

ETSI EN 301 908-12 V3.1.1 (2008-04)

Harmonized European Standard (Telecommunications series)

**Electromagnetic compatibility
and Radio spectrum Matters (ERM);
Base Stations (BS), Repeaters and User Equipment (UE) for
IMT-2000 Third-Generation cellular networks;
Part 12: Harmonized EN for IMT-2000,
CDMA Multi-Carrier (cdma2000) (Repeaters)
covering 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).

The present document has been produced by ETSI in response to a mandate from the European Commission issued under Council Directive 98/34/EC (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 [1] 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").

The present document is part 12 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 essential requirements of article 3.2 of the R&TTE Directive";
- Part 2: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 3: "Harmonized EN for IMT-2000, CDMA Direct Spread (UTRA FDD) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 4: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 5: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (BS) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 6: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD) (UE) covering essential requirements of article 3.2 of the R&TTE Directive";
- Part 7: "Harmonized EN for IMT-2000, CDMA TDD (UTRA TDD) (BS) covering 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) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive".

Part 12: "Harmonized EN for IMT-2000, CDMA Multi-Carrier (cdma2000) (Repeaters) covering essential requirements of article 3.2 of the R&TTE Directive".

| National transposition dates | |
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| Date of adoption of this EN: | 24 August 2007 |
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| Date of withdrawal of any conflicting National Standard (dow): | 30 November 2009 |

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. The modular structure is shown in EG 201 399.

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1 Scope

The present document applies to the following radio equipment types:

- Repeaters for IMT-2000 CDMA multi-carrier (cdma2000).

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

Table 1: CDMA multi-carrier Repeater service frequency bands

| Direction of transmission | CDMA multi-carrier Repeater service frequency bands | Band Class (BC) |
|---------------------------|---|-----------------|
| Forward link (DL) | 2 110 MHz to 2 170 MHz | 6 |
| Reverse link (UL) | 1 920 MHz to 1 980 MHz | |
| Forward link (DL) | 1 805 MHz to 1 880 MHz | 8 |
| Reverse link (UL) | 1 710 MHz to 1 785 MHz | |
| Forward link (DL) | 925 MHz to 960 MHz | 9 |
| Reverse link (UL) | 880 MHz to 915 MHz | |
| Forward link (DL) | 2 620 MHz to 2 690 MHz | 13 |
| Reverse link (UL) | 2 500 MHz to 2 570 MHz | |

Repeaters for IMT-2000 CDMA multi-carrier (cdma2000) may support:

- 1) operation in cdma2000 spread spectrum systems as defined in TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 systems; or
- 2) operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein in Type 2 cdma2000 systems.

The present document is intended to cover the provisions of Directive 1999/5/EC [1] (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 [1] 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

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- 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.
- For a non-specific reference, the latest version 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.

- [1] 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).

- [2] Void.
- [3] Void.
- [4] ANSI/TIA-97-F-1 (June 2006): "Recommended Minimum Performance Standard for cdma2000 Spread Spectrum Base Stations - Addendum 1".
- [5] TIA-2000.2-D-1 (January 2006): "Physical Layer Standard for cdma2000 Spread Spectrum Systems - Addendum 1".
- [6] Void.
- [7] Void.
- [8] Void.
- [9] Void.
- [10] Void.
- [11] TIA-856-A-1[E] (February 2007): "cdma2000 High Rate Packet Data Air Interface Specification - Addendum 1".
- [12] TIA-864-A (January 2006): "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network Equipment".
- [13] Void.
- [14] TIA-1037 (2007): "Recommended Minimum Performance Standard for cdma2000 Spread Spectrum Repeater".
- [15] TIA-1030-B (December 2006): "Band Class Specification for cdma2000 Spread Spectrum Systems".

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 [1] and the following apply:

Band Class (BC): set of frequency channels and a numbering scheme for these channels

Base Station (BS): fixed station used for communicating with mobile stations

NOTE 1: Base stations for IMT-2000 CDMA multi-carrier (cdma2000) may support, operation in cdma2000 spread spectrum systems as defined in TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 system, or operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein as operation in Type 2 cdma2000 systems.

NOTE 2: Depending upon the context, the term base station may refer to a cell, a sector within a cell, an MSC, and access network or other part of the wireless system. See also MSC.

CDMA channel: set of channels transmitted from the base station and the mobile stations on a given frequency

CDMA channel number: 11-bit number corresponding to the centre of the CDMA frequency assignment

CDMA frequency assignment: 1,23 MHz segment of spectrum

NOTE: For band classes 6, 8, and 9, the channel is centred on one of the 50 kHz channels.

chip rate: rate of "chips" (modulated symbols after spreading) per second

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

donor coupling loss: coupling loss between the Repeater and the donor base station

Down Link (DL): signal path where base station or Repeater transmits and the mobile receives

NOTE: Also referred to as the forward link.

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

forward CDMA channel: CDMA channel from a base station or Repeater to mobile stations

NOTE: The forward CDMA channel contains one or more code channels that are transmitted on a CDMA frequency assignment using a particular pilot PN offset.

High Rate Packet Data (HRPD): CDMA technique optimized for data communications in Type 2 cdma2000 systems

maximum output power (P_{max}): mean power level per carrier measured at the antenna connector of the Repeater in specified reference condition

mean power: total calorimetric power measured in a specified bandwidth at the antenna connector.

mobile station: station intended to be used while in motion or during halts at unspecified points

NOTE: Mobile stations include portable units (e.g. hand-held personal units) and units installed in vehicles and HRPD access terminals.

pass band: frequency range that the Repeater operates in with operational configuration

NOTE 1: This frequency range can correspond to one or several consecutive nominal 5 MHz channels. If they are not consecutive each subset of channels is considered as an individual pass band.

NOTE 2: The Repeater can have one or several pass bands.

radio configuration: set of forward traffic channel and reverse traffic channel transmission formats that are characterized by physical layer parameters such as transmission rates, modulation characteristics, and spreading rate

NOTE: Radio configurations are defined in TIA-2000.2 [5], clauses 2.1.3 and 3.1.3.

Resolution Band Width (RBW): measured in Hz and represents the frequency over which power is integrated in a spectrum analyser to display the amplitude at the centre of the integration frequency range

repeater: device that receives, amplifies and transmits the radiated or conducted RF carrier both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station)

NOTE: A repeater can be a device that receives, amplifies and transmits one or more radiated or conducted CDMA channel(s) both in the down-link direction (from the base station to the mobile area) and in the up-link direction (from the mobile to the base station).

reverse CDMA channel: CDMA channel from the mobile station to the base station

NOTE: From the base station's perspective, the reverse CDMA channel is the sum of all mobile station transmissions on a CDMA frequency assignment.

RF carrier: direct-sequence spread RF channel

NOTE: For the forward CDMA channel, the number of RF carriers is 1 for spreading rate 1 and 3 for spreading rate 3; for the reverse CDMA channel, there is one RF carrier.

spreading rate: PN chip rate of the forward CDMA channel or the reverse CDMA channel, defined as a multiple of 1,2288 Mcps

spreading rate 1: spreading rate 1 is often referred to as "1X"

NOTE 1: A spreading rate 1 forward CDMA channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.

NOTE 2: A spreading rate 1 reverse CDMA channel uses a single direct-sequence spread carrier with a chip rate of 1,2288 Mcps.

spreading rate 3: spreading rate 3 is often referred to as "3X"

NOTE 1: A spreading rate 3 forward CDMA channel uses three direct-sequence spread carriers (see multiple-carrier forward channel) each with a chip rate of 1,2288 Mcps.

NOTE 2: A spreading rate 3 reverse CDMA channel uses a single direct-sequence spread carrier with a chip rate of 3,6864 Mcps.

Up Link (UL): signal path where the mobile or Repeater transmits and the base station receives

NOTE: Also referred to as the reverse link.

User Equipment (UE): mobile station supporting operation in cdma2000 spread spectrum systems

NOTE: See TIA-2000.2 [5], referred to herein as operation in Type 1 cdma2000 system; access terminal supporting operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [11], referred to herein as operation in Type 2 cdma2000 system; and mobile station supporting operation in Type 1 and Type 2 cdma2000 systems.

3.2 Symbols

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

| | |
|--------|---|
| dBc | ratio (in dB) of the sideband power of a signal, measured in a given bandwidth at a given frequency offset from the centre frequency of the same signal, to the total inband power of the signal. For CDMA, the total inband power of the signal is measured in a 1,23 MHz bandwidth around the centre frequency of the CDMA signal for a spreading rate 1 CDMA signal and in 3,69 MHz bandwidth around the centre frequency of the CDMA signal for a spreading rate 3 CDMA signal. |
| dBm | measure of power expressed in terms of its ratio (in dB) to 1 mW |
| dBm/Hz | measure of power spectral density. The ratio, dBm/Hz, is the power in 1 Hz of bandwidth, where power is expressed in units of dBm |
| GHz | GigaHertz (10^9 Hertz) |
| kHz | kiloHertz (10^3 Hertz) |
| MHz | MegaHertz (10^6 Hertz) |

3.3 Abbreviations

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

| | |
|-------|---|
| BC | Band Class |
| BS | Base Station |
| CDMA | Code Division Multiple Access |
| CW | Continuous Wave (unmodulated signal) |
| DCS | Digital Cellular System |
| DL | Downlink |
| EMC | ElectroMagnetic Compatibility |
| GSM | Global System for Mobile Communications |
| HRPD | High Rate Packet Data |
| IMT | International Mobile Telecommunications |
| MSC | Mobile Switching Centre |
| PN | PseudoNoise |
| R&TTE | Radio and Telecommunications Terminal Equipment |
| RBW | Resolution BandWidth |

| | |
|------|------------------------------------|
| RF | Radio Frequency |
| TDD | Time Division Duplex |
| UE | User Equipment |
| UL | Uplink |
| UTRA | Universal Terrestrial Radio Access |

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 is shared between systems of the IMT-2000 family or systems having compatible characteristics.

4.2.1 Introduction

To meet the essential requirement under article 3.2 of the R&TTE Directive [1] for IMT-2000 Repeater equipment five essential parameters in addition to those in part 1 have been identified. Table 2 provides a cross reference between these five essential parameters and the corresponding six technical requirements for equipment within the scope of the present document.

Table 2: Cross references

| Essential parameter | Corresponding technical requirements |
|---|--------------------------------------|
| Spectrum emissions mask | 4.2.2 Spectrum emissions mask |
| Conducted spurious emissions from the antenna connector | 4.2.3 Spurious emissions |
| Accuracy of maximum output power | 4.2.4 Maximum output power |
| Receiver immunity | 4.2.5 Input intermodulation |
| | 4.2.6 Out-of-band gain |
| Intermodulation attenuation of the output | 4.2.7 Output intermodulation |

The supplier shall declare operating band(s) for the Repeater. The technical requirements apply for the declared operating band(s) as outlined for each requirement. For a Repeater supporting more than one operating band, conformance testing for each technical requirement in clause 5 shall be performed independently for each operating band.

The technical requirements also apply to Repeater configurations described in annex B.

4.2.2 Spectrum emissions mask

4.2.2.1 Definition

Out-of-band emissions are unwanted emissions immediately outside the channel bandwidth resulting from the modulation process and non-linearity in the transmitter but excluding spurious emissions. This out-of-band emission limit is specified in terms of a spectrum emission mask for the transmitter.