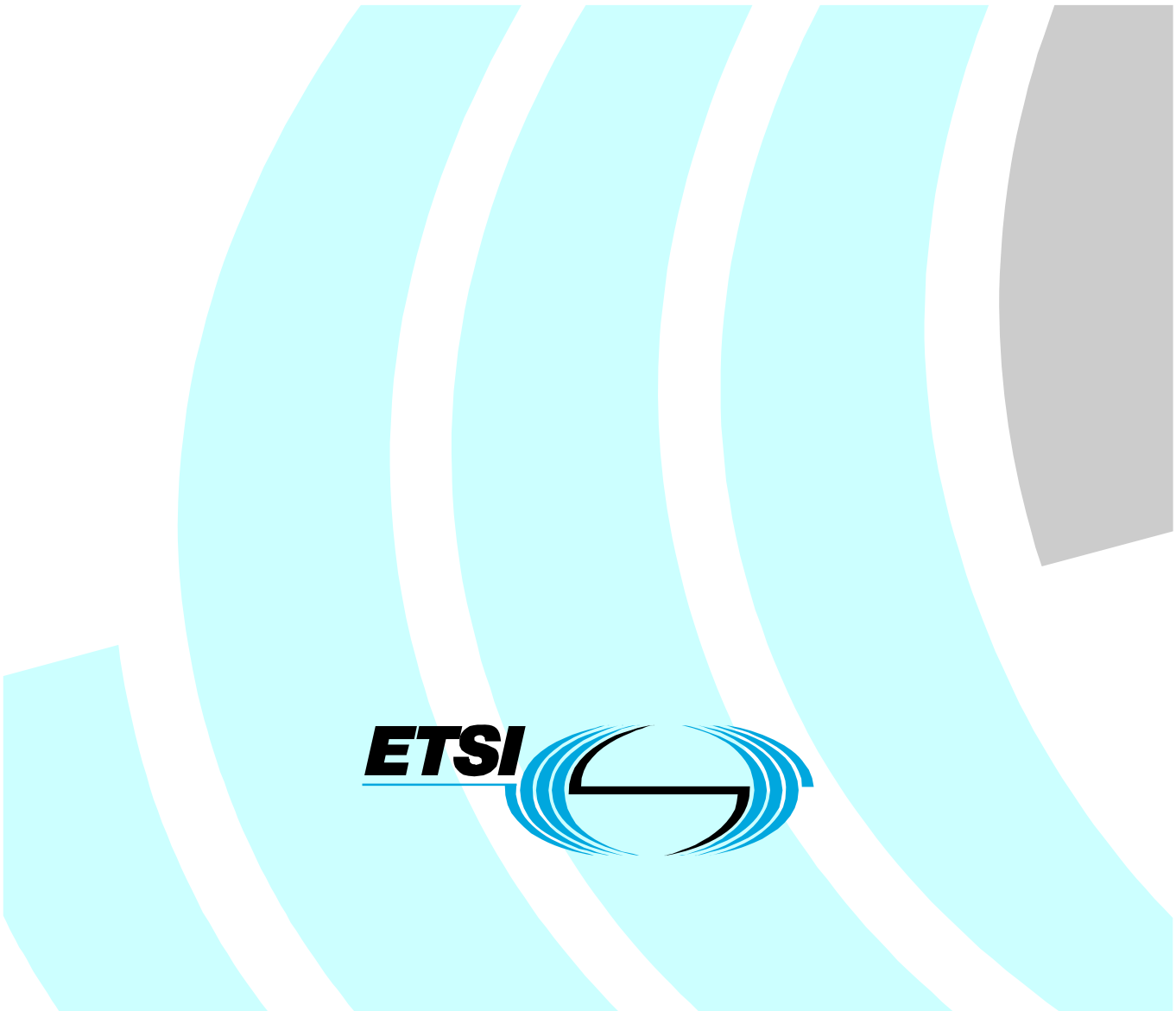
ETSI EN 301 908-1 V5.2.1 (2011-05)

Harmonized European Standard

IMT cellular networks;
Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive;
Part 1: Introduction and common requirements



Reference
REN/MSG-TFES-006-1

Keywords
3G, 3GPP, 3GPP2, cdma2000, cellular, digital,
E-UTRA, IMT, IMT-2000, LTE, mobile, radio,
regulation, UMTS, UTRA, WCDMA, WiMAX

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status.
Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Copyright Notification

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

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 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 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 Harmonised 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 summarised in annex A.

The present document is part 1 of a multi-part deliverable covering the essential requirements under article 3.2 of Directive 1999/5/EC [i.2] (R&TTE Directive) for Base Stations (BS), Repeaters and User Equipment (UE) for IMT cellular networks, as identified below:

Part 1: "Introduction and common requirements";

Part 2: "CDMA Direct Spread (UTRA FDD) User Equipment (UE)";

Part 3: "CDMA Direct Spread (UTRA FDD) Base Stations (BS)";

Part 4: "CDMA Multi-Carrier (cdma2000) User Equipment (UE)";

Part 5: "CDMA Multi-Carrier (cdma2000) Base Stations (BS)";

Part 6: "CDMA TDD (UTRA TDD) User Equipment (UE)";

Part 7: "CDMA TDD (UTRA TDD) Base Stations (BS)";

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: "CDMA Direct Spread (UTRA FDD) (Repeaters)";

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: "Evolved Universal Terrestrial Radio Access (E-UTRA) User Equipment (UE)";

Part 14: "Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)";

Part 15: "Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters)";

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";

Part 18: "E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS)";

Part 19: "OFDMA TDD WMAN (Mobile WiMAX) TDD User Equipment (UE)";

Part 20: "OFDMA TDD WMAN (Mobile WiMAX) TDD Base Station (BS)";

Part 21: "OFDMA TDD WMAN (Mobile WiMAX) FDD User Equipment (UE)";

Part 22: "OFDMA TDD WMAN (Mobile WiMAX) FDD Base Stations (BS)".

National transposition dates	
Date of adoption of this EN:	12 April 2011
Date of latest announcement of this EN (doa):	31 July 2011
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 January 2012
Date of withdrawal of any conflicting National Standard (dow):	31 January 2013

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 user equipment, repeaters and base stations for IMT, falling within the scope of one of the other parts of EN 301 908, except for IMT-2000 FDMA/TDMA (DECT). The present document also covers the corresponding ancillary equipment.

NOTE 1: EN 301 908-10 [5] contains in particular requirements for radiated spurious emissions and control and monitoring functions applicable to IMT-2000 FDMA/TDMA (DECT) equipment.

The present document includes technical requirements which are common to equipment falling within the scope of several of the other parts.

NOTE 2: The other parts of EN 301 908, which are listed in the foreword of the present document, specify technical requirements in respect of a particular type of IMT equipment.

NOTE 3: ITU-R Recommendation M.1457-9 [1] defines the characteristics of the members of the IMT-2000 family by means of references to technical specifications developed by Standards Development organizations. The present document applies to equipment designed to meet any version of the terrestrial specifications referenced in ITU-R Recommendation M.1457-9 [1].

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 [i.2] may apply to equipment within the scope of the present document.

NOTE 4: 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 reference 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] ITU-R Recommendation M.1457-9 (2010): "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications 2000 (IMT-2000)".

[2] Void.

[3] ITU-R Recommendation SM.329-10 (2003): "Unwanted emissions in the spurious domain".

[4] ITU-R Recommendation SM.1539-1 (2002): "Variation of the boundary between the out-of-band and spurious domains required for the application of Recommendations ITU-R SM.1541 and ITU-R SM.329".

[5] ETSI EN 301 908-10 (V4.1.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 10: Harmonized EN for IMT-2000, FDMA/TDMA (DECT) covering essential requirements of article 3.2 of the R&TTE Directive".

[6] ETSI EN 301 502 (V9.2.1): "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".

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] 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 terms and definitions given in the R&TTE Directive [i.2] and the following apply:

ancillary equipment: equipment (apparatus), used in connection with a User Equipment (UE), Repeater or Base Station (BS) is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a user equipment UE, repeater or BS to provide additional operational and/or control features to the radio equipment, (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a UE, BS or combination of BS and repeater; and
- the UE, BS or combination of BS and repeater 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).

applicable part: part of the multi-part deliverable, of which the present document is the first part, for which the scope of that document includes the equipment to be tested

Base Station RF bandwidth: bandwidth in which a Base Station transmits and receives multiple carriers and/or RATs simultaneously

channel bandwidth: RF bandwidth supporting a single E-UTRA, Mobile WiMAX or UMB 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.

enclosure port: physical boundary of the apparatus through which electromagnetic fields may radiate or impinge

NOTE: In the case of integral antenna equipment, this port is inseparable from the antenna port.

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

idle mode: state of User Equipment (UE) when switched on but with no Radio Resource Control (RRC) connection

IMT-2000: third generation mobile systems which are scheduled to start service around the year 2000 subject to market considerations

NOTE: ITU-R Recommendation M.1457-9 [1] identifies the detailed specifications for the IMT-2000 radio interfaces.

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

MSR Base Station: 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)

port: particular interface, of the specified equipment (apparatus), with the electromagnetic environment

NOTE: For example, any connection point on an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 3.1-1).

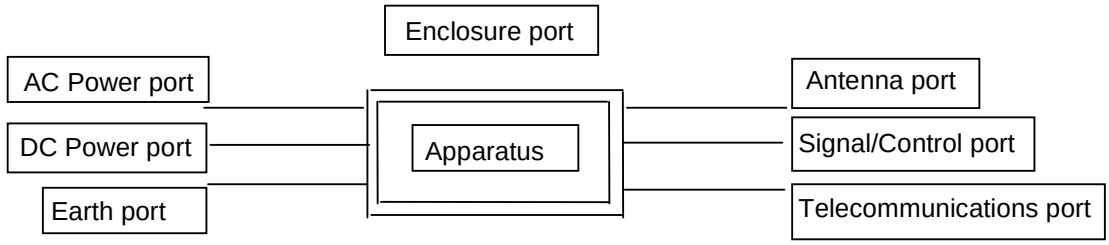


Figure 3.1-1: Examples of ports

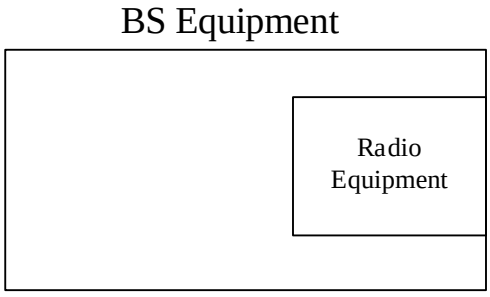


Figure 3.1-2: BS with single enclosure solution

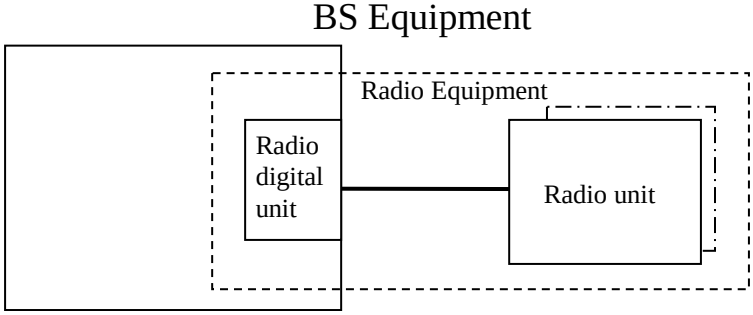


Figure 3.1-3: BS with multiple enclosure solution

radio communications equipment: telecommunications equipment which includes one or more transmitters and/or receivers and/or parts thereof for use in a fixed, mobile or portable application

NOTE: It can be operated with ancillary equipment but if so, is not dependent on it for basic functionality.

radio digital unit: equipment which contains base band and functionality for controlling Radio unit

radio equipment: equipment which contains Radio digital unit and Radio unit

radio unit: equipment which contains transmitter and receiver

signal and control port: port which carries information or control signals, excluding antenna ports

telecommunication port: port which is intended to be connected to telecommunication networks (e.g. public switched telecommunication networks, integrated services digital networks), local area networks (e.g. Ethernet, token ring) and similar networks

traffic mode: state of User Equipment (UE) when switched on and with Radio Resource Control (RRC) connection established

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

WiMAX: trade marked name for the OFDMA TDD WMAN IMT technology

3.2 Symbols

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

$BW_{Channel}$	Channel bandwidth
$F_{BW\ RF,\ high}$	Upper RF bandwidth edge
$F_{BW\ RF,\ low}$	Lower RF bandwidth edge

3.3 Abbreviations

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

BS	Base Station
CDMA	Code Division Multiple Access
CW	Continuous Wave
DECT	Digital Enhanced Cordless Telecommunication
EDGE	Enhanced Data rates for GSM Evolution
e.i.r.p.	equivalent isotropically radiated power
EMC	ElectroMagnetic Compatibility
ERM	Electromagnetic compatibility and Radio spectrum Matters

e.r.p. effective radiated power
EUT Equipment Under Test
E-UTRA Evolved Universal Terrestrial Radio Access

NOTE: Also known as LTE.

FDD Frequency Division Duplex
FDMA Frequency Division Multiple Access
GSM Global System for Mobile communications
IMT-2000 International Mobile Telecommunications 2000
LTE Long Term Evolution

NOTE: Also known as E-UTRA.

MSG Mobile Standards Group
MSR Multi-Standard Radio
OFDMA Orthogonal Frequency Division Multiple Access
R&TTE Radio Telecommunications and Terminal Equipment
RF Radio Frequency
RAT Radio Access Technology
RIT Radio Interface Technology
RMS Root Mean Square
RRC Radio Resource Control
TFES Task Force for European Standards for IMT
TDD Time Division Duplex
TDMA Time Division Multiple Access
UE User Equipment
UMB Ultra Mobile Broadband
UTRA Universal Terrestrial Radio Access
WMAN Wireless Metropolitan Area Network

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.

4.2 Conformance requirements

The requirements in the present document are based on the assumption that the operating band is shared between systems of the IMT family 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 equipment three common essential parameters have been identified. Tables 4.2.1-1 and 4.2.1-2 provide cross-references, for UE, repeater and BS respectively, between these essential parameters and the corresponding technical requirements for equipment within the scope of the present document.

Table 4.2.1-1: Cross references for User Equipment (UE)

Essential parameter	Corresponding technical requirements
Radiated emissions	4.2.2 Radiated emissions (UE)
Control and monitoring functions	4.2.4 Control and monitoring functions (UE)

Table 4.2.1-2: Cross references for Base Stations (BS), and repeaters

Essential parameter	Corresponding technical requirements
Radiated emissions	4.2.3 Radiated emissions (BS and repeater)

NOTE: Receiver sensitivity, use of correct timing and use of correct code are covered in clauses B.1 and B.2 respectively.

4.2.2 Radiated emissions (UE)

4.2.2.1 Definition

This test assesses the ability of radio communications equipment and ancillary equipment to limit unwanted emissions from the enclosure port.

This test is applicable to radio communications equipment and ancillary equipment.

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

4.2.2.2 Limits

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out-of-band emissions and spurious emissions are based on ITU-R Recommendations SM.329-10 [3] and SM.1539-1 [4].

The requirements shown in table 4.2.2.2-1 are only applicable for frequencies in the spurious domain.

Table 4.2.2.2-1: Radiated spurious emissions requirements (UE)

Frequency	Minimum requirement (e.r.p.)/ reference bandwidth idle mode	Minimum requirement (e.r.p.)/ reference bandwidth traffic mode	Applicability
30 MHz ≤ f < 1 000 MHz	-57 dBm/100 kHz	-36 dBm/100 kHz	All
1 GHz ≤ f < 12,75 GHz	-47 dBm/1 MHz	-30 dBm/1 MHz	All
fc - 2,5 × 5 MHz < f < fc + 2,5 × 5 MHz		Not defined	UTRA FDD, UTRA TDD, 3,84 Mcps option, cdma2000, spreading rate 3
fc - 2,5 × $BW_{Channel}$ MHz < f < fc + 2,5 × $BW_{Channel}$ MHz		Not defined	E-UTRA FDD, E-UTRA TDD, Mobile WiMAX, UMB
fc - 2,5 × 10 MHz < f < fc1 + 2,5 × 10 MHz		Not defined	UTRA TDD, 7,68 Mcps option
fc - 4 MHz < f < fc + 4 MHz		Not defined	UTRA TDD, 1,28 Mcps option cdma2000, spreading rate 1
fc - 500 kHz < f < fc + 500 kHz		Not defined	UWC 136, 200 kHz option
fc - 250 kHz < f < fc + 250 kHz		Not defined	UWC 136, 30 kHz option
NOTE: fc is the UE transmit centre frequency.			

4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

4.2.3 Radiated emissions (BS and repeater)

4.2.3.1 Definition

This test assesses the ability of BS and repeater to limit unwanted emission from the enclosure port.

This test is applicable to Base Stations, except for BS that are only single-RAT GSM/EDGE capable and also applicable to repeaters. This test shall be performed on a representative configuration of the equipment under test. For a BS with multiple enclosures, the BS part with Radio digital unit and the Radio unit may be tested separately.

For Base Stations that are only single-RAT GSM/EDGE capable, the limits and the test method in clauses 4.2.16 and 5.3.16 of EN 301 502 [6] apply.

4.2.3.2 Limits

The frequency boundary and reference bandwidths for the detailed transitions of the limits between the requirements for out-of-band emissions and spurious emissions are based on ITU-R Recommendations SM.329-10 [3] and SM.1539-1 [4].

The requirements, shown in table 4.2.3.2-1, are applicable for frequencies in the spurious domain.

The BS and repeater shall meet the limits given in table 4.2.3.2-1.

Table 4.2.3.2-1: Radiated spurious emissions requirements (BS and repeater)

Frequency	Minimum requirement (e.r.p.)/ reference bandwidth	Applicability
30 MHz ≤ f < 1 000 MHz	-36 dBm/100 kHz	All
1 GHz ≤ f < 12,75 GHz	-30 dBm/1 MHz	All
Fc1 - 2,5 × 5 MHz < f < Fc2 + 2,5 × 5 MHz	Not defined	UTRA FDD, UTRA TDD, 3,84 Mcps option, cdma2000, spreading rate 3
Fc1 - 2,5 × 10 MHz < f < Fc2 + 2,5 × 10 MHz	Not defined	UTRA TDD, 7,68 Mcps option
Fc1 - 2,5 × $BW_{Channel}$ MHz < f < Fc2 + 2,5 × $BW_{Channel}$ MHz	Not defined	E-UTRA FDD, E-UTRA TDD, Mobile WiMAX, UMB ($BW_{Channel}$ ≥ 2,5 MHz)
$F_{BW\ RF,\ low}$ - 10 MHz < f < $F_{BW\ RF,\ high}$ + 10 MHz	Not defined	E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Stations
Fc1 - 4 MHz < f < Fc2 + 4 MHz	Not defined	UTRA TDD, 1,28 Mcps option, cdma2000, spreading rate 1 UMB ($BW_{Channel}$ = 1,25 MHz)
Fc1 - 500 kHz < f < Fc2 + 500 kHz	Not defined	UWC 136, 200 kHz option
Fc1 - 250 kHz < f < Fc2 + 250 kHz	Not defined	UWC 136, 30 kHz option

Key:

Fc1: Center frequency of first carrier frequency used by the BS and repeater.

Fc2: Center frequency of last carrier frequency used by the BS and repeater.

$BW_{Channel}$: Channel BandWidth.

$F_{BW\ RF,\ high}$: Upper RF bandwidth edge.

$F_{BW\ RF,\ low}$: Lower RF bandwidth edge.

4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

4.2.4 Control and monitoring functions (UE)

4.2.4.1 Definition

This requirement, together with other control and monitoring technical requirements identified in the table of cross references in the applicable part, verifies that the control and monitoring functions of the UE prevent it from transmitting in the absence of a valid network.

This test is applicable to radio communications equipment and ancillary equipment in the operating band defined in the applicable part of this multipart harmonized standard.

This test shall be performed on the radio communications equipment and/or a representative configuration of the ancillary equipment.

4.2.4.2 Limits

The maximum measured power during the duration of the test shall not exceed -30 dBm.

4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

5 Testing for compliance with technical requirements

5.1 Environmental conditions for testing

Tests defined in the present document shall be carried out at representative points within the boundary limits of the operational environmental profile.

Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the declared operational environmental profile) to give confidence of compliance for the affected technical requirements.

Normally it should be sufficient for all tests to be conducted using normal test conditions except where otherwise stated.

5.2 Interpretation of the measurement results

The interpretation of the results recorded in a test report for the measurements described in the present document shall be as follows:

- the measured value related to the corresponding limit will be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty for the measurement of each parameter shall be included in the test report;
- the recorded value of the measurement uncertainty shall be, for each measurement, equal to or lower than the figures in table 5.2-1 for UE and table 5.2-2 for BS and repeater.

For the test methods, according to the present document, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 [i.5] or TR 102 215 [i.4] and shall correspond to an expansion factor (coverage factor) k = 1,96 (which provides a confidence level of 95 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Tables 5.2-1 and 5.2-2 are based on this expansion factor.

Table 5.2-1: Maximum measurement uncertainty (UE)

Parameter	Uncertainty
Effective radiated RF power between 30 MHz and 180 MHz	±6 dB
Effective radiated RF power between 180 MHz and 12,75 GHz	±3 dB
Conducted RF power	±1 dB

Table 5.2-2: Maximum measurement uncertainty (BS and repeater)

Parameter	Uncertainty for EUT dimension ≤ 1 m	Uncertainty for EUT dimension > 1 m
Effective radiated RF power between 30 MHz to 180 MHz	±6 dB	±6 dB
Effective radiated RF power between 180 MHz to 4 GHz	±4 dB	±6 dB
Effective radiated RF power between 4 GHz to 12,75 GHz	±6 dB	±9 dB (see note)
Conducted RF power	±1 dB	±1 dB
NOTE: This value may be reduced to ±6 dB when further information on the potential radiation characteristic of the EUT is available.		

NOTE: If the test system for a test is known to have a measurement uncertainty greater than that specified in tables 5.2-1 or 5.2-2, this equipment can still be used, provided that an adjustment is made follows:

- Any additional uncertainty in the test system over and above that specified in tables 5.2-1 or 5.2-2 is used to tighten the test requirements - making the test harder to pass (for some tests, e.g. receiver tests, this may require modification of stimulus signals). This procedure will ensure that a test system not compliant with tables 5.2-1 or 5.2-2 does not increase the probability of passing an EUT that would otherwise have failed a test if a test system compliant with tables 5.2-1 or 5.2-2 had been used.

5.3 Essential radio test suites

5.3.1 Radiated emissions (UE)

5.3.1.1 Test method

Whenever possible the test site should be a fully anechoic chamber simulating the free-space conditions. EUT shall be placed on a non-conducting support. Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser).

At each frequency at which a component is detected, the EUT shall be rotated to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement, which shall be the reference method. The measurement shall be repeated with the test antenna in the orthogonal polarization plane. Test systems are allowed to be pre-substituted by carrying out the substitution measurement for each frequency and by recording the obtained value into test system software as a correction factor.

NOTE: Effective radiated power (e.r.p.) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2,15 dB between e.i.r.p. and e.r.p.
e.r.p. (dBm) = e.i.r.p. (dBm) - 2,15 (ITU-R Recommendation SM.329-10 [3], annex 1).

Measurements are made with a tuned dipole antenna or a reference antenna with a known gain referenced to an isotropic antenna. Unless otherwise stated, all measurements are done as mean power (RMS).

If a different test site or method is used, this shall be stated in the test report. The results shall be converted to the reference method values and the validity of the conversion shall be demonstrated.

5.3.1.2 Test configurations

This clause defines the configurations for emission tests as follows:

- the equipment shall be tested under normal test conditions;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- the test conditions, test configuration and mode of operation shall be recorded in the test report;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, RF input/output ports shall be correctly terminated;
- ports that are not connected to cables during normal operation, e.g. service connectors, programming connectors; temporary connectors, etc. shall not be connected to any cables for the purpose of this test. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables:
  - emission tests shall be performed in two modes of operation:
    - with a communication link established (traffic mode); and
    - in the idle mode;
- the traffic mode configuration which uses the UE maximum output power for testing shall be declared by the manufacturer.

Ancillary equipment shall be tested with it connected to a UE in which case compliance shall be demonstrated to the appropriate clauses of the present document.

The results obtained shall be compared to the limits in clause 4.2.2.2 in order to prove compliance.

5.3.2 Radiated emissions (BS and repeater)

5.3.2.1 Test method

a) A test site fulfilling the requirements of ITU-R Recommendation SM.329-10 [3] shall be used. The EUT shall be placed on a non-conducting support and shall be operated from a power source via a RF filter to avoid radiation from the power leads.

   Mean power of any spurious components shall be detected by the test antenna and measuring receiver (e.g. a spectrum analyser). At each frequency at which a component is detected, the EUT shall be rotated and the height of the test antenna adjusted to obtain maximum response, and the effective radiated power (e.r.p.) of that component determined by a substitution measurement. The measurement shall be repeated with the test antenna in the orthogonal polarization plane. Test systems are allowed to be pre-substituted by carrying out the substitution measurement for each frequency and by recording the obtained value into test system software as a correction factor.

NOTE: Effective radiated power (e.r.p.) refers to the radiation of a half wave tuned dipole instead of an isotropic antenna. There is a constant difference of 2,15 dB between e.i.r.p. and e.r.p.
e.r.p. (dBm) = e.i.r.p. (dBm) - 2,15 (ITU-R Recommendation SM.329-10 [3], annex 1).

b) The BS shall transmit with maximum power declared by the manufacturer with all transmitters active. Set the Base Station to transmit a signal as defined in the applicable part for measurement of spurious emissions.

In case of a repeater the gain and the output power shall be adjusted to the maximum value as declared by the manufacturer. Use an input signal as defined in the applicable part for the measurement of spurious emissions.

c) The video bandwidth shall be approximately three times the resolution bandwidth. If this video bandwidth is not available on the measuring receiver, it shall be the maximum available and at least 1 MHz. Unless otherwise stated, all measurements are done as mean power (RMS). The received power shall be measured over the frequency ranges and using the measurement bandwidth as defined in table 4.2.3.2-1.

5.3.2.2 Test configurations

This clause defines the configurations for emission tests as follows:

- the equipment shall be tested under normal test conditions as specified in the functional standards;
- the test configuration shall be as close to normal intended use as possible;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate actual operation conditions and to ensure that all the different types of termination are tested;
- the test conditions, test configuration and mode of operation shall be recorded in the test report;
- ports which in normal operation are connected shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the input/output characteristics of the ancillary equipment, Radio Frequency (RF) input/output ports shall be correctly terminated;
- ports which are not connected to cables during normal operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of this test. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables.

For an EUT which contains more than one BS, it is sufficient to perform tests relating to connectors of each representative type of the BS forming part of the EUT.

For an EUT which contains more than one repeater, it is sufficient to perform tests relating to connectors of each representative type of the repeater forming part of the EUT.

At the manufacturer's discretion the test may be performed on the ancillary equipment separately or a representative configuration of the combination of radio and ancillary equipment. In each case the EUT is tested against all applicable emission clauses of the present document and in each case, compliance enables the ancillary equipment to be used with different radio equipment.

The results obtained shall be compared to the limits in clause 4.2.3.2 in order to prove compliance.

5.3.3 Control and monitoring functions (UE)

5.3.3.1 Test method

a) At the start of the test, the UE shall be switched off. The UE antenna connector shall be connected to a power measuring equipment, with the following characteristics:

- the RF bandwidth shall exceed the total operating transmit frequency range of the UE for operation with an applicable part;
- the response time of the power measuring equipment shall be such that the measured power has reached within 1 dB of its steady state value within 100 µs of a CW signal being applied;

- it shall record the maximum power measured.

NOTE: The equipment may include a video low pass filter to minimize its response to transients or Gaussian noise peaks.

b) The UE shall be switched on for a period of approximately fifteen minutes, and then switched off.

c) The EUT shall remain switched off for a period of at least thirty seconds, and shall then be switched on for a period of approximately one minute.

d) The maximum power emitted from the UE throughout the duration of the test shall be recorded.

The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

Annex A (normative): HS Requirements and conformance Test specifications Table (HS-RTT)

The HS Requirements and conformance Test specifications Table (HS-RTT) in table A-1 serves a number of purposes, as follows:

- it provides a statement of all the requirements in words and by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it provides a statement of all the test procedures corresponding to those requirements by cross reference to (a) specific clause(s) in the present document or to (a) specific clause(s) in (a) specific referenced document(s);
- it qualifies each requirement to be either:
  - Unconditional: meaning that the requirement applies in all circumstances; or
  - Conditional: meaning that the requirement is dependent on the manufacturer having chosen to support optional functionality defined within the schedule.
- in the case of Conditional requirements, it associates the requirement with the particular optional service or functionality;
- it qualifies each test procedure to be either:
  - Essential: meaning that it is included with the Essential Radio Test Suite and therefore the requirement shall be demonstrated to be met in accordance with the referenced procedures;
  - Other: meaning that the test procedure is illustrative but other means of demonstrating compliance with the requirement are permitted.

Table A-1: HS Requirements and conformance Test specifications Table (HS-RTT)

Harmonized Standard EN 301 908-1 The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive [i.2]						
Requirement			**Requirement Conditionality**		**Test Specification**	
No	**Description**	**Reference: Clause No**	**U/C**	**Condition**	**E/O**	**Reference: Clause No**
1	Radiated emissions (UE)	4.2.2	U		E	5.3.1
2	Radiated emissions (BS and repeater)	4.2.3	U		E	5.3.2
3	Control and monitoring functions (UE)	4.2.4	U		E	5.3.3

Key to columns:

Requirement:

No A unique identifier for one row of the table which may be used to identify a requirement or its test specification.

Description A textual reference to the requirement.

Clause Number Identification of clause(s) defining the requirement in the present document unless another document is referenced explicitly.

Requirement Conditionality:

U/C Indicates whether the requirement is to be *unconditionally* applicable (U) or is *conditional* upon the manufacturers claimed functionality of the equipment (C).

Condition Explains the conditions when the requirement shall or shall not be applicable for a technical requirement which is classified "conditional".

Test Specification:

E/O Indicates whether the test specification forms part of the Essential Radio Test Suite (E) or whether it is one of the Other Test Suite (O).

NOTE: All tests whether "E" or "O" are relevant to the requirements. Rows designated "E" collectively make up the Essential Radio Test Suite; those designated "O" make up the Other Test Suite; for those designated "X" there is no test specified corresponding to the requirement. The completion of all tests classified "E" as specified with satisfactory outcomes is a necessary condition for a presumption of conformity. Compliance with requirements associated with tests classified "O" or "X" is a necessary condition for presumption of conformity, although conformance with the requirement may be claimed by an equivalent test or by manufacturer's assertion supported by appropriate entries in the technical construction file.

Clause Number Identification of clause(s) defining the test specification in the present document unless another document is referenced explicitly. Where no test is specified (that is, where the previous field is "X") this field remains blank.

Annex B (informative): Receiver sensitivity and correct operation of the equipment

B.1 Receiver sensitivity

In the cellular radiocommunications systems using IMT standards within the scope of the present document, the power of transmissions is usually controlled so that the power of the transmitted signal intended to be received by a particular receiver is reduced to the minimum level consistent with proper reception. This is accomplished by a closed-loop employing messages reporting received power and/or signal quality between the BS and UE.

If a receiver has inadequate receiver sensitivity, the power of the transmitted signal intended for that receiver will need to be much higher than would otherwise be needed. If the transmitted power is increased excessively, this will cause harmful interference to other receivers using the same frequency in the neighbouring geographic area. Therefore, receiver sensitivity is justified as an essential requirement under article 3.2 of the R&TTE Directive [i.2].

The product specifications for IMT UE and BS (falling within the scope of applicable parts) include requirements relating to receiver sensitivity. The level of these requirements has been based on consideration of the performance of that receiver, and not harmful interference indirectly caused to other receivers. As a consequence, these requirements are too stringent to be justified as essential requirements under article 3.2 of the R&TTE Directive [i.2]. However, the applicable parts under article 3.2 of the R&TTE Directive [i.2] for IMT UE and BS (see the foreword of the present document) include an essential requirement for strong interfering signal handling of the receiver. This requirement implicitly requires a certain level of receiver performance, which is less stringent than that required by the product requirements relating directly to receiver sensitivity.

It is considered that the level of receiver performance needed by an IMT UE or BS to meet the essential requirement for receiver strong interfering signal handling is an appropriate level for an essential requirement under article 3.2 of the R&TTE Directive [i.2].

Therefore, no separate conformance requirement is defined in the present document or in the applicable parts relating to receiver sensitivity.

B.2 Correct functioning of the equipment

In a radiocommunications system, it is essential that certain functions of equipment operate correctly, in order to prevent harmful interference to other users of the radio spectrum. These functions can include transmission on the correct frequency, at the correct time and/or using the correct code (for equipment using CDMA). For the BS, the parameters of these functions are commanded by the network, and for the UE they are commanded by the BS.

Several of the tests in the applicable parts implicitly require a connection to be established between the Equipment Under Test (EUT) and the test apparatus. This implicitly requires the EUT to respond correctly to the commands it receives.

It is considered that the establishment of a connection demonstrates that the equipment meets most aspects of correct functioning to meet the essential requirements under article 3.2 of the R&TTE Directive [i.2]. Tests for certain specific functions are defined in applicable parts, where these functions are critical to the prevention of harmful interference.

Therefore, the explicit tests for correct functioning of the equipment, together with the implicit testing through the ability to establish a connection, are sufficient to meet the essential requirement for correct functioning of the equipment so as to prevent harmful interference, under article 3.2 of the R&TTE Directive [i.2].

Annex C (informative): Overview and organization of EN 301 908 standard parts

This annex provides an overview of the technologies included in the multipart standard EN 301 908 and how the different standard parts map to the terrestrial components of IMT. IMT is specified by ITU-R in Recommendation M.1457-9 [1] and contains the following terrestrial IMT-2000 component radio interfaces:

- IMT-2000 CDMA Direct Spread.
- IMT-2000 CDMA Multi-Carrier.
- IMT-2000 CDMA TDD.
- IMT-2000 TDMA Single-Carrier.
- IMT-2000 FDMA/TDMA.
- IMT-2000 OFDMA TDD WMAN.

EN 301 908 is a multi-part deliverable covering Base Stations (BS), Repeaters and User Equipment (UE) for the members of the terrestrial component of the IMT family. Further details of the standard parts are given below.

A cross-reference table for the standards parts applicable to the IMTterrestrial component radio access technologies is given in table C-1 and a frequency band cross reference table is given in table C-2. The scope, content and relation between the standard parts are given in the clauses below.

Table C-1: IMT Radio Interface Technologies in EN 301 908 and the corresponding standard parts

IMT-2000 terrestrial RIT (as identified by ITU-R) [1]	RIT name (as identified by the SDO)	Reference SDO	Equipment type	EN 301 908 part covering the RIT and equipment type	Notes
IMT-2000 CDMA Direct Spread	UTRA FDD	ETSI (3GPP)	UE	Part 2	
			BS	Part 3	
			Repeater	Part 11	
	E-UTRA FDD	ETSI (3GPP)	UE	Part 13	
			BS	Part 14	
			Repeater	Part 15	
IMT-2000 CDMA Multi-Carrier	Cdma2000	TIA (3GPP2)	UE	Part 4	
			BS	Part 5	
			Repeater	Part 12	
	UMB	TIA (3GPP2)	UE	Part 16	
			BS	Part 17	
IMT-2000 CDMA TDD	UTRA TDD	ETSI (3GPP)	UE	Part 6	
			BS	Part 7	
	E-UTRA TDD	ETSI (3GPP)	UE	Part 13	
			BS	Part 14	
IMT-2000 TDMA Single-Carrier	UWC136	TIA	UE	Part 8	
			BS	Part 9	
IMT-2000 FDMA/TDMA	DECT	ETSI (DECT)	-	Part 10	
IMT-2000 CDMA Direct Spread and IMT-2000 CDMA TDD	UTRA FDD/TDD E-UTRA and GSM/EDGE	ETSI (3GPP)	BS	Part 18	Covers multi-RAT capable (MSR) BS, including GSM/EDGE operation. GSM/EDGE single RAT capable BS is covered by EN 301 502 [6]
IMT-2000 OFDMA TDD WMAN	Mobile WiMAX TDD component	IEEE/ WiMAX Forum	UE	Part 19	
			BS	Part 20	
	Mobile WiMAX FDD component	IEEE/ WiMAX Forum	UE	Part 21	
			BS	Part 22	

Table C-2: Frequency band cross reference table for IMT Radio Interface Technologies in EN 301 908

UTRA FDD Band	UTRA TDD Band	E-UTRA Band	CDMA2000/ UMB Band Class	Mobile WiMAX Band Class	Frequency Range
I	-	1	6	-	1 920 MHz to 1 980 MHz paired with 2 110 MHz to 2 170 MHz
III	-	3	8	6C	1 710 MHz to 1 785 MHz paired with 1 805 MHz to 1 880 MHz
VII	-	7	13	-	2 500 MHz to 2 570 MHz paired with 2 620 MHz to 2 690 MHz
VIII	-	8	9	7G	880 MHz to 915 MHz paired with 925 MHz to 960 MHz
XV	-	-	-	-	1 900 MHz to 1 920 MHz paired with 2 600 MHz to 2 620 MHz
XVI	-	-	-	-	2 010 MHz to 2 025 MHz paired with 2 585 MHz to 2 600 MHz
XX	-	20	-	-	791 to 821 MHz paired with 832 MHz to 862 MHz
-	a	33	-	-	1 900 MHz to 1 920 MHz
-	a	34	-	-	2 010 MHz to 2 025 MHz
-	d	38	-	-	2 570 MHz to 2 620 MHz
-	-	-	-	1B	2 300 MHz to 2 400 MHz
NOTE: The technical specifications identify additional frequency bands not currently included within EN 301 908.					

EN 301 908 is divided into multiple standard parts as follows:

Part 1: Introduction and common requirements
The scope of Part 1 is common technical requirements for the IMT-2000 RITs, except for IMT-2000 FDMA/TDMA. This includes radiated emissions (UE, BS and repeater) and Control and monitoring functions (UE).

Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)
The scope of Part 2 is User Equipment for IMTCDMA Direct Spread, which includes UTRA FDD as defined by ETSI (3GPP).

Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)
The scope of Part 3 is Base Stations for IMT CDMA Direct Spread, which includes UTRA FDD as defined by ETSI (3GPP).

Part 4: CDMA Multi Carrier (cdma2000) User Equipment (UE)
The scope of Part 4 is User Equipment for IMT CDMA Multi-Carrier, which includes cdma2000 as defined by TIA (3GPP2).

Part 5: CDMA Multi Carrier (cdma2000) Base Stations (BS)
The scope of Part 5 is Base Stations for IMT CDMA Multi-Carrier, which includes cdma2000 as defined by TIA (3GPP2).

Part 6: CDMA TDD (UTRA TDD) User Equipment (UE)
The scope of Part 6 is User Equipment for IMT CDMA TDD, which includes UTRA TDD as defined by ETSI (3GPP).

Part 7: CDMA TDD (UTRA TDD) Base Stations (BS)
The scope of Part 7 is Base Stations for IMT CDMA TDD, which includes UTRA TDD as defined by ETSI (3GPP).

Part 8: IMT-2000 TDMA Single Carrier (UWC 136) (UE)
The scope of Part 8 is User Equipment for IMT-2000 TDMA Single-Carrier, which includes UWC136 as defined by TIA. Part 8 was published in the first release of EN 301 908.

Part 9: IMT-2000 TDMA Single Carrier (UWC 136) (BS)
The scope of Part 9 is Base Stations for IMT-2000 TDMA Single-Carrier, which includes UWC136 as defined by TIA. Part 9 was published in the first release of EN 301 908.

Part 10: IMT-2000 FDMA/TDMA (DECT)
The scope of Part 10 is equipment for IMT-2000 TDMA FDMA/TDMA, which includes DECT as defined by ETSI (DECT), including radiated spurious emission and Control and monitoring function.

Part 11: CDMA Direct Spread (UTRA FDD) (Repeaters)
The scope of Part 11 is Repeaters for IMT CDMA Direct Spread, which includes UTRA FDD as defined by ETSI (3GPP).

Part 12: IMT-2000 CDMA Multi Carrier (cdma2000) (Repeaters)
The scope of Part 12 is Repeaters for IMT-2000 CDMA Multi-Carrier, which includes cdma2000 as defined by TIA (3GPP2).

Part 13: Evolved Universal Terrestrial Radio Access (E-UTRA) (UE)
The scope of Part 13 is User Equipment for E-UTRA as defined by ETSI (3GPP).

Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) (BS)
The scope of Part 14 is Base Stations for E-UTRA as defined by ETSI (3GPP).

Part 15: Evolved Universal Terrestrial Radio Access (E-UTRA FDD) (Repeaters)
The scope of Part 15 is Repeaters for E-UTRA (FDD) as defined by ETSI (3GPP).

Part 16: IMT-2000 Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE)
The scope of Part 16 is User Equipment for UMB as defined by TIA (3GPP2).

Part 17: IMT-2000 Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS)
The scope of Part 17 is Base Stations for UMB as defined by TIA (3GPP2).

Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Stations (BS)
The scope of Part 18 is Multi-Standard Radio capable Base stations (E-UTRA, UTRA, GSM/EDGE) as defined by ETSI (3GPP).

Part 19: IMT-2000 OFDMA TDD WMAN (Mobile WiMAX) TDD User Equipment (UE)
The scope of Part 19 is User Equipment for OFDMA TDD WMAN (Mobile WiMAX) operating in TDD mode as defined by IEEE / WiMAX Forum.

Part 20: IMT-2000 OFDMA TDD WMAN (Mobile WiMAX) TDD Base Stations (BS)
The scope of Part 20 is Base stations for OFDMA TDD WMAN (Mobile WiMAX) operating in TDD mode as defined by IEEE / WiMAX Forum.

Part 21: IMT-2000 OFDMA TDD WMAN (Mobile WiMAX) FDD User Equipment (UE)
The scope of Part 21 User Equipment for OFDMA TDD WMAN Mobile WiMAX (FDD) as defined by IEEE / WiMAX Forum.

Part 22: IMT-2000 OFDMA TDD WMAN (Mobile WiMAX) FDD Base Stations (BS)
The scope of Part 22 Base Station for OFDMA TDD WMAN Mobile WiMAX (FDD) as defined by IEEE / WiMAX Forum.

Annex D (informative): The EN title in the official languages

The enlargement of the European Union (EU) resulted in a requirement from the EU for a larger number of languages for the translation of the titles of Harmonized Standards and mandated ENs that are to be listed in the Official Journal to support the implementation of this legislation.

For this reason the title translation concerning the present document can be consulted via the e-approval application.

Annex E (informative): Bibliography

Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC (text with EEA relevance (EMC Directive)).

Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

CEPT/ERC/REC 74-01 (Siófok 1998, Nice 1999, Sesimbra 2002, Hradec Kralove 2005): "Unwanted Emissions in the Spurious Domain".

ETSI EN 301 489 (all parts): "Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services".

History

Document history				
V1.1.1	January 2002	Publication		
V2.2.1	October 2003	Publication		
V3.2.1	May 2007	Publication		
V4.2.1	March 2010	Publication		
V5.1.1	July 2010	Public Enquiry	PE 20101109:	2010-07-12 to 2010-11-09
V5.2.1	February 2011	Vote	V 20110412:	2011-02-11 to 2011-04-12
V5.2.1	May 2011	Publication		