

# ETSI EN 301 908-3 V7.1.1 (2015-07)



**IMT cellular networks;  
Harmonized EN covering the essential requirements  
of article 3.2 of the R&TTE Directive;  
Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)**

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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 produced by ETSI in response to mandates M/284 and M/406 issued from the European Commission under Directive 98/34/EC [i.1] as amended by Directive 98/48/EC [i.7].

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].

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

The present document is part 3 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.5].

National transposition dates	
Date of adoption of this EN:	1 July 2015
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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).

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## 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 ETSI EG 201 399 [i.3].

# 1 Scope

The present document applies to the following {radio}{telecommunications terminal} equipment types:

- 1) Stations for IMT 2000 CDMA Direct Spread (UTRA FDD).

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: UTRA FDD Base Station operating bands**

UTRA FDD band	Direction of transmission	UTRA FDD Base Station operating bands
I	Transmit	2 110 MHz to 2 170 MHz
	Receive	1 920 MHz to 1 980 MHz
III	Transmit	1 805 MHz to 1 880 MHz
	Receive	1 710 MHz to 1 785 MHz
VII	Transmit	2 620 MHz to 2 690 MHz
	Receive	2 500 MHz to 2 570 MHz
VIII	Transmit	925 MHz to 960 MHz
	Receive	880 MHz to 915 MHz
XV	Transmit	2 600 MHz to 2 620 MHz
	Receive	1 900 MHz to 1 920 MHz
XVI	Transmit	2 585 MHz to 2 600 MHz
	Receive	2 010 MHz to 2 025 MHz
XX	Transmit	791 MHz to 821 MHz
	Receive	832 MHz to 862 MHz
XXII	Transmit	3 510 MHz to 3 590 MHz
	Receive	3 410 MHz to 3 490 MHz
XXXII (see note)	Transmit	1 452 MHz to 1 492 MHz
	Receive	-

NOTE: The down link frequenc(ies) of this band are paired with the uplink frequenc(ies) of the other FDD band (external) of the dual band configuration.

The present document covers requirements for UTRA FDD Base Stations for 3GPP Releases 99, 4, 5, 6, 7, 8, 9, 10 and 11. This includes the requirements for BS operating bands from 3GPP Release 12. In addition, the present document covers requirements for UTRA FDD Base Stations in the operating bands specified in ETSI TS 102 735 [i.4].

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

### 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 reference document (including any amendments) applies.

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

- [1] Void.
- [2] ETSI TS 125 141 (V11.10.0) (01-2015): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 11.10.0 Release 11)".
- [3] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".
- [4] Recommendation ITU-T O.153 (10-1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".
- [5] ETSI TS 136 104 (V11.11.0) (01-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 11.11.0 Release 11)".
- [6] ETSI TS 145 004 (V11.0.0) (10-2012): "Digital cellular telecommunications system (Phase 2+); Modulation (3GPP TS 45.004 version 11.0.0 Release 11)".
- [7] Void.
- [8] Void.
- [9] ETSI TS 125 104 (V11.10.0) (01-2015): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 11.10.0 Release 11)".

## 2.2 Informative references

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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 Radio Equipment Directive".
- [i.4] ETSI TS 102 735 (V7.1.0): "Universal Mobile Telecommunications System (UMTS); Band-specific requirements for UMTS Frequency Division Duplex (FDD) operation in the bands 1 900 MHz to 1 920 MHz paired with 2 600 MHz to 2 620 MHz and 2 010 MHz to 2 025 MHz paired with 2 585 MHz to 2 600 MHz".
- [i.5] ETSI EN 301 908-1 (V7.1.1) (09-2014): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 1: Introduction and common requirements".
- [i.6] ETSI TR 100 028 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.7] 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.



- [i.8] ETSI EN 301 908-18 (V7.1.2) (07-2014): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS)".
- [i.9] CEPT ECC Decision (13)03: "The harmonised use of the frequency band 1452-1492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)".

## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

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

**ancillary equipment:** equipment (apparatus) used in connection with a Base Station

NOTE: This is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a BS to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location);
- the equipment cannot be used on a standalone basis to provide user functions independently of a BS; and
- the BS to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment (i.e. it is not a sub-unit of the main equipment essential to the main equipment basic functions).

**Base Station class:** wide area Base Station, medium range Base Station, local area Base Station or home Base Station, as declared by the manufacturer

**BS RF bandwidth:** bandwidth in which a Base Station transmits and/or receives multiple carriers simultaneously within each supported operating band

**BS RF bandwidth edge:** frequency of one of the edges of the Base Station RF bandwidth

**chip rate:** rate of "chips" (modulated symbols after spreading) per second

NOTE: The UTRA FDD chip rate is 3,84 Mchip/s.

**contiguous spectrum:** spectrum consisting of a contiguous block of spectrum with no sub-block gap(s)

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

**environmental profile:** range of environmental conditions under which equipment, within the scope of the present document, is required to comply with the provisions of the present document

**highest carrier:** carrier with the highest carrier centre frequency transmitted/received in the specified operating band(s)

**home Base Station:** base station characterized by requirements derived from femtocell scenarios

**inter-RF bandwidth gap:** frequency gap between two consecutive RF bandwidths that are placed within two supported operating bands

**local area Base Station:** base station characterized by requirements derived from picocell scenarios with a BS to UE minimum coupling loss equal to 45 dB

**lower edge:** lowest frequency in the Base station RF bandwidth, or the lowest frequency in the channel bandwidth of a single E-UTRA carrier, used as a frequency reference point for transmitter and receiver requirements

**lower sub-block edge:** frequency at the lower edge of one sub-block

NOTE: It is used as a frequency reference point for both transmitter and receiver requirements.

**lowest carrier:** carrier with the lowest carrier centre frequency transmitted/received in the specified operating band(s)

**maximum BS RF bandwidth:** maximum RF bandwidth supported by a BS within each supported operating band

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

**maximum radio bandwidth:** maximum frequency difference between the upper edge of the highest used carrier and the lower edge of the lowest used carrier

**mean power:** power (transmitted or received) in a bandwidth of at least  $(1 + \alpha)$  times the chip rate of the radio access mod, when applied to a WCDMA-modulated signal

NOTE 1: The period of measurement is at least one timeslot unless otherwise stated.

NOTE 2:  $\alpha = 0,22$  is the roll-off factor of the WCDMA signal.

**medium range Base Station:** base station characterized by requirements derived from microcell scenarios with a BS to UE minimum coupling loss equal to 53 dB

**MIMO mode:** downlink MIMO configuration with two transmit antennas

**MIMO mode with four transmit antennas:** downlink MIMO configuration with four transmit antennas

**multi-band Base Station:** base station characterized by the ability of its transmitter and/or receiver to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

**multi-band receiver:** receiver characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

**multi-band transmitter:** transmitter characterized by the ability to process two or more carriers in common active RF components simultaneously, where at least one carrier is configured at a different non-overlapping operating band than the other carrier(s)

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

**non-contiguous spectrum:** spectrum consisting of two or more sub-blocks separated by sub-block gap(s)

**operating band:** frequency range that is defined with a specific set of technical requirements, in which UTRA FDD operates

NOTE: The operating band(s) for a UTRA FDD BS is declared by the manufacturer according to the designations in table 1-1. Operating bands for UTRA are designated with Roman numerals, while the corresponding operating bands for E-UTRA are designated with Arabic numerals.

**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

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

**RRC filtered mean power:** mean power as measured through a root raised cosine filter with roll-off factor  $\alpha$  and a bandwidth equal to the chip rate of the radio access mode

NOTE: The RRC filtered mean power of a perfectly modulated WCDMA signal is 0,246 dB lower than the mean power of the same signal.

**sub-block:** one contiguous allocated block of spectrum for use by the same Base Station

NOTE: There may be multiple instances of sub-blocks within an RF bandwidth.

**sub-block bandwidth:** bandwidth of one sub-block

**sub-block gap:** frequency gap between two consecutive sub-blocks within an RF bandwidth, where the RF requirements in the gap are based on co-existence for un-coordinated operation

**total RF bandwidth:** maximum sum of RF bandwidths in all supported operating bands

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

**upper edge:** highest frequency in the BS RF Bandwidth or the highest frequency in the channel bandwidth of a single UTRA carrier; used as a frequency reference point for transmitter and receiver requirements

**upper sub-block edge:** frequency at the higher edge of one sub-block. It is used as a frequency reference point for both transmitter and receiver requirements

**wide area Base Station:** Base Station characterized by requirements derived from Macro Cell scenarios with a BS to UE minimum coupling loss equal to 70 dB

NOTE: This Base Station class has the same requirements as the general purpose Base Station in Releases 99, 4 and 5.

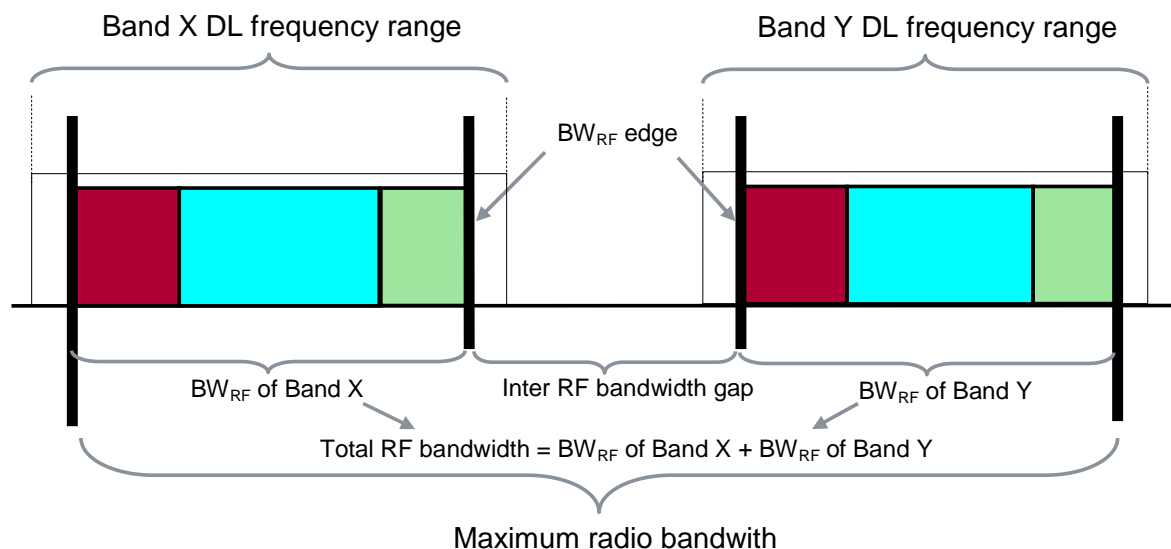
## 3.2 Symbols

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

$\Delta f$	Separation between the carrier centre frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
$\Delta f_{\max}$	The largest value of $\Delta f$ used for defining the requirement
B	Appropriate frequency in the Bottom of the operating band of the BS
CPICH $\hat{E}_c$	Common Pilot Channel code power (on the adjacent channel)
$F_{\text{filter}}$	Filter centre frequency
$F_{\text{high}}$	The highest BS transmit frequency of the downlink operating band
$F_{\text{low}}$	The lowest BS transmit frequency of the downlink operating band
$F_{\text{uw}}$	Frequency of unwanted signal
$I_{\text{oh}}$	Total received power density excluding own Home BS signal
$P_{\text{EM},N}$	Declared emission level for channel N
$P_{\text{max}}$	Maximum output power (per carrier)
$\alpha$	Roll-off factor
$B_{\text{RFBW}}$	Maximum BS RF bandwidth located at the bottom of the supported frequency range in each operating band
f	Frequency
$\Delta f$	Separation between the channel edge frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
$F_{\text{offset}}$	Frequency offset from the centre frequency of the <i>highest</i> transmitted/received carrier to the <i>upper</i> RF bandwidth edge or sub-block edge, or from the centre frequency of the <i>lowest</i> transmitted/received carrier to the <i>lower</i> RF bandwidth edge or sub-block edge

NOTE:  $F_{\text{offset}}$  for UTRA FDD is 2,5 MHz.

M	Appropriate frequency in the Middle of the operating band of the BS
$M_{\text{RFBW}}$	Maximum BS RF bandwidth located in the middle of the supported frequency range in each operating band
$P_{\text{EM},N}$	Declared emission level for channel N
$P_{\text{EM},B32,\text{ind}}$	Declared emission level in Band 32, ind=a, b, c, d, e
PRAT	Rated output power (per carrier)
Prated,t	Rated total output power
$P_{\text{out}}$	Output power
Rx	Receiver
T	Appropriate frequency in the Top of the operating band of the BS
$T_{\text{RFBW}}$	Maximum BS RF bandwidth located at the top of the supported frequency range in each operating band
Tx	Transmitter
$W_{\text{gap}}$	Sub-block gap or inter RF bandwidth gap size



**Figure 3.2-1: Illustration of maximum radio bandwidth and Total RF bandwidth for Multi-band Base Station**

### 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
BTS	Base Transceiver Station
CACLR	Cumulative ACLR
CDMA	Code Division Multiple Access
CPICH	Common Pilot Channel
CW	Continuous Wave
DC	Direct Current
DL	Down Link (forward link)
DTT	Digital Terrestrial Television
DUT	Device Under Test
EIRP	Effective Isotropic Radiated Power
EMC	ElectroMagnetic Compatibility
EUT	Equipment Under Test
FDD	Frequency Division Duplexing
GMSK	Gaussian Minimum Shift Keying
GSM	Global System for Mobile communications
HSDPA	High Speed Downlink Packet Access
IMT	International Mobile Telecommunications
MIMO	Multiple Input Multiple Output
MS	Mobile Station
MSR	Multi-Standard Radio
NC	Non-Contiguous
PCCPCH	Primary Common Control Physical Channel
R&TTE	Radio and Telecommunications Terminal Equipment
RAT	Radio Access Technology
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root-Raised Cosine
SCCPCH	Secondary Common Control Physical Channel
TDD	Time Division Duplexing

UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UL	Up Link (reverse link)
UMTS	Universal Mobile Telecommunications System
UTRA	Universal Terrestrial Radio Access
WCDMA	Wideband Code Division Multiple 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

#### 4.2.1 Introduction

The requirements in the present document are based on the assumption that the operating band (see table 1-1) is shared between systems of the IMT family (for band III and VIII also GSM) or systems having compatible characteristics.

To meet the essential requirement under article 3.2 of Directive 1999/5/EC [i.2] (R&TTE Directive) for IMT Base Stations (BS), seven essential parameters in addition to those in ETSI EN 301 908-1 [i.5] have been identified. Table 4.2.1-1 provides a cross reference between these seven essential parameters and the corresponding ten 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 Spectrum emissions mask
	4.2.3 Adjacent Channel Leakage power Ratio (ACLR)
	4.2.11 Home BS output power for adjacent channel protection
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 Receiver Adjacent Channel Selectivity (ACS)

**NOTE:** There are EC and ECC Decisions for the harmonization 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.

The supplier shall declare the following:

- The operating band(s) supported by the Base Station according to table 1-1.
- The supported RF configurations according to clause 4.11.6 in ETSI TS 125 141 [2].