

# ETSI EN 301 908-3 V15.1.1 (2024-05)



**IMT cellular networks;  
Harmonised Standard for access to radio spectrum;  
Part 3: CDMA Direct Spread (UTRA FDD)  
Base Stations (BS)  
Release 15**

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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:	7 May 2024
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## Modal verbs terminology

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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.

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# 1 Scope

The present document specifies technical characteristics and methods of measurements for types of radio equipment:

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

These radio equipment types are capable of operating in whole or any part of the operating band(s) 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	Related EC/ECC decision
I	Transmit	2 110 MHz to 2 170 MHz	[i.8] and [i.9]
	Receive	1 920 MHz to 1 980 MHz	
III	Transmit	1 805 MHz to 1 880 MHz	[i.10] and [i.11]
	Receive	1 710 MHz to 1 785 MHz	
VII	Transmit	2 620 MHz to 2 690 MHz	[i.12] and [i.13]
	Receive	2 500 MHz to 2 570 MHz	
VIII	Transmit	925 MHz to 960 MHz	[i.10] and [i.11]
	Receive	880 MHz to 915 MHz	
XX	Transmit	791 MHz to 821 MHz	[i.14] and [i.15]
	Receive	832 MHz to 862 MHz	
XXII	Transmit	3 510 MHz to 3 590 MHz	[i.16] and [i.17]
	Receive	3 410 MHz to 3 490 MHz	
XXXII (see note)	Transmit	1 452 MHz to 1 496 MHz	[i.18] and [i.19]
	Receive	-	

NOTE: Radio equipment in band XXXII only operates in transmit mode (downlink only). Only transmitter requirements are applicable.

The present document covers conducted requirements for UTRA Base Stations for 3GPP Release 15. Additionally, it includes requirements for selected operating bands from 3GPP Releases 16 and 17.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.2] is given in annex A.

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

- [1] [ETSI TS 125 141 \(V15.4.0\) \(04-2019\)](#): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 15.4.0 Release 15)".
- [2] [ETSI TS 145 004 \(V15.0.0\) \(07-2018\)](#): "Digital cellular telecommunications system (Phase 2+) (GSM); GSM/ EDGE Modulation (3GPP TS 45.004 version 15.0.0 Release 15)".
- [3] [ETSI TS 125 104 \(V15.5.0\) \(04-2019\)](#): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 15.5.0 Release 15)".



- [4] [ETSI EN 301 908-18 \(V15.1.1\) \(09-2021\)](#): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS) Release 15".

## 2.2 Informative references

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- [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] Void. (<https://standards.iteh.ai>)
- [i.5] ETSI EN 301 908-1 (V15.1.1) (09-2021): "IMT cellular networks; Harmonised Standard for access to radio spectrum; Part 1: Introduction and common requirements Release 15".
- [i.6] ETSI TR 100 028 (all parts) (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".
- [i.7] Recommendation ITU-R SM.329-12 (09-2012): "Unwanted emissions in the spurious domain".
- [i.8] [Commission Implementing Decision \(EU\) 2020/667](#) of 6 May 2020 amending Decision 2012/688/EU as regards an update of relevant technical conditions applicable to the frequency bands 1 920-1 980 MHz and 2 110-2 170 MHz.
- [i.9] [ECC Decision \(06\)01](#): "The harmonised utilisation of the bands 1920-1980 MHz and 2110-2170 MHz for mobile/fixed communications networks (MFCN), including terrestrial IMT systems", Approved 24 March 2006, Amended 8 March 2019.
- [i.10] [Commission Implementing Decision \(EU\) 2022/173](#) of 7 February 2022 on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing electronic communications services in the Union and repealing Decision 2009/766/EC.
- [i.11] [ECC Decision \(06\)13](#): "Designation of the bands 880-915 MHz, 925-960 MHz, 1710-1785 MHz and 1805-1880 MHz for terrestrial UMTS, LTE, WiMAX and IoT cellular systems", Approved 01 December 2006, Amended 8 March 2019.
- [i.12] [Commission Implementing Decision \(EU\) 2020/636](#) of 8 May 2020 amending Decision 2008/477/EC as regards an update of relevant technical conditions applicable to the 2 500-2 690 MHz frequency band.
- [i.13] [ECC Decision 05\(05\)](#): "Harmonised utilization of spectrum for Mobile/Fixed Communications Networks (MFCN) operating within the band 2 500-2 690 MHz", Approved 18 March 2005, Amended 05 July 2019.

- [i.14] [Commission Decision 2010/267/EU](#) of 6 May 2010 on harmonised technical conditions of use in the 790-862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union.
- [i.15] [ECC Decision \(09\)03](#): "Harmonised conditions for mobile/fixed communications networks (MFCN) operating in the band 790 - 862 MHz", 30 October 2009.
- [i.16] [Commission implementing Decision \(EU\) 2019/235](#) of 24 January 2019 on amending Decision 2008/411/EC as regards an update of relevant technical conditions applicable to the 3 400-3 800 MHz frequency band.
- [i.17] [ECC Decision 11\(06\)](#): "Harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz", Approved 09 December 2011, Amended 26 October 2018.
- [i.18] [Commission Implementing Decision \(EU\) 2018/661](#) of 26 April 2018 amending Implementing Decision (EU) 2015/750 on the harmonisation of the 1452-1492 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Union as regards its extension in the harmonised 1427-1452 MHz and 1492-1517 MHz frequency bands.
- [i.19] [ECC Decision \(13\)03](#): "The harmonised use of the frequency band 1 452-1 492 MHz for Mobile/Fixed Communications Networks Supplemental Downlink (MFCN SDL)".
- [i.20] ETSI TR 103 877 (V1.1.1): "Task Force for European Standards for IMT-2000 (MSG); Technical Parameter selection in ETSI EN 301 908 Base Station (BS) Harmonised Standards".
- [i.21] ETSI TS 103 807 (V1.1.1) (06-2021): "Mobile Standards Group (MSG); IMT Cellular Networks Base Stations (BS) Additional Regulatory Requirements".

## 3 Definition of terms, symbols and abbreviations

### 3.1 Terms

For the purposes of the present document, the following terms 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 (BS) class:** classification of BS according to its intended use

NOTE: There are three BS classes in the present document: wide area Base Station, medium range Base Station and local Area Base Station.

**BS receiver:** composite receiver function of a BS receiving in an operating band

**BS RF Bandwidth:** RF bandwidth in which a base station transmits and/or receives single or multiple carrier(s) within a supported operating band

NOTE: In single carrier operation, the Base Station RF Bandwidth is equal to the channel 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 carriers:** set of two or more carriers configured in a spectrum block where there are no RF requirements based on co-existence for un-coordinated operation within the spectrum block

**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

**minimum coupling loss:** minimum distance loss including antenna gain, measured between antenna connectors

**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 operating band (which is not a sub-band or superseding-band of another supported 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 operating band (which is not a sub-band or superseding-band of another supported 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 operating band (which is not a sub-band or superseding-band of another supported 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) 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:** mean power level per carrier that the manufacturer has declared to be available at the antenna connector

**rated total output power:** 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 less than the mean power of the same signal.

**sub-band:** part of the uplink and downlink frequency range of the operating band

**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

**superseding-band:** band that includes the whole of the uplink and downlink frequency range of the operating band

**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

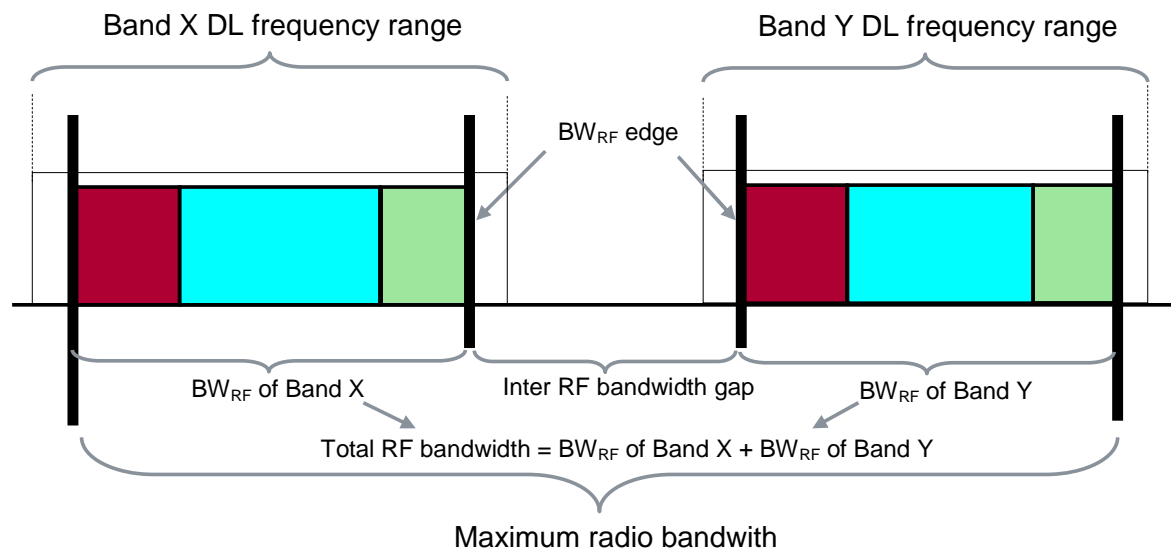
For the purposes of the present document, the following symbols apply:

$\alpha$  Roll-off factor

$\Delta f$  Frequency offset of the measurement filter -3 dB point

NOTE: 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
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
Iu ant	BS internal logical interface between the implementation specific O&M function and the RET antennas and TMAs control unit function of the BS
f	Frequency
$F_{\text{DL\_low}}$	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
$P_{\max,c}$	Maximum output power (per carrier)
$P_{\text{out}}$	Output power
$P_{\text{rated,c}}$	Rated output power (per carrier)
$P_{\text{rated,t}}$	Rated total output power
$P_{\text{REFSENS}}$	Reference sensitivity power level
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
$W_{\text{gap}}$	Sub-block gap or Inter RF Bandwidth gap size



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

### 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
DB-DC	Dual Band and Dual Carrier
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 Free Trade Association
EUT	Equipment Under Test
E-UTRA	Evolved UTRA
FDD	Frequency Division Duplexing
GMSK	Gaussian Minimum Shift Keying
GSM	Global System for Mobile communications
HARQ	Hybrid Automatic Repeat reQuest
HSDPA	High-Speed Downlink Packet Access
IMT	International Mobile Telecommunications
LNA	Low Noise Amplifier
MIMO	Multiple Input Multiple Output
MS	Mobile Station
MSR	Multi-Standard Radio
NC	Non-Contiguous