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Harmonized European Standard

**IMT cellular networks;
Harmonized EN covering the essential requirements
of article 3.2 of the R&TTE Directive;
Part 20: OFDMA TDD WMAN (Mobile WiMAX)
TDD Base Stations (BS)**

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Foreword

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

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Directive 98/34/EC [i.1] as amended by Directive 98/48/EC [i.8].

The title and reference to the present document are intended to be included in the publication in the Official Journal of the European Union of titles and references of Harmonized Standard under the Directive 1999/5/EC [i.2].

See article 5.1 of Directive 1999/5/EC [i.2] for information on presumption of conformity and Harmonised Standards or parts thereof the references of which have been published in the Official Journal of the European Union.

The requirements relevant to Directive 1999/5/EC [i.2] are summarized in annex A.

The present document is part 20 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

National transposition dates	
Date of adoption of this EN:	10 June 2013
Date of latest announcement of this EN (doa):	30 September 2013
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2014
Date of withdrawal of any conflicting National Standard (dow):	31 March 2015

Introduction

The present document is part of a set of standards developed by ETSI and is designed to fit in a modular structure to cover all radio and telecommunications terminal equipment within the scope of the R&TTE Directive [i.2]. The modular structure is shown in EG 201 399 [i.3].

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 is intended to cover the provisions of Directive 1999/5/EC [1.2], (R&TTE Directive) article 3.2, which states that "... radio equipment shall be so constructed that it effectively uses the spectrum allocated to terrestrial/space radio communications and orbital resources so as 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 Directive 1999/5/EC [1.2] 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

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 reference 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.

2.1 Normative references

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

- [1] ETSI EN 301 908-1 (V6.2.1) (04-2013): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 1: Introduction and common requirements".
- [2] CEPT/ERC/REC 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

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 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations.
- [i.2] Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity (R&TTE Directive).
- [i.3] ETSI EG 201 399: "Electromagnetic compatibility and Radio spectrum Matters (ERM); A guide to the production of Harmonized Standards for application under the R&TTE Directive".
- [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] Recommendation ITU-R SM.329-12 (2012): "Unwanted emissions in the spurious domain".
- [i.8] Directive 98/48/EC of the European Parliament and of the Council of 20 July 1998 amending Directive 98/34/EC laying down a procedure for the provision of information in the field of technical standards and regulations.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in the R&TTE Directive [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: when applied to a modulated signal, this is the power (transmitted or received) in a bandwidth

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

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
CW	Continuous Wave
ERM	Electromagnetic compatibility and Radio spectrum Matters
GHz	GigaHertz
IMT	International Mobile Telecommunications
MHz	MegaHertz
MSG	Mobile Standards Group
OFDMA	Orthogonal Frequency Division Multiple Access
PER	Packet Error Ratio
R&TTE	Radio equipment and Telecommunications Terminal Equipment
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 Essential requirements specification

With reference to article 3.2 of Directive 1999/5/EC [i.2] the phenomena in this clause have been identified as relevant to the essential requirements.

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 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 R&TTE Directive [i.2] for IMT Base Stations (BS) six essential parameters in addition to those in EN 301 908-1 [1] have been identified. Table 4.2.1-1 provides a cross reference between these six essential parameters and the corresponding nine 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
Spectrum emissions mask	4.2.2 Transmitter Spectrum emissions mask
	4.2.3 Transmitter adjacent channel leakage power ratio
	4.2.6 Transmitter Intermodulation characteristics
Conducted spurious emissions in active mode	4.2.4 Transmitter spurious emissions
Accuracy of maximum output power	4.2.5 Transmitter maximum output power
Conducted spurious emission in idle mode	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Receiver Blocking characteristics
	4.2.9 Receiver Intermodulation characteristics
Receiver adjacent channel selectivity	4.2.10 Receiver Adjacent Channel Selectivity (ACS)

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 (Δf) (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 (Δf) (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				
	$0,5 \times BW$	$0,71 \times BW$	$1,06 \times BW$	$2,0 \times BW$	$2,5 \times BW$
$39 \text{ dBm} < P_{nom}$	-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			
	$0,5 \times BW < \Delta f < 0,71 \times BW$	$0,71 \times BW < \Delta f < 1,06 \times BW$	$1,06 \times BW < \Delta f < 2,0 \times BW$	$2,0 \times BW < \Delta f < 2,5 \times BW$
$33 \text{ dBm} < P_{nom} \leq 39 \text{ dBm}$	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: $y = -10 \log(BW/10)$.

4.2.2.3 Conformance

Conformance tests described in clause 5.4.1 shall be carried out.