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**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)**

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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 mandate M/284 issued from the European Commission under Directive 98/34/EC [i.1] as amended by Directive 98/48/EC [i.6].

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 Harmonized 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 18 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.7].

National transposition dates

Date of adoption of this EN:	30 June 2014
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Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 March 2015
Date of withdrawal of any conflicting National Standard (dow):	31 March 2016

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**may not**", "**need**", "**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 EG 201 399 [i.3].

1 Scope

The present document applies to the following radio equipment type:

- 1) Multi-Standard Radio capable Base stations (E-UTRA, UTRA, GSM/EDGE).

These radio equipment types are capable of operating in all or any part of the frequency bands given in table 1-1.

Table 1-1: Base station operating bands

Band designation and Band Category	Direction of transmission	MSR Base Station operating bands
1 (BC1)	Transmit	2 110 MHz to 2 170 MHz
	Receive	1 920 MHz to 1 980 MHz
3 (BC2)	Transmit	1 805 MHz to 1 880 MHz
	Receive	1 710 MHz to 1 785 MHz
7 (BC1)	Transmit	2 620 MHz to 2 690 MHz
	Receive	2 500 MHz to 2 570 MHz
8 (BC2)	Transmit	925 MHz to 960 MHz
	Receive	880 MHz to 915 MHz
20 (BC1)	Transmit	791 MHz to 821 MHz
	Receive	832 MHz to 862 MHz
22 (BC1)	Transmit	3 510 MHz to 3 590 MHz
	Receive	3 410 MHz to 3 490 MHz
33 (BC3)	Transmit and Receive	1 900 MHz to 1 920 MHz
34 (BC3)	Transmit and Receive	2 010 MHz to 2 025 MHz
38 (BC3)	Transmit and Receive	2 570 MHz to 2 620 MHz
40 (BC3)	Transmit and Receive	2 300 MHz to 2 400 MHz
42 (BC3)	Transmit and Receive	3 400 MHz to 3 600 MHz
43 (BC3)	Transmit and Receive	3 600 MHz to 3 800 MHz

NOTE 1: For BS capable of multi-band operation, the supported operating bands may belong to different Band Categories.

The present document covers requirements for multi-RAT capable E-UTRA, UTRA and GSM/EDGE MSR Base Stations for 3GPP™ Release 9, 10 and 11.

The present document is intended to cover the provisions of Directive 1999/5/EC [i.2] (R&TTE Directive) [i.2], 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 2: 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 referenced 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] Void.
- [2] ETSI TS 137 141 (V11.8.0) (2014-04): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing (3GPP TS 37.141 version 11.8.0 Release 11)".
- [3] ETSI TS 125 104 (V11.8.0) (2014-01): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (FDD) (3GPP TS 25.104 version 11.8.0 Release 11)".
- [4] ETSI TS 125 105 (V11.6.0) (2014-01): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) radio transmission and reception (TDD) (3GPP TS 25.105 version 11.6.0 Release 11)".
- [5] ETSI TS 136 104 (V11.8.2) (2014-04): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 11.8.2 Release 11)".
- [6] ETSI TS 145 005 (V11.4.0) (2014-01): "Digital cellular telecommunications system (Phase 2+); Radio transmission and reception (3GPP TS 45.005 version 11.4.0 Release 11)".
- [7] Void.
- [8] ETSI EN 301 908-3 (V6.2.1) (2013-10): "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)".
- [9] ETSI EN 301 908-7 (V5.2.1) (2011-07): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 7: CDMA TDD (UTRA TDD) Base Stations (BS)".
- [10] ETSI EN 301 908-14 (V6.2.1) (2013-10): "IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)".
- [11] ETSI EN 301 502 (V11.0.1) (2013-11): "Global System for Mobile communications (GSM); Harmonized EN for Base Station Equipment covering the essential requirements of article 3.2 of the R&TTE Directive".
- [12] ETSI TS 137 104 (V11.8.0) (2014-04): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception (3GPP TS 37.104 version 11.8.0 Release 11)".
- [13] ETSI TS 136 141 (V11.8.0) (2014-04): "LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing (3GPP TS 36.141 version 11.8.0 Release 11)".
- [14] ETSI TS 125 141 (V11.8.0) (2014-04): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (FDD) (3GPP TS 25.141 version 11.8.0 Release 11)".
- [15] ETSI TS 125 142 (V11.3.0) (2013-07): "Universal Mobile Telecommunications System (UMTS); Base Station (BS) conformance testing (TDD) (3GPP TS 25.142 version 11.3.0 Release 11)".
- [16] ETSI TS 151 021 (V11.4.0) (2013-10): "Digital cellular telecommunications system (Phase 2+); Base Station System (BSS) equipment specification; Radio aspects (3GPP TS 51.021 version 11.4.0 Release 11)".

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] Void.
- [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".
- [i.6] 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.7] ETSI EN 301 908-1 (V6.2.1) (2013-04): "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.8] Recommendation ITU-R SM.329-12 (09/2012): "Unwanted emissions in the spurious domain".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

band category: group of operating bands for which the same MSR scenarios apply

NOTE: The band categories for MSR BS are defined in clause 4.4 of TS 137 141 [2] and are listed in table 1-1.

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

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

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

carrier: modulated waveform conveying the E-UTRA, UTRA or GSM/EDGE physical channels

carrier aggregation: aggregation of two or more E-UTRA component carriers in order to support wider transmission bandwidths

carrier aggregation band: set of one or more operating bands across which multiple E-UTRA carriers are aggregated with a specific set of technical requirements

NOTE: Carrier aggregation band(s) for an E-UTRA BS is declared by the manufacturer according to the designations in table 4.2.1-2.

carrier power: power at the antenna connector in the channel bandwidth of the carrier averaged over at least one subframe for E-UTRA, at least one slot for UTRA and the useful part of the burst for GSM/EDGE

channel bandwidth: RF bandwidth supporting a single E-UTRA, UTRA or GSM/EDGE RF carrier

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

configured carrier power: target maximum power for a specific carrier for the operating mode set in the BS

contiguous spectrum: spectrum consisting of a contiguous block of spectrum with no sub-block gaps

downlink operating band: part of the operating band designated for downlink

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

intra-band contiguous carrier aggregation: contiguous E-UTRA carriers aggregated in the same operating band

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

lower RF bandwidth edge: frequency of the lower edge of the Base Station RF bandwidth, used as a frequency reference point for transmitter and receiver requirements

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

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

NOTE: The Maximum Base Station RF bandwidth for BS configured for contiguous and non-contiguous operation within each supported operating band is declared separately.

maximum carrier output power: carrier power available at the antenna connector for 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

maximum throughput: maximum achievable throughput for a reference measurement channel

maximum total output power: sum of the power of all carriers available at the antenna connector for a specified reference condition

measurement bandwidth: bandwidth in which an emission level is specified

medium range Base Station: Base Stations characterized by requirements derived from micro cell scenarios with a BS to UE minimum coupling loss equal to 53 dB

MB-MSR Base Station: MSR 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)

MSR Base Station (BS): Base Station characterized by the ability of its receiver and transmitter to process two or more carriers in common active RF components simultaneously in a declared RF bandwidth, where at least one carrier is of a different RAT 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)

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

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

NOTE: The operating band(s) for a BS is declared by the manufacturer. Operating bands have designations according to table 1-1.

single-RAT operation: operation of a BS in an operating band with only one RAT configured in that operating band

sub-block: 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

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

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

transmission bandwidth: bandwidth of an instantaneous E-UTRA transmission from a UE or BS, 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, e.g. 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

upper RF bandwidth edge: frequency of the upper edge of the Base Station RF bandwidth, used as a frequency reference point for transmitter and receiver requirements

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

wide area Base Station: Base Stations 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 the sixth release version of the present document, corresponding to 3GPP Release 8.

3.2 Symbols

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

BW_{RF}	Base Station RF bandwidth, where $BW_{RF} = F_{BW_{RF,high}} - F_{BW_{RF,low}}$
B_{RFBW}	Maximum RF bandwidth located at the bottom of the supported frequency range in the operating band
CA_X	CA for band X where X is the applicable E-UTRA operating band
f	Frequency
Δf	Separation between the Base Station RF bandwidth 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_{filter}	Filter centre frequency
f_offset	Separation between the Base Station RF bandwidth edge frequency and the centre of the measuring filter
f_offset_max	The maximum value of f_offset used for defining the requirement

$F_{\text{block,high}}$	Upper sub-block edge, where $F_{\text{block,high}} = F_{\text{C,block,high}} + F_{\text{offset, RAT}}$
$F_{\text{block,low}}$	Lower sub-block edge, where $F_{\text{block,low}} = F_{\text{C,block,low}} - F_{\text{offset, RAT}}$
$F_{\text{BW RF,high}}$	Upper RF bandwidth edge, where $F_{\text{BW RF,high}} = F_{\text{C,high}} + F_{\text{offset, RAT}}$
$F_{\text{BW RF,low}}$	Lower RF bandwidth edge, where $F_{\text{BW RF,low}} = F_{\text{C,low}} - F_{\text{offset, RAT}}$
$F_{\text{C,block, high}}$	Center frequency of the highest transmitted/received carrier in a sub-block
$F_{\text{C,block, low}}$	Center frequency of the lowest transmitted/received carrier in a sub-block
$F_{\text{C,high}}$	Center frequency of the highest transmitted/received carrier
$F_{\text{C,low}}$	Center frequency of the lowest transmitted/received carrier
$F_{\text{offset, RAT}}$	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 for a specific RAT
$F_{\text{UL,low}}$	The lowest frequency of the uplink operating band
$F_{\text{UL,high}}$	The highest frequency of the uplink operating band
M_{RFBW}	Maximum RF bandwidth located in the middle of the supported frequency range in the operating band
$P_{\text{EM,N}}$	Declared emission level for channel N
$P_{\text{GSMcarrier}}$	Power level of the GSM/EDGE carrier adjacent to the RF bandwidth edge
P_{max}	Maximum total output power
$P_{\text{max,c}}$	Maximum carrier output power
P_{REFSENS}	Reference Sensitivity power level
T_{RFBW}	Maximum RF bandwidth located at the top of the supported frequency range in the operating band
W_{gap}	Sub-block gap size or inter RF bandwidth gap size

3.3 Abbreviations

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

ACLR	Adjacent Channel Leakage Ratio
AM	Amplitude Modulation
ARFCN	Absolute Radio Frequency Channel Number
ATT	Attenuator
BC	Band Category
BER	Bit Error Ratio
BS	Base Station
BTS	Base Transceiver Station
BW	Bandwidth
CA	Carrier Aggregation
CACLR	Cumulative Adjacent Channel Leakage Ratio
CS	Capability Set
CW	Continuous Wave
DC	Direct Current
DTT	Digital Terrestrial Television
DwPTS	Downlink part of the special subframe (for E-UTRA TDD operation)
EDGE	Enhanced Data rates for GSM Evolution
EUT	Equipment Under Test
E-UTRA	Evolved Universal Terrestrial Radio Access
FDD	Frequency Division Duplex
FRC	Fixed Reference Channel

NOTE: The fixed reference channels for E-UTRA are detailed in annex A of TS 136 141 [13].

GSM	Global System for Mobile Communications
IMT	International Mobile Telecommunications
ITU-R	Radiocommunication Sector of the ITU
LA	Local Area
MB-MSR	Multi-Band Multi-Standard Radio
MBT	Multi-Band Testing
MC-BTS	Multi-Carrier Base Transceiver Station
MR	Medium Range
MS	Mobile Station
MSR	Multi-Standard Radio

RAT	Radio Access Technology
RB	Resource Block (for E-UTRA)
RF	Radio Frequency
RMS	Root Mean Square (value)
RRC	Root-Raised Cosine
RX	Receiver
SBT	Single Band Testing
TC	Test Configuration
TDD	Time Division Duplex
TX	Transmitter
UARFCN	UTRA Absolute Radio Frequency Channel Number
UE	User Equipment
UEM	operating band Unwanted Emissions Mask
UTRA	Universal Terrestrial Radio Access
WA	Wide Area

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 (see table 1-1) is shared between systems of the IMT 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 Base Stations (BS), seven essential parameters in addition to those in EN 301 908-1 [i.7] 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 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 In-band blocking
	4.2.9 Out-of-band blocking
	4.2.10 Receiver intermodulation characteristics
Receiver adjacent channel selectivity	4.2.11 Narrowband blocking