

ETSI EN 301 908-14 V4.2.1 (2010-03)

Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Base Stations (BS), Repeaters and User Equipment (UE)
for IMT-2000 Third-Generation cellular networks;
Part 14: Harmonized EN for IMT-2000,
Evolved Universal Terrestrial Radio Access (E-UTRA) (BS)
covering the essential requirements
of article 3.2 of the R&TTE Directive**

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Reference

DEN/ERM-TFES-002-14

Keywords

3G, 3GPP, cellular, digital, IMT-2000, mobile,
radio, regulation, UMTS, WCDMA

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC [i.1] (as amended) laying down a procedure for the provision of information in the field of technical standards and regulations.

The present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [i.2] 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 ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [i.2] are given in annex A.

The present document is part 14 of a multi-part deliverable covering the Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

- Part 1: "Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 7: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 8: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 9: "Harmonized EN for IMT-2000, TDMA Single-Carrier (UWC 136) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";

- Part 10: "Harmonized EN for IMT-2000, FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 11: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 12: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 13: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 14: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";**
- Part 15: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 16: "Harmonized EN for IMT-2000, Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 17: "Harmonized EN for IMT-2000, Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive".

National transposition dates	
Date of adoption of this EN:	19 February 2010
Date of latest announcement of this EN (doa):	31 May 2010
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2010
Date of withdrawal of any conflicting National Standard (dow):	30 November 2011

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 Evolved Universal Terrestrial Radio Access (E-UTRA).

This radio equipment type is capable of operating in all or any part of the operating bands given in table 1-1.

Table 1-1: E-UTRA Base Station operating bands

E-UTRA band	Direction of transmission	E-UTRA Base Station operating bands
1	Transmit	2 110 MHz to 2 170 MHz
	Receive	1 920 MHz to 1 980 MHz
3	Transmit	1 805 MHz to 1 880 MHz
	Receive	1 710 MHz to 1 785 MHz
7	Transmit	2 620 MHz to 2 690 MHz
	Receive	2 500 MHz to 2 570 MHz
8	Transmit	925 MHz to 960 MHz
	Receive	880 MHz to 915 MHz
33	Transmit and Receive	1 900 MHz to 1 920 MHz
34	Transmit and Receive	2 010 MHz to 2 025 MHz
38	Transmit and Receive	2 570 MHz to 2 620 MHz

The present document covers requirements for E-UTRA Base Stations for Release 8.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.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 R&TTE Directive 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 a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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 indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI EN 301 908-1 (V4.1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive".
- [2] ETSI TS 136 141 (V8.4.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 8.4.0 Release 8)".
- [3] Void.
- [4] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".
- [5] ETSI TS 125 104 (V8.8.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 8.8.0 Release 8)".
- [6] ETSI TS 125 105 (V8.5.0): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105 version 8.5.0 Release 8)".
- [7] ETSI TS 136 104 (V8.7.0): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 8.7.0 Release 8)".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [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 candidate 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 TR 100 028 (all parts) (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

carrier: modulated waveform conveying the E-UTRA or UTRA (WCDMA) physical channels

channel bandwidth: RF bandwidth supporting a single E-UTRA RF carrier with the transmission bandwidth configured in the uplink or downlink of a cell

NOTE: The channel bandwidth is measured in MHz and is used as a reference for transmitter and receiver RF requirements.

channel edge: lowest and highest frequency of the E-UTRA carrier, separated by the channel bandwidth

downlink operating band: part of the operating band designated for downlink (BS transmit)

Downlink Reference Symbol (DL RS) power: resource element power of Downlink Reference Symbol

maximum output power: mean power level per carrier of the Base Station measured at the antenna connector in a specified reference condition

maximum throughput: maximum achievable throughput for a reference measurement channel

mean power: when applied to E-UTRA transmission this is the power measured in the channel bandwidth of the carrier where the period of measurement shall be at least one subframe (1 ms), unless otherwise stated

multi-carrier transmission configuration: set of one or more contiguous carriers that a BS is able to transmit simultaneously according to the manufacturer's specification

operating band: frequency range (paired or unpaired) that is defined with a specific set of technical requirements, in which E-UTRA operates

NOTE: The operating band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in table 1-1.

output power: mean power of one carrier of the Base Station, delivered to a load with resistance equal to the nominal load impedance of the transmitter

rated output power: rated output power of the Base Station is the mean power level per carrier that the manufacturer has declared to be available at the antenna connector

resource block: a physical resource consisting of a number of symbols in the time domain and a number of consecutive subcarriers spanning 180 kHz in the frequency domain

throughput: number of payload bits successfully received per second for a reference measurement channel in a specified reference condition

transmission bandwidth: bandwidth of an instantaneous transmission from a UE or BS, measured in Resource Block units

transmission bandwidth configuration: highest transmission bandwidth allowed for uplink or downlink in a given channel bandwidth, measured in Resource Block units

transmitter OFF period: time period during which the BS transmitter is not allowed to transmit

transmitter ON period: time period during which the BS transmitter is transmitting data and/or reference symbols, i.e. data subframes or DwPTS

transmitter transient period: time period during which the transmitter is changing from the OFF period to the ON period or vice versa

uplink operating band: part of the operating band designated for uplink (BS receive)

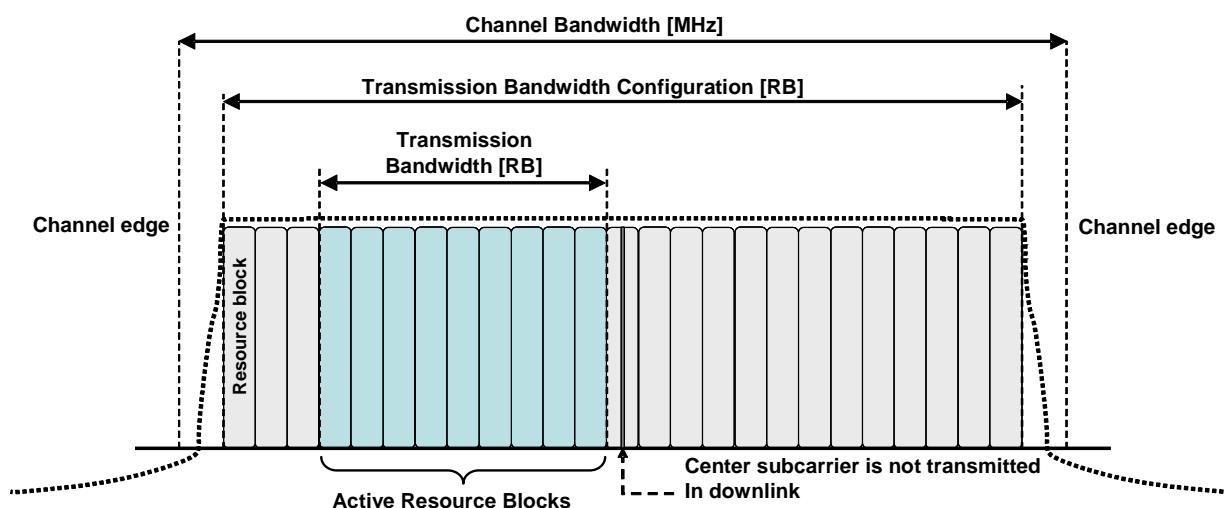


Figure 3.1-1: Definition of Channel Bandwidth and Transmission Bandwidth Configuration for one E-UTRA carrier

3.2 Symbols

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

BW_{Channel}	Channel bandwidth
BW_{Config}	Transmission bandwidth configuration, expressed in MHz, where $BW_{\text{Config}} = N_{\text{RB}} \times 180 \text{ kHz}$ in the uplink and $BW_{\text{Config}} = 15 \text{ kHz} + N_{\text{RB}} \times 180 \text{ kHz}$ in the downlink
f	Frequency
Δf	Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
Δf_{max}	The largest value of Δf used for defining the requirement
F_{C}	Carrier centre frequency
$F_{\text{interferer}}$	Centre frequency of the interfering signal
f_{offset}	Separation between the channel edge frequency and the centre of the measuring filter
$f_{\text{offset}_{\text{max}}}$	The maximum value of f_{offset} used for defining the requirement
$F_{\text{DL}_{\text{low}}}$	The lowest frequency of the downlink operating band
$F_{\text{DL}_{\text{high}}}$	The highest frequency of the downlink operating band
$F_{\text{UL}_{\text{low}}}$	The lowest frequency of the uplink operating band (see table 1-1)
$F_{\text{UL}_{\text{high}}}$	The highest frequency of the uplink operating band (see table 1-1)
I_{uant}	E-Node B internal logical interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the E-Node B
N_{RB}	Transmission bandwidth configuration, expressed in units of Resource Blocks
p	Antenna port number
(P_i)	Power of the signal at antenna connector i
(P_s)	Sum of the power for all antenna connectors
P_{max}	Maximum output power
P_{REFSENS}	Reference sensitivity power level

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage Ratio
ACS	Adjacent Channel Selectivity
B	Bottom RF channel

NOTE: For testing purposes.

BS	Base Station
BTS	Base Transceiver Station

NOTE: For GSM.

BW	Bandwidth
CW	Continuous Wave
DC	Direct Current
DwPTS	Downlink part of the special subframe

NOTE: For TDD operation.

EARFCN	E-UTRA Absolute Radio Frequency Channel Number
E-TM	E-UTRA Test Model
EUT	Equipment Under Test
E-UTRA	Evolved Universal Terrestrial Radio Access
FDD	Frequency Division Duplex
FRC	Fixed Reference Channel
ITU-R	International Telecommunication Union - Radiocommunication
M	Middle RF channel

NOTE: For testing purposes.

MIMO	Multiple Input Multiple Output
MS	Mobile Station

NOTE: For GSM.

RB	Resource Block
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root Raised Cosine
RX	Receive
T	Top RF channel

NOTE: For testing purposes.

TDD	Time Division Duplex
TX	Transmit
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access

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 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.

For guidance on how a supplier can declare the environmental profile, see annex C.

4.2 Conformance requirements

The requirements in the present document are based on the assumption that the operating band (e.g. band 1, 3, 7 and 8) is shared between systems of the IMT-2000 family (for band 3 and 8 also GSM) or systems having compatible characteristics.

4.2.1 Introduction

To meet the essential requirement under article 3.2 of Directive 1999/5/EC [i.2] (R&TTE Directive) for IMT-2000 Base Stations (BS), seven 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 seven essential parameters and the corresponding nine technical requirements for equipment within the scope of the present document.

Table 4.2.1-1: Cross references

Essential parameter	Corresponding technical requirements
Spectrum emissions mask	4.2.2 Operating band unwanted emissions
	4.2.3 Adjacent Channel Leakage power Ratio (ACLR)
Conducted spurious emissions from the transmitter antenna connector	4.2.4 Transmitter spurious emissions
Accuracy of maximum output power	4.2.5 Base Station maximum output power
Intermodulation attenuation of the transmitter	4.2.6 Transmit intermodulation
Conducted spurious emissions from the receiver antenna connector	4.2.7 Receiver spurious emissions
Impact of interference on receiver performance	4.2.8 Blocking characteristics
	4.2.9 Receiver intermodulation characteristics
Receiver adjacent channel selectivity	4.2.10 Adjacent Channel Selectivity (ACS) and narrow-band blocking

4.2.2 Operating band unwanted emissions

4.2.2.1 Definition

Unwanted emissions consist of out-of-band emissions and spurious emissions (ITU-R Recommendation SM.329-10 [4]). Out of band emissions are emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. The out-of-band emissions requirement for the BS transmitter is specified both in terms of Adjacent Channel Leakage power Ratio (ACLR) and Operating band unwanted emissions.

The Operating band unwanted emission limits are defined from 10 MHz below the lowest frequency of the downlink operating band up to 10 MHz above the highest frequency of the downlink operating band (see table 1-1).

The requirements shall apply whatever the type of transmitter considered (single carrier or multi-carrier) and for all transmission modes foreseen by the manufacturer's specification.

4.2.2.2 Limit

Emissions shall not exceed the maximum levels specified in the tables below, where:

- Δf is the separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency.
- f_{offset} is the separation between the channel edge frequency and the centre of the measuring filter.
- $f_{\text{offset}_{\text{max}}}$ is the offset to the frequency 10 MHz outside the downlink operating band.
- Δf_{max} is equal to $f_{\text{offset}_{\text{max}}}$ minus half of the bandwidth of the measuring filter.