

# ETSI EN 301 908-20 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 20: OFDMA TDD WMAN (Mobile WiMAX™)  
TDD Base Stations (BS)**

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# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Modal verbs terminology.....	6
Introduction .....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	7
3 Definitions, symbols and abbreviations .....	8
3.1 Definitions .....	8
3.2 Symbols.....	9
3.3 Abbreviations .....	9
4 Technical requirements specification.....	10
4.1 Environmental profile.....	10
4.2 Conformance requirements .....	10
4.2.1 Introduction.....	10
4.2.2 Transmitter Spectrum Emission Mask.....	11
4.2.2.1 Definition .....	11
4.2.2.2 Limits .....	11
4.2.2.2.1 Spectrum emission mask for 5 MHz channel bandwidth - BCI 1.B and 3.A .....	11
4.2.2.2.2 Spectrum emission mask for 10 MHz channel bandwidth - BCI 1.B and 3.A .....	11
4.2.2.2.3 Spectrum emission mask for BCI 5L.A, 5L.C, 5H.A and 5H.C.....	11
4.2.2.3 Conformance.....	12
4.2.3 Transmitter Adjacent Channel Leakage power Ratio (ACLR).....	12
4.2.3.1 Definition .....	12
4.2.3.2 Limits .....	12
4.2.3.2.1 ACLR requirements for 5 MHz channel bandwidth.....	12
4.2.3.2.2 ACLR requirements for 10 MHz channel bandwidth.....	13
4.2.3.3 Conformance.....	13
4.2.4 Transmitter spurious emissions.....	13
4.2.4.1 Definition .....	13
4.2.4.2 Limits .....	13
4.2.4.2.1 General requirements.....	13
4.2.4.2.2 Additional Spurious Emission Requirements.....	14
4.2.4.3 Conformance.....	14
4.2.5 Base station maximum output power.....	15
4.2.5.1 Definition .....	15
4.2.5.2 Limits .....	15
4.2.5.3 Conformance.....	15
4.2.6 Transmit intermodulation .....	15
4.2.6.1 Definition .....	15
4.2.6.2 Limits .....	15
4.2.6.3 Conformance.....	15
4.2.7 Receiver spurious emissions .....	15
4.2.7.1 Definition .....	15
4.2.7.2 Limits .....	16
4.2.7.3 Conformance.....	16
4.2.8 Receiver blocking characteristics .....	16
4.2.8.1 Definition .....	16
4.2.8.2 Limits .....	16
4.2.8.3 Conformance.....	18
4.2.9 Receiver intermodulation characteristics .....	18
4.2.9.1 Definition .....	18
4.2.9.2 Limits .....	18

4.2.9.3	Conformance .....	19
4.2.10	Receiver Adjacent Channel Selectivity.....	19
4.2.10.1	Definition .....	19
4.2.10.2	Limits .....	19
4.2.10.3	Conformance.....	19
4.2.11	Receiver reference sensitivity level .....	19
4.2.11.1	Definition .....	19
4.2.11.2	Limits .....	20
4.2.11.3	Conformance.....	20
5	Testing for compliance with technical requirements.....	20
5.1	Environmental conditions for testing .....	20
5.2	Product information.....	20
5.3	Interpretation of the measurement results .....	20
5.4	Essential radio test suites.....	21
5.4.1	Transmitter Spectrum Emission Mask.....	21
5.4.1.1	Method of measurement.....	22
5.4.1.1.1	Initial conditions .....	22
5.4.1.1.2	Procedure.....	22
5.4.1.2	Test requirements .....	23
5.4.2	Transmitter Adjacent Channel Leakage Power Ratio (ACLR).....	23
5.4.2.1	Method of measurement.....	23
5.4.2.1.1	Initial conditions .....	23
5.4.2.1.2	Procedure.....	23
5.4.2.2	Test requirements .....	24
5.4.3	Transmitter spurious emissions.....	24
5.4.3.1	Method of measurement.....	24
5.4.3.1.1	Initial conditions .....	25
5.4.3.1.2	Procedure.....	25
5.4.3.2	Test requirements .....	25
5.4.4	Base Station maximum output power .....	25
5.4.4.1	Method of measurement .....	25
5.4.4.1.1	Initial conditions .....	26
5.4.4.1.2	Procedure.....	26
5.4.4.2	Test requirements .....	26
5.4.5	Transmit Intermodulation .....	26
5.4.5.1	Method of measurement.....	26
5.4.5.1.1	Initial conditions .....	27
5.4.5.1.2	Procedure.....	27
5.4.5.2	Test requirements.....	27
5.4.6	Receiver spurious emissions .....	27
5.4.6.1	Method of measurement.....	28
5.4.6.1.1	Initial conditions .....	28
5.4.6.1.2	Procedure.....	28
5.4.6.2	Test requirements.....	28
5.4.7	Receiver blocking characteristics .....	28
5.4.7.1	Method of Measurement .....	28
5.4.7.1.1	Initial conditions .....	29
5.4.7.1.2	Procedure.....	29
5.4.7.2	Test requirements .....	30
5.4.8	Receiver Intermodulation characteristics .....	30
5.4.8.1	Method of measurement.....	30
5.4.8.1.1	Initial conditions .....	30
5.4.8.1.2	Procedure.....	31
5.4.8.2	Test requirements .....	31
5.4.9	Receiver adjacent channel selectivity .....	31
5.4.9.1	Method of measurement.....	31
5.4.9.1.1	Initial conditions .....	32
5.4.9.1.2	Procedure.....	32
5.4.9.2	Test requirements .....	32
5.4.10	Receiver reference sensitivity level .....	32
5.4.10.1	Method of test .....	32

5.4.10.2	Test requirement .....	32
<b>Annex A (normative):</b>	<b>Relationship between the present document and the essential requirements of Directive 2014/53/EU .....</b>	<b>33</b>
<b>Annex B (normative):</b>	<b>Environmental profile .....</b>	<b>34</b>
<b>Annex C (informative):</b>	<b>Void .....</b>	<b>35</b>
<b>Annex D (informative):</b>	<b>Bibliography .....</b>	<b>36</b>
History .....		37

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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 20 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 2014/53/EU [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:

- Base stations 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 Base Station frequency bands**

Mobile WiMAX™ Band Class Index	IMT-2000 OFDMA TDD WMAN service operating bands	Channel Bandwidth; BW
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 requirements in the present document apply to both Wide Area Base Stations and Local Area Base Stations unless otherwise stated.

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 (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.
- [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".

## 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

**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™:** trade marked 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
$BW$	Nominal 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
$k$	Boltzmann's constant
$M_{BS}$	Base Station Interface M
$M_{MS}$	Mobile Station Interface M
$N_{th}$	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
BW	Bandwidth
CW	Continuous Wave
EC	European Commission
ECC	Electronic Communications Committee
EFTA	European Free Trade Association
ERM	Electromagnetic compatibility and Radio spectrum Matters
EU	European Union
EUT	Equipment Under Test
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
RRC	Root Raised Cosine
Rx	Receiver
TDD	Time Division Duplexing
TFES	Task Force for European Standards for IMT
TPC	Transmit Power Control
Tx	Transmit, Transmitter
UE	User Equipment
UEE	User Equipment Emulator
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 required operational environmental profile.

### 4.2 Conformance requirements

This clause describes the conformance requirements for OFDMA TDD WMAN Base Stations.

#### 4.2.1 Introduction

To meet the essential requirement under article 3.2 of the Directive 2014/53/EU [i.2] for IMT Base Stations (BS), 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.

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 emission 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 Base station maximum output power	5.4.4
Transmitter power accuracy		
Transmit intermodulation attenuation	4.2.6 Transmit intermodulation	5.4.5
Receiver unwanted emissions in the spurious domain	4.2.7 Receiver spurious emissions	5.4.6
Receiver blocking	4.2.8 Receiver Blocking characteristics	5.4.7
Receiver desensitization		
Receiver radio-frequency intermodulation	4.2.9 Receiver Intermodulation characteristics	5.4.8
Receiver adjacent signal selectivity	4.2.10 Receiver Adjacent Channel Selectivity (ACS)	5.4.9
Receiver sensitivity	4.2.11 Receiver reference sensitivity level	5.4.10

There are EC and ECC Decisions for the harmonisation of certain frequency bands for terrestrial systems capable of providing electronic communications services, including technical conditions and parameters related to spectrum usage of the bands. These are related to the deployment and installation of the equipment, but are not related to the conformity of the equipment with the present document.

## 4.2.2 Transmitter Spectrum Emission Mask

### 4.2.2.1 Definition

The Transmitter 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 transmitting on a single RF carrier configured in accordance with the manufacturer's specification shall meet the requirement.

#### 4.2.2.2.1 Spectrum emission mask for 5 MHz channel bandwidth - BCI 1.B and 3.A

**Table 4.2.2.2.1-1: Spectrum Emission Mask for 5 MHz channel bandwidth**

Offset from channel centre frequency ( $\Delta f$ ) (MHz)	Allowed emission level within the integration bandwidth (dBm)	Integration bandwidth (kHz)
$2,5 \leq \Delta f < 3,5$	-13 dBm	50
$3,5 \leq \Delta f < 12,5$	-13 dBm	1 000

#### 4.2.2.2.2 Spectrum emission mask for 10 MHz channel bandwidth - BCI 1.B and 3.A

**Table 4.2.2.2.2-1: Spectrum Emission Mask for 10 MHz channel bandwidth**

Offset from channel centre frequency ( $\Delta f$ ) (MHz)	Allowed emission level within the integration bandwidth (dBm)	Integration bandwidth (kHz)
$5 \leq \Delta f < 6$	-13 dBm	100
$6 \leq \Delta f < 25$	-13 dBm	1 000

#### 4.2.2.2.3 Spectrum emission mask for BCI 5L.A, 5L.C, 5H.A and 5H.C

**Table 4.2.2.2.3-1: Relative Spectrum Emission Mask**

$P_{nom}$	Frequency Offset				
	0,5 x BW	0,71 x BW	1,06 x BW	2,0 x BW	2,5 x BW
$39 \text{ dBm} < P_{nom}$	-20 dB	-27 dB	-32 dB	-50 dB	-50 dB
$33 \text{ dBm} < P_{nom} \leq 39 \text{ dBm}$	-20 dB	-27 dB	-32 dB	$-50 \text{ dB} + (39 \text{ dBm} - P_{nom})$	Note

NOTE: See table 4.2.2.2.3-2.

**Table 4.2.2.2.3-2: Absolute Spectrum Emission Mask**

$P_{nom}$	Frequency Offset			
	$0,5 \text{ x BW} < \Delta f < 0,71 \text{ x BW}$	$0,71 \text{ x BW} < \Delta f < 1,06 \text{ x BW}$	$1,06 \text{ x BW} < \Delta f < 2,0 \text{ x BW}$	$2,0 \text{ x BW} < \Delta f < 2,5 \text{ x BW}$
$33 \text{ dBm} < P_{nom} \leq 39 \text{ dBm}$	Note 1	Note 1	Note 1	$-21 + y \text{ dBm/MHz}$
$P_{nom} \leq 33 \text{ dBm}$	-5,5 dBm/MHz	-5,5 dBm/MHz	-23,5 dBm/MHz	-23,5 dBm/MHz

NOTE 1: See table 4.2.2.2.3-1.  
NOTE 2:  $y = -10 \log (BW/10)$ .