which the emission power is integrated.

$\Delta f$  is defined as the frequency offset in MHz from the channel centre frequency.

##### 4.2.3.2.1 Requirements for 5 MHz channel bandwidth

**Table 4.2.3.2.1-1: Spectrum Emission Mask for 5 MHz channel bandwidth - BCI 1.B and 3.A**

Segment number	Offset from channel centre frequency ( $\Delta f$ ) (MHz)	Integration bandwidth (kHz)	Allowed emission level within the integration bandwidth (dBm)
1	2,5 to < 3,5	50	-13,00
2	3,5 to < 7,5	1 000	-13,00
3	7,5 to < 8	500	-16,00
4	8 to < 10,4	1 000	-25,00
5	10,4 to < 12,5	1 000	-25,00

**Table 4.2.3.2.1-2: Spectrum Emission Mask for 5 MHz channel bandwidth - BCI 5L.A and 5H.A**

Segment number	Offset from channel centre frequency ( $\Delta f$ ) (MHz)	Integration bandwidth (kHz)	Allowed emission level within the integration bandwidth (dBm)
1	2,5 to < 3,5	30	-33,5 - 15( $\Delta f$ - 2,5)
2	3,5 to < 7,5	1 000	-33,5 - 1( $\Delta f$ - 3,5)
3	7,5 to < 8,5	1 000	-37,5 - 10( $\Delta f$ - 7,5)
4	8,5 to < 12,5	1 000	-47,5

##### 4.2.3.2.2 Requirements for 10 MHz channel bandwidth

**Table 4.2.3.2.2-1: Spectrum emission mask for 10 MHz channel bandwidth - BCI 1.B and 3.A**

Segment number	Offset from channel centre frequency ( $\Delta f$ ) (MHz)	Integration bandwidth (kHz)	Allowed emission level within the integration bandwidth (dBm)
1	5 to < 6	100	-13,00
2	6 to < 10	1 000	-13,00
3	10 to < 11	1 000	-13 - 12( $\Delta f$ - 10)
4	11 to < 15	1 000	-25,00
5	15 to < 20	1 000	-25,00
6	20 to < 25	1 000	-25,00