

# ETSI EN 301 908-3 V11.1.1 (2016-05)



**IMT cellular networks;**  
**Harmonised Standard covering the essential requirements**  
**of article 3.2 of the Directive 2014/53/EU;**  
**Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)**

*Full Standard Preview*  
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## Foreword

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

For non EU countries the present document may be used for regulatory (Type Approval) purposes.

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.1] 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 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:	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).

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## 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 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	1 492 MHz to 1 496 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 contains requirements to demonstrate that Radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

## 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.

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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] ETSI TS 125 141 (V11.12.0) (01-2016): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 11.12.0 Release 11)".
- [2] 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)".

- [3] ETSI TS 125 104 (V11.12.0) (01-2016): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 11.12.0 Release 11)".

## 2.2 Informative references

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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] 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.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) (08-2015): "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 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 (V11.1.1): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the Directive 2014/53/EU; 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] ETSI TS 136 104 (V12.8.0) (07-2015): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 12.8.0 Release 12)".
- [i.8] ETSI EN 301 908-18 (V11.1.1): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS)".
- [i.9] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".
- [i.10] Recommendation ITU-T O.153 (10-1992): "Basic parameters for the measurement of error performance at bit rates below the primary rate".



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

NOTE: In single carrier operation the channel bandwidth is equal to BS RF Bandwidth.

**BS RF Bandwidth edge:** frequency of one of the edges of the BS RF Bandwidth

NOTE: Base Station RF Bandwidth edges are separated by the Base Station RF Bandwidth.

**channel bandwidth:** RF bandwidth supporting a single UTRA RF carrier

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

**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

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

**Inter-band gap:** frequency gap between two supported consecutive operating bands

**Inter RF Bandwidth gap:** frequency gap between two consecutive BS 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 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.

**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 a BS RF Bandwidth.

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

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

**Total RF Bandwidth:** maximum sum of BS RF Bandwidths in all supported operating bands

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

**upper sub-block edge:** frequency at the higher edge of one sub-block

NOTE: 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:

$\alpha$	Roll-off factor
$\Delta f$	Frequency offset of the measurement filter -3 dB point, as defined in clause 4.2.2.2
$\Delta f_{\max}$	The largest value of $\Delta f$ used for defining the requirement
$B$	Appropriate frequency in the Bottom of the operating band of the BS
$B_{\text{RFBW}}$	Maximum BS RF Bandwidth located at the bottom of the supported frequency range in each operating band
$BW_{\max}$	Maximum Radio Bandwidth
$BW_{\text{tot}}$	Total RF Bandwidth
$\text{CPICH } \hat{E}_c$	Common Pilot Channel code power (on the adjacent channel)
$E_b$	Average energy per information bit
$E_c$	Total energy per PN chip
$F_{\text{filter}}$	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 offset of unwanted signal
$I_{\text{oh}}$	Total received power density excluding own Home BS signal
$f$	Frequency
$F_{\text{offset}}$	Frequency offset from the centre frequency of the <i>highest</i> transmitted/received carrier to the <i>upper</i> BS RF Bandwidth edge, sub-block edge, or Inter RF Bandwidth edge, from the centre frequency of the <i>lowest</i> transmitted/received carrier to the <i>lower</i> BS RF Bandwidth edge, sub-block edge or Inter RF Bandwidth edge

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

$F_{\text{DL\_low}}$	The lowest frequency of the downlink operating band
$F_{\text{DL\_high}}$	The highest frequency of the downlink operating band
$F_{\text{DL\_Offset}}$	The offset parameter used to calculate the UARFCN
$F_{\text{UL\_low}}$	The lowest frequency of the uplink operating band
$F_{\text{UL\_high}}$	The highest frequency of the uplink operating band
$F_{\text{UL\_Offset}}$	The offset parameter used to calculate the UARFCN
$M$	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
$P_{\text{EM,B32,ind}}$	Declared emission level in Band 32, ind=a, b, c, d, e
$P_{\text{max,c}}$	Maximum output power (per carrier)
$P_{\text{rated,c}}$	Rated output power (per carrier)
$P_{\text{rated,t}}$	Rated total output power
$P_{\text{out}}$	Output power
$P_{\text{REFSENS}}$	Reference sensitivity power level
Rx	Receiver

T	Appropriate frequency in the Top of the operating band of the BS
$T_{RFBW}$	Maximum BS RF Bandwidth located at the top of the supported frequency range in each operating band
Tx	Transmitter
$W_{gap}$	Sub-block gap or Inter RF Bandwidth gap size

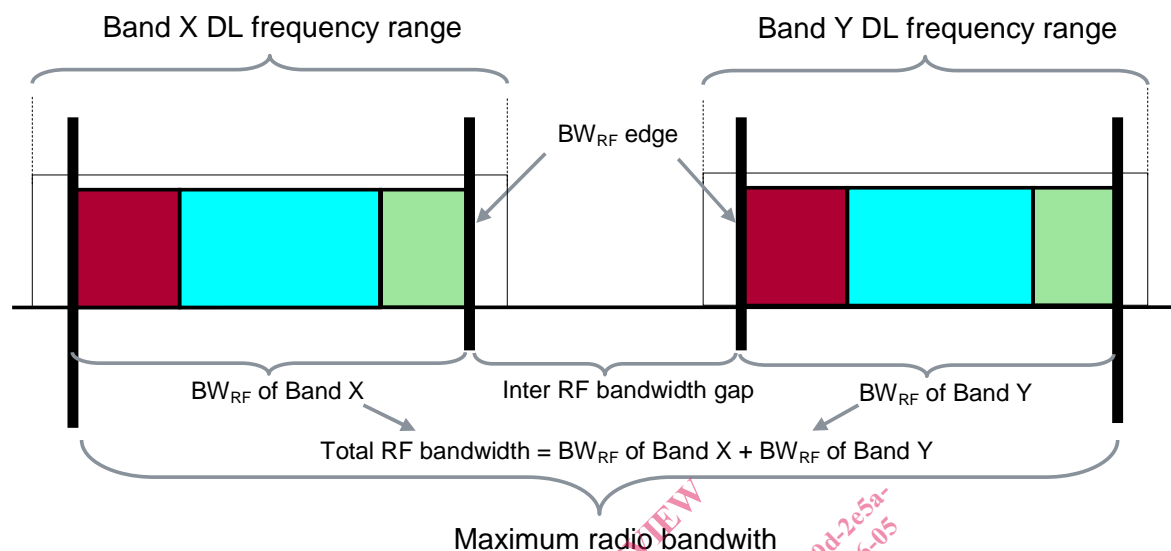


Figure 3.2-1: Illustration of Maximum Radio Bandwidth  $BW_{max}$  and Total RF Bandwidth  $BW_{tot}$  for Multi-band Base Station  $BW_{tot}$

### 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
CEPT	Conférence Européenne des administrations des Postes et des Télécommunications
CPICH	Common Pilot Channel
CW	Continuous Wave
DC	Direct Current
DL	Down Link (forward link)
DPCH	Dedicated Physical Channel
DTT	Digital Terrestrial Television
DUT	Device Under Test
EC	European Commission
ECC	Electronic Communications Committee
EFTA	European Foreign Trade Association
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
MC	Multi-Carrier

MIMO	Multiple Input Multiple Output
MS	Mobile Station
MSR	Multi-Standard Radio
NC	Non-Contiguous
PCCPCH	Primary Common Control Physical Channel
PN	Pseudo Noise
RAT	Radio Access Technology
RBW	Resolution BandWidth (of test equipment)
RF	Radio Frequency
RMS	Root Mean Square
RRC	Root-Raised Cosine
SC	Single Carrier
SCCPCH	Secondary Common Control Physical CHannel
TDD	Time Division Duplexing
TPC	Transmitter Power Control
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

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## 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 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.5] 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.