

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Base Stations (BS), Repeaters and User Equipment (UE)
for IMT-2000 Third-Generation cellular networks;
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**

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Foreword

This Harmonized European Standard (Telecommunications series) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM), and is now submitted for the Vote phase of the ETSI standards Two-step Approval Procedure.

The present document has been produced by ETSI in response to a mandate 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 present document is intended to become a Harmonized Standard, the reference of which will be published in the Official Journal of the European Communities referencing the Directive 1999/5/EC [i.2] 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 ("the R&TTE Directive").

Technical specifications relevant to Directive 1999/5/EC [i.2] are given in annex A.

The present document is part 17 of a multi-part deliverable covering the Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks, as identified below:

- Part 1: "Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 7: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD and E-UTRA TDD) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- 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: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD and E-UTRA FDD) (Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- 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: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (UE) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 14: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (BS) covering the essential requirements of article 3.2 of the R&TTE Directive";
- Part 15: "Harmonized EN for IMT-2000, Evolved Universal Terrestrial Radio Access (E-UTRA) (FDD Repeaters) covering the essential requirements of article 3.2 of the R&TTE Directive";
- 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".**

| Proposed national transposition dates | |
|--|---------------------------------|
| Date of latest announcement of this EN (doa): | 3 months after ETSI publication |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 6 months after doa |
| Date of withdrawal of any conflicting National Standard (dow): | 18 months after doa |

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 types:

- Base Stations (also denoted as Access Network) for Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB) compliant with TIA-1121.001 [4].

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

Table 1-1: UMB Base Station operating bands

| Band Class (BC) | Direction of transmission | UMB Base Station operating bands |
|-----------------|---------------------------|----------------------------------|
| 6 | Transmit | 2 110 MHz to 2 170 MHz |
| | Receive | 1 920 MHz to 1 980 MHz |
| 8 | Transmit | 1 805 MHz to 1 880 MHz |
| | Receive | 1 710 MHz to 1 785 MHz |
| 9 | Transmit | 925 MHz to 960 MHz |
| | Receive | 880 MHz to 915 MHz |
| 13 | Transmit | 2 620 MHz to 2 690 MHz |
| | Receive | 2 500 MHz to 2 570 MHz |

The present document covers requirements for UMB Base Stations.

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: 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 a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
 - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
 - for informative references.

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 indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI EN 301 908-1 (V4.1.2): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Base Stations (BS), Repeaters and User Equipment (UE) for IMT-2000 Third-Generation cellular networks; Part 1: Harmonized EN for IMT-2000, introduction and common requirements, covering the essential requirements of article 3.2 of the R&TTE Directive".

- [2] 3GPP2 C.S0088-0 V1.0, (March 2009): "Recommended Minimum Performance Standards for cdma2000 Ultra Mobile Broadband (UMB) Access Network" (to be published as TIA-1170).

NOTE: Available at http://www.3gpp2.org/Public_html/specs/C.S0088_v1.0_AN_MPS_for_UMB-090402.pdf.

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

- [4] TIA-1121.001 (December 2007): "Physical Layer for Ultra Mobile Broadband (UMB) Air Interface Specification".

- [5] 3GPP2 C.S0089-0 Version 1.0, (March 2009): "Recommended Minimum Performance Standards for cdma2000 Ultra Mobile Broadband Access Terminal" (to be published as TIA-1171).

NOTE: Available at http://www.3gpp2.org/Public_html/specs/C.S0089_v1.0_AT_MPS_for_UMB-090402.pdf.

- [6] 3GPP2 C.S0090-0 Version 1.0, (March 2009): "Test Application Specification for cdma2000 Ultra Mobile Broadband (UMB)" (to be published as TIA-1172).

NOTE: Available at http://www.3gpp2.org/Public_html/specs/C.S0090-0_v1.0_TAS_for_UMB-090402.pdf.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [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 candidate Harmonized Standards for application under the R&TTE Directive".

3 Definitions, symbols and abbreviations

3.1 Definitions

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

access network: network equipment providing data connectivity between a packet switched data network (typically the Internet) and the access terminals

NOTE: Connectivity is typically provided at the Link Layer (PPP). An access network is equivalent to a Base Station in TIA-1121.001 [4]. In the context of transmitter testing, an access network applies to operation with a single carrier and single sector active only.

access terminal: device providing data connectivity to a user

NOTE: An access terminal may be connected to a computing device such as a laptop personal computer or may be self-contained data device such as a personal digital assistant.

ACK channel: used by the access terminal to inform the access network whether a data packet transmitted on the Forward Traffic Channel has been received successfully or not

active set: set of pilots assigned to a particular access terminal

adjacent channel leakage power ratio: ratio of the on-channel transmit power to the power measured in one of the adjacent channels with no active channel in the adjacent channel

band class: set of frequency channels and a numbering scheme for these channels

Code Division Multiple Access (CDMA): technique for spread-spectrum multiple-access digital communications that creates channels through the use of unique code sequences

control channel: portion of the Forward Channel that carries control information

Effective Isotropic Radiated Power (EIRP): product of the power supplied to the antenna and the antenna gain in a direction relative to an isotropic antenna

Effective Radiated Power (ERP): product of the power supplied to the antenna and the antenna gain relative to a half-wave dipole in a given direction

error: when referring to packet error, an error event occurs when a packet FCS does not check

NOTE: When referring to a symbol error, an error event occurs when the symbol is classified as a valid symbol different from the transmitted symbol.

forward channel: UMB Channel from an access network to access terminals

NOTE: The Forward Channel is transmitted on a CDMA frequency assignment using a particular pilot PN offset.

Forward Test Application Protocol (FTAP): Test Application protocol allowing Forward Link performance characterizations (see 3GPP2 C.S0090-0 [6])

Forward Traffic Channel (FTC): Forward Channel used to transport user and signalling traffic from an access network to an access terminal

Frame Check Sequence (FCS): Frame Check Sequence of the Physical Layer packets is a CRC (see CRC)

Line Impedance Stabilization Network (LISN): network inserted in the supply mains lead of apparatus to be tested that provides, in a given frequency range, a specified load impedance for the measurement of disturbance voltages and that may isolate the apparatus from the supply mains in that frequency range

packet: physical layer protocol data unit

power control bit: bit sent in every slot on the Reverse Power Control Channel that signals the access terminal to increase or decrease its transmit power

Received Signal Quality Indicator (RSQI): Reverse Traffic Channel measure of signal quality related to the received Data E_b/N_t

NOTE: See also E_b and N_t .

reverse channel: UMB Channel from the access terminal to the access network

NOTE: From the access network's perspective, the Reverse Channel is the sum of all access terminal transmissions on a UMB frequency assignment.

reverse traffic channel: Reverse Channel used to transport user and signalling traffic from a single access terminal to one or more sectors

sector: part of the access network that provides the land side modem

servicing sector: sector which is responsible for sending data to the access terminal

system time: time reference used by the system. System Time is synchronous to UTC time (except for leap seconds) and uses the same time origin as Global Positioning System (GPS) time

NOTE: All sectors use the same System Time (within a small error). Access terminals use the same System Time, offset by the propagation delay from the sector to the access terminal. See also Universal Coordinated Time.

traffic channel: communication path between an access terminal and an access network used for user and signalling traffic

NOTE: The term Traffic Channel implies a Forward Traffic Channel and Reverse Traffic Channel pair. See also Forward Traffic Channel and Reverse Traffic Channel.

Universal Coordinated Time (UTC): internationally agreed-upon time scale maintained by the Bureau International de l'Heure (BIH) used as the time reference by nearly all commonly available time and frequency distribution systems, e.g. WWV, WWVH, LORAN-C, Transit, Omega, and GPS

3.2 Symbols

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

| | |
|-----------------|--|
| Bps | Bits per second |
| C | Confidence level |
| dBc | The ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the center frequency of the same signal, to the total inband power of the signal |
| dBm | A measure of power expressed in terms of its ratio (in dB) to one milliwatt |
| dBm/Hz | A measure of power spectral density |
| NOTE: | The ratio, dBm/Hz, is the power in one Hertz of bandwidth, where power is expressed in units of dBm. |
| dBW | A measure of power expressed in terms of its ratio (in dB) to one Watt |
| E_b | Average energy per information bit for the Reverse Data Channel at the sector RF input ports |
| E_b/N_t | The ratio in dB of the combined received energy per bit to the effective noise power spectral density for the Reverse Data Channel at the sector RF input ports |
| GHz | Gigahertz (10^9 Hertz) |
| I_0 | The total received power spectral density, including signal and interference, as measured at the sector RF input ports |
| I_{oc} | The power spectral density of a band-limited white noise source (simulating interference from other users and cells) as measured at the sector RF input ports |
| I_{or} | The total transmit power spectral density of the Reverse Channel at the access terminal simulator antenna connector |
| \hat{I}_{or} | The received power spectral density of the Reverse Channel as measured at the sector RF input ports |
| kbps | Kilobits per second |
| kHz | Kilohertz (10^3 Hertz) |
| K_{max} | The maximum number of errors in a test procedure |
| km/h | Kilometers per hour |
| λ_{lim} | Specification error rate limit |
| MHz | Megahertz (10^6 Hertz) |
| ms | Millisecond (10^{-3} second) |
| ns | Nanosecond (10^{-9} second) |
| N_t | The effective noise power spectral density at the sector RF input ports |
| ppm | Parts per million |
| μs | Microsecond (10^{-6} second) |
| χ^2 | Chi-squared distribution |

3.3 Abbreviations

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

| | |
|---------|--|
| AC | Alternating Current |
| ACLR | Adjacent Channel Leakage power Ratio |
| ACS | Adjacent Channel Selectivity |
| AWGN | Additive White Gaussian Noise |
| BS | Base Station |
| CBW | Channel BandWidth |
| CDMA | Code Division Multiple Access |
| CRC | Cyclic Redundancy Code |
| CW | Continuous Waveform |
| DC | Direct Current |
| EIRP | Effective Isotropic Radiated Power |
| ERP | Effective Radiated Power |
| FCS | Frame Check Sequence |
| FDD | Frequency Division Duplex |
| FER | Frame Error Rate |
| FLAB | Forward Link Assignment Block |
| FLCS | Forward Link Control Segment |
| F-PCCH | Forward Power Control Channel |
| FTAP | Forward Test Application Protocol |
| FTC | Forward Traffic Channel |
| GPS | Global Positioning System |
| HARQ | Hybrid Automatic Repeat reQuest |
| LAB | Link Assignment Block |
| LISN | Line Impedance Stabilization Network |
| PCP | Packet Consolidation Protocol |
| PER | Packet Error Rate |
| PN | PseudoNoise |
| PPP | Point-to-Point Protocol |
| R-ACKCH | Reverse Acknowledgement Channel |
| RBW | Resolution BandWidth |
| R-CDCCH | Reverse CDMA Dedicated Control Channel |
| RF | Radio Frequency |
| RL | Reverse Link |
| RLAB | Reverse Link Assignment Block |
| RMS | Root Mean Square |
| RSQI | Received Signal Quality Indicator |
| RTAP | Reverse Test Application Protocol |
| RTC | Reverse Traffic Channel |
| Rx | receive |
| TAP | Test Application Protocol |
| Tx | transmit |
| UMB | Ultra Mobile Broadband |
| UTC | Universel Temps Coordonné (Universal Coordinated Time) |
| VSWR | Voltage Standing Wave Ratio |
| 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 D.

4.2 Conformance requirements

The requirements in the present document are based on the assumption that the operating band (band class 6, 8, 9 and 13) is shared between systems of the IMT-2000 family (for band classes 8 and 9 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-2000 Base Station (BS) seven essential parameters in addition to those in EN 301 908-1 [1] have been identified. Table 4.2.1-1 provides a cross reference between these seven essential parameters and the seven corresponding technical requirements for equipment within the scope of the present document.

Table 4.2.1-1: Cross references

| Essential parameter | Corresponding technical requirements with reference |
|---|---|
| Spectrum emissions mask | 4.2.2 Transmitter conducted spurious emissions |
| Conducted spurious emissions from the transmitter antenna connector | 4.2.2 Transmitter conducted spurious emissions |
| Accuracy of maximum output power | 4.2.3 Base Station maximum output power |
| Intermodulation attenuation of the transmitter | 4.2.4 Inter-Base Station transmitter intermodulation |
| Conducted spurious emissions from the receiver antenna connector | 4.2.5 Receiver spurious emissions (Conducted spurious emissions when not transmitting) |
| Impact of interference on receiver performance | 4.2.6 Receiver blocking characteristics |
| | 4.2.7 Intermodulation spurious response attenuation |
| Receiver adjacent channel selectivity | 4.2.8 Adjacent Channel Selectivity (ACS) |

4.2.2 Transmitter conducted spurious emissions

4.2.2.1 Definition

The conducted spurious emissions are emissions at frequencies that are outside the assigned UMB Channel, measured at the sector RF output port.

4.2.2.2 Limits

When transmitting with carrier frequencies less than 1 GHz (i.e. when transmitting in BC 9), the spurious emissions shall be less than the limits specified in table 4.2.2.2-1. When transmitting with carrier frequencies higher than 1 GHz (BC 6, 8, 13), the spurious emissions shall be less than the limits specified in table 4.2.2.2-2. The out-of-band spurious emissions shall be less than the limits specified in table 4.2.2.2-3. The spurious emissions shall be less than the limits for the protection of the access network receiver as specified in table 4.2.2.2-4.

Coexistence requirements may be applied for the protection of access terminal and/or access network operating in other frequency bands in the same geographical area. The requirements may apply in geographic areas in which both UMB FDD operating in frequency band classes 6, 8, 9 and 13 and a system operating in another frequency band than the UMB operating band are deployed. The power of any spurious emission shall not exceed the limits of table 4.2.2.2-5 for an access network where requirements for co-existence with the system listed in the first column apply.

The requirements for coexistence with co-located access networks may be applied for the protection of other access network receivers when GSM900, DCS1800, PCS1900, GSM850, FDD UTRA are co-located with a UMB FDD access network. The power of any spurious emission shall not exceed the limits of table 4.2.2.2-6 for a Wide Area (WA) access network where requirements for co-location with an access network type listed in the first column apply. The measured ACLR shall be equal to or more than the limits specified in table 4.2.2.2-7.