

# ETSI EN 301 908-5 V4.2.1 (2010-03)

---

*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 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**

---



---

Reference

REN/ERM-TFES-005-5

---

Keywords

---

3G, 3GPP2, cdma2000, cellular, digital, IMT-2000, mobile, radio, regulation, UMTS

**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/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

---

**Copyright Notification**

---

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2010.  
All rights reserved.

**DECT™**, **PLUGTESTS™**, **UMTS™**, **TIPHON™**, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

**3GPP™** is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**LTE™** is a Trade Mark of ETSI currently being registered

for the benefit of its Members and of the 3GPP Organizational Partners.

**GSM®** and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
Introduction .....	7
1 Scope .....	8
2 References .....	8
2.1 Normative references .....	9
2.2 Informative references.....	9
3 Definitions, symbols and abbreviations .....	10
3.1 Definitions .....	10
3.2 Symbols.....	18
3.3 Abbreviations .....	22
4 Technical requirements specifications .....	23
4.1 Environmental profile.....	23
4.2 Conformance requirements .....	23
4.2.1 Introduction.....	23
4.2.2 Transmitter conducted spurious emissions .....	23
4.2.2.1 Definition .....	23
4.2.2.2 Limits .....	24
4.2.2.3 Conformance.....	26
4.2.3 Maximum output power.....	26
4.2.3.1 Definition .....	26
4.2.3.2 Limits .....	26
4.2.3.2.1 Base stations operating in Type 1 cdma2000 systems.....	26
4.2.3.2.2 Base stations operating in Type 2 cdma2000 systems.....	26
4.2.3.3 Conformance .....	27
4.2.4 Inter-Base Station transmitter intermodulation.....	27
4.2.4.1 Definition .....	27
4.2.4.2 Limits .....	27
4.2.4.3 Conformance.....	27
4.2.5 Receiver conducted spurious emissions.....	28
4.2.5.1 Definition .....	28
4.2.5.2 Limits .....	28
4.2.5.3 Conformance.....	28
4.2.6 Receiver blocking characteristics .....	28
4.2.6.1 Definition .....	28
4.2.6.2 Limits .....	28
4.2.6.2.1 Base stations operating in Type 1 cdma2000 systems.....	28
4.2.6.2.2 Base stations operating in Type 2 cdma2000 systems.....	28
4.2.6.3 Conformance.....	28
4.2.7 Intermodulation spurious response attenuation.....	29
4.2.7.1 Definition .....	29
4.2.7.2 Limits .....	29
4.2.7.2.1 Base stations operating in Type 1 cdma2000 systems.....	29
4.2.7.2.2 Base stations operating in Type 2 cdma2000 systems.....	29
4.2.7.3 Conformance.....	29
4.2.8 Adjacent channel selectivity .....	29
4.2.8.1 Definition .....	29
4.2.8.2 Limits .....	29
4.2.8.2.1 Base stations operating in Type 1 cdma2000 systems.....	29
4.2.8.2.2 Base stations operating in Type 2 cdma2000 systems.....	29
4.2.8.3 Conformance.....	29
5 Testing for compliance with technical requirements.....	30
5.1 Conditions for testing .....	30

5.1.1	Introduction.....	30
5.1.2	Standard equipment under test.....	30
5.1.2.1	Basic equipment.....	30
5.1.2.2	Ancillary equipment.....	30
5.2	Interpretation of the measurement results .....	30
5.3	Essential radio test suites.....	30
5.3.1	Transmitter conducted spurious emissions .....	31
5.3.1.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	31
5.3.1.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems .....	31
5.3.2	Maximum output power.....	32
5.3.2.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	32
5.3.2.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems .....	32
5.3.3	Inter-Base Station transmitter intermodulation.....	33
5.3.3.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	33
5.3.3.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems 2 .....	33
5.3.4	Receiver conducted spurious emissions.....	34
5.3.4.1	Test procedure for Base Stations supporting operation in Type 1 or Type 2 cdma2000 systems .....	34
5.3.5	Receiver blocking characteristics .....	35
5.3.5.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	35
5.3.5.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems .....	36
5.3.6	Intermodulation spurious response attenuation.....	36
5.3.6.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	36
5.3.6.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems .....	37
5.3.7	Adjacent channel selectivity .....	37
5.3.7.1	Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems .....	37
5.3.7.2	Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems .....	38
<b>Annex A (normative):</b>	<b>HS Requirements and conformance Test specifications Table (HS-RTT).....</b>	<b>39</b>
<b>Annex B (normative):</b>	<b>Base station Configurations .....</b>	<b>41</b>
B.1	Receiver diversity.....	41
B.2	Duplexers .....	41
B.3	Power supply options .....	41
B.4	Ancillary RF amplifiers.....	42
B.5	BS using antenna arrays .....	42
B.5.1	Receiver tests.....	43
B.5.2	Transmitter tests .....	43
<b>Annex C (informative):</b>	<b>Environmental profile and standard test conditions .....</b>	<b>44</b>
C.1	Introduction .....	44
C.2	CDMA environmental requirements .....	44
C.2.1	Temperature and power supply voltage.....	44
C.2.1.1	Definition.....	44
C.2.1.2	Method of measurement .....	44
C.2.1.3	Minimum standard.....	45
C.2.2	High humidity .....	45
C.2.2.1	Definition.....	45
C.2.2.2	Method of measurement .....	45
C.2.2.3	Minimum standard.....	45
C.3	Standard test conditions.....	45
C.3.1	Standard environmental test conditions.....	45
C.3.2	Standard conditions for the primary power supply.....	46
C.3.2.1	General.....	46
C.3.2.2	Standard DC test voltage from accumulator batteries.....	46
C.3.2.3	Standard AC voltage and frequency .....	46

<b>Annex D (informative):</b>	<b>The EN title in the official languages .....</b>	<b>47</b>
<b>Annex E (informative):</b>	<b>Bibliography .....</b>	<b>48</b>
History .....		49

---

# 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 (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 [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 5 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".

<b>National transposition dates</b>	
Date of adoption of this EN:	19 February 2010
Date of latest announcement of this EN (doa):	31 May 2010
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 November 2010
Date of withdrawal of any conflicting National Standard (dow):	30 November 2011

---

## 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 for IMT-2000 CDMA multi-carrier (cdma2000) and Evolved CDMA Multi-Carrier Ultra Mobile Broadband (UMB).

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

**Table 1-1: CDMA multi-carrier Base Station operating bands**

Band Class (BC)	Direction of transmission	CDMA multi-carrier 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 IMT-2000 CDMA multi-carrier (cdma2000) User Equipments and Evolved CDMA Multi-Carrier (UMB) User Equipment.

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

- 1) operation in cdma2000 spread spectrum systems as defined in 3GPP2 C.S0002-D [2], 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 [7], referred to herein in Type 2 cdma2000 systems.

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] ANSI/TIA-97-F-1 (June 2006): "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations - Addendum 1".
- [2] 3GPP2 C.S0002-D V2.0 (September 2005): "Physical Layer Standard for cdma2000 Spread Spectrum Systems Revision D".

NOTE: Available at: [http://www.3gpp2.org/Public\\_html/Specs/C.S0002-D\\_v2.0\\_051006.pdf](http://www.3gpp2.org/Public_html/Specs/C.S0002-D_v2.0_051006.pdf).

- [3] ANSI/TIA-98-F-1 (June 2006): "Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations - Addendum".
- [4] TIA/EIA-126-D (June 2001): "Loopback Service Options Standard (LSO) for cdma Spread Spectrum Systems".
- [5] TIA-870-A (March 2005): "Test Data Service Option (TDSO) for cdma2000 Spread Spectrum Systems - Revision A".
- [6] TIA/EIA/IS-871 (April 2001): "Markov Service Option (MSO) for cdma2000 Spread Spectrum Systems".
- [7] TIA-856-B-1 (October 2007): "cdma2000 High Rate Packet Data Air Interface Specification".
- [8] 3GPP2 C.S0032-B V1.0 (May 2008): "Recommended Minimum Performance Standards for cdma2000 High Rate Packet Data Access Network".

NOTE: Available at: [http://www.3gpp2.org/Public\\_html/specs/C.S0032-B\\_v1.0\\_080519.pdf](http://www.3gpp2.org/Public_html/specs/C.S0032-B_v1.0_080519.pdf).

- [9] 3GPP2 C.S0029-B V1.0 (March 2008): "Test Application Specification (TAS) for High Rate Packet Data Air Interface".

NOTE: Available at: [http://www.3gpp2.org/Public\\_html/specs/C.S0029-B\\_v1.0\\_080409.pdf](http://www.3gpp2.org/Public_html/specs/C.S0029-B_v1.0_080409.pdf).

- [10] 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".
- [11] ETSI EN 301 908-17 (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 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".

## 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 (V2.1.1): "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:

**1X:** mode of operation of a Base Station or access network using spreading rate 1

**1XDO:** mode of operation of a Base Station or access network using spreading rate 1 in data optimized systems

**3X:** mode of operation of a Base Station using spreading rate 3

**access attempt:** sequence of one or more access probe sequences on the access channel or enhanced access channel containing the same message

NOTE: See also access probe, access probe sequence, and enhanced access probe.

**access channel:** reverse CDMA channel used by mobile stations for communicating to the Base Station

NOTE: The access channel is used for short signalling message exchanges, such as call originations, responses to pages, and registrations. The access channel is a slotted random access channel.

**access channel preamble:** preamble of an access probe consisting of a sequence of all-zero frames that is sent at the 4 800 bit/s rate

**access network:** network equipment providing data connectivity between a packet switched data network (typically the Internet) and the access terminals in Type 2 cdma2000 systems

NOTE: Connectivity is typically provided at the link layer (PPP). As used in the present document it is synonymous with Base Station except that HRPD access network always use spreading rate 1.

**access probe:** one access channel transmission consisting of a preamble and a message

NOTE: The transmission is an integer number of frames in length, and transmits one access channel message. See also access probe sequence and access attempt.

**access probe sequence:** sequence of one or more access probes on the access channel or enhanced access channel

NOTE: The same access channel or enhanced access channel message is transmitted in every access probe of an access attempt. See also access probe, enhanced access probe, and access attempt.

**access terminal:** device providing data connectivity to a user in Type 2 cdma2000 systems

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 or may be a mobile station. Also referred to as HRPD access terminal using spreading rate 1 or UE operating in a Type 2 cdma2000 system.

**active frame:** frame that contains data and, therefore, is enabled in terms of traffic power

**additional preamble:** preamble sent after the last fractional preamble on the reverse pilot channel, prior to transmitting on the enhanced access channel or on the reverse common control channel

**adjacent channel leakage ratio:** ratio of the on-channel transmit power to the power measured in one of the adjacent channels

**bad frame:** frame classified with insufficient frame quality or for radio configuration 19 600 bit/s primary traffic only, with bit errors

NOTE: See also good frame.

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

NOTE: Band classes are defined in ANSI/TIA-97 [1], clause 3.1, and ANSI/TIA-98 [3], clause 3.1.

**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 3GPP2 C.S0002-D [2], referred to herein as operation in Type 1 cdma2000 system, or operation in cdma2000 High Rate Packet Data Systems as defined in TIA-856 [7], 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.

**basic access mode:** mode used on the enhanced access channel where a mobile station transmits an enhanced access channel preamble and enhanced access data in a method similar to that used on the access channel

**broadcast control channel:** code channel in a forward CDMA channel used for transmission of control information from a Base Station to a mobile station

**candidate frequency:** frequency for which the Base Station specifies a search set, when searching on other frequencies while performing mobile-assisted handoffs

**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 class 0, the channel is centred on one of the 30 kHz channels.  
For band classes 1, 4, 6, 7, 8, 9 and 10, the channel is centred on one of the 50 kHz channels.  
For band classes 2, 3, 11 and 12, the channel is centred on one of the 25 kHz channels.  
For band class 5, the channel is centred on one of the 20 kHz or 25 kHz channels.

**CDMA preferred set:** set of CDMA channel numbers in a CDMA system corresponding to frequency assignments that a mobile station will normally search to acquire a CDMA pilot channel

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

**code channel:** subchannel of a forward CDMA channel or reverse CDMA channel. Each subchannel uses an orthogonal Walsh function or quasi-orthogonal function

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

**code symbol:** output of an error-correcting encoder. Information bits are input to the encoder and code symbols are output from the encoder

NOTE: See convolutional code and turbo code.

**common assignment channel:** forward common channel used by the Base Station to acknowledge a mobile station accessing the enhanced access channel, and in the case of reservation access mode, to transmit the address of a reverse common control channel and associated common power control subchannel

**common power control channel:** forward common channel which transmits power control bits (i.e. common power control subchannels) to multiple mobile stations

NOTE: The common power control channel is used by mobile stations operating in the power controlled access mode, reservation access mode, or designated access mode.

**common power control subchannel:** subchannel on the common power control channel used by the Base Station to control the power of a mobile station when operating in the power controlled access mode on the enhanced access channel or when operating in the reservation access mode or the designated access mode on the reverse common control channel

**continuous transmission:** mode of operation in which discontinuous transmission is not permitted

**convolutional code:** type of error-correcting code

NOTE: A code symbol can be considered as the convolution of the input data sequence with the impulse response of a generator function.

**cyclic redundancy code:** class of linear error detecting codes which generate parity check bits by finding the remainder of a polynomial division

NOTE: See also frame quality indicator.

**discontinuous transmission:** mode of operation in which a Base Station or a mobile station switches its transmitter or a particular code channel on and off autonomously

NOTE: For the case of DTx operation on the forward dedicated control channel, the forward power control subchannel is still transmitted.

**down-link:** signal path where Base Station transmits and the mobile receives

NOTE: Also referred to as the forward link.

**effective radiated power:** product of the power supplied to the antenna and the antenna gain in a direction relative to a half-wave dipole

**enhanced access channel:** reverse channel used by the mobile for communicating to the Base Station

NOTE: The enhanced access channel operates in the basic access mode, power controlled access mode, and reservation access mode. It is used for transmission of short messages, such as signalling, MAC messages, response to pages, and call originations. It can also be used to transmit moderate-sized data packets.

**enhanced access channel preamble:** non-data-bearing portion of the enhanced access probe sent by the mobile station to assist the Base Station in initial acquisition and channel estimation

**enhanced access data:** data transmitted while in the basic access mode or power controlled access mode on the enhanced access channel or while in the reservation mode on a reverse common control channel

**enhanced access header:** frame containing access origination information transmitted immediately after the enhanced access channel preamble while in the power controlled access mode or reservation access mode

**enhanced access probe:** one enhanced access channel transmission consisting of an enhanced access channel preamble, optionally an enhanced access header, and optionally enhanced access data

**enhanced access probe sequence:** sequence of one or more enhanced access probes on the enhanced access channel

NOTE: See also enhanced access probe.

**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 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.

**forward common control channel:** control channel used for the transmission of digital control information from a Base Station to one or more mobile stations

**forward dedicated control channel:** portion of a radio configuration 3 through 9 forward traffic channel used for the transmission of higher-level data, control information, and power control information from a Base Station to a mobile station

**forward fundamental channel:** portion of a forward traffic channel which carries a combination of higher-level data and power control information

**forward MAC channel:** forward channel used for medium access control in Type 2 cdma2000 systems

NOTE: Forward MAC channel consists of the reverse power control channels, the DRCLock channel and the reverse activity channel.

**forward pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by each CDMA Base Station

NOTE: The pilot channel allows a mobile station to acquire the timing of the forward CDMA channel, provides a phase reference for coherent demodulation, and provides means for signal strength comparisons between Base Stations for determining when to handoff.

**forward power control subchannel:** subchannel on the forward fundamental channel or forward dedicated control channel used by the Base Station to control the power of a mobile station when operating on the reverse traffic channel

**forward supplemental channel:** portion of a radio configuration 3 through 9 forward traffic channel which operates in conjunction with a forward fundamental channel or a forward dedicated control channel in that forward traffic channel to provide higher data rate services, and on which higher-level data is transmitted

**forward supplemental code channel:** portion of a radio configuration 1 and 2 forward traffic channel which operates in conjunction with a forward fundamental channel in that forward traffic channel to provide higher data rate services, and on which higher-level data is transmitted

**forward test application protocol:** test application protocol allowing forward link performance characterizations of Type 2 cdma2000 systems

NOTE: See 3GPP2 C.S0029-B [9].

**forward traffic channel:** one or more code channels used to transport user and signalling traffic from the Base Station to the mobile station

NOTE: See forward fundamental channel, forward dedicated control channel, forward supplemental channel, and forward supplemental code channel.

**frame:** basic timing interval in the system

NOTE: For the sync channel, a frame is 26,667 ms long. For the access channel, the paging channel, the broadcast channel, the forward supplemental code channel, and the reverse supplemental code channel, a frame is 20 ms long. For the forward supplemental channel and the reverse supplemental channel, a frame is 20 ms, 40 ms or 80 ms long. For the enhanced access channel, the forward common control channel, and the reverse common control channel, a frame is 5 ms, 10 ms or 20 ms long. For the forward fundamental channel, forward dedicated control channel, reverse fundamental channel, and reverse dedicated control channel, a frame is 5 ms or 20 ms long. For the common assignment channel, a frame is 5 ms long.

**frame activity:** ratio of the number of active frames to the total number of frames during channel operation

**Frame Error Rate (FER):** number of frames in error on the forward traffic channel divided by the total number of frames

NOTE: The value of Frame Error Rate may be estimated by using Service Option 2, 9, 32, 54 or 55 (see ANSI/TIA-97 [1], clause 1.3).

**frame quality indicator:** CRC check applied to 9,6 kbit/s and 4,8 kbit/s traffic channel frames of radio configuration 1, to all forward traffic channel frames for radio configurations 2 through 9, to all reverse traffic channel frames for radio configurations 2 through 6, the broadcast channel, common assignment channel, enhanced access channel, and to the reverse common control channel

**good frame:** frame not classified as a bad frame

NOTE: See also bad frame.

**good message:** received message is declared a good message if it is received with a correct CRC

**handoff:** act of transferring communication with a mobile station from one Base Station to another

**hard handoff:** handoff characterized by a temporary disconnection of the traffic channel

NOTE: Hard handoffs occur when the mobile station is transferred between disjoint active sets, the CDMA frequency assignment changes, the frame offset changes, or the mobile station is directed from a CDMA traffic channel to an analog voice channel. See also soft handoff.

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

**MAC channel:** See forward MAC channel.

**mean input power:** total received calorimetric power measured in a specified bandwidth at the antenna connector, including all internal and external signal and noise sources

**mean output power:** total transmitted calorimetric power measured in a specified bandwidth at the antenna connector when the transmitter is active

**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.

**mobile station class:** mobile station classes define mobile station characteristics, such as slotted operation and transmission power

**mobile switching centre:** configuration of fixed equipment that provides cellular or PCS service

**non-slotted mode:** operation mode of the mobile station in which the mobile station continuously monitors the paging channel

**orthogonal channel noise simulator:** hardware mechanism used to simulate the users on the other orthogonal channels of a forward CDMA channel

**orthogonal transmit diversity:** forward link transmission method which distributes forward link channel symbols among multiple antennas and spreads the symbols with a unique Walsh or quasi-orthogonal function associated with each antenna

**paging channel:** code channel in a forward CDMA channel used for transmission of control information and pages from a Base Station to a mobile station

**packet:** physical layer protocol data unit

**packet activity:** ratio of the number of active frames to the total number of frames during channel operation in Type 2 cdma2000 systems

**packet error:** packet error event occurs when a decoded packet's FCS does not check

**physical layer:** part of the communication protocol between the mobile station and the Base Station that is responsible for the transmission and reception of data

NOTE: The physical layer in the transmitting station is presented a frame and transforms it into an over-the-air waveform. The physical layer in the receiving station transforms the waveform back into a frame.

**piece-wise linear FER curve:** FER - versus -  $E_b/N_t$  curve in which the FER vertical axis is in log scale and the  $E_b/N_t$  horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines

**piece-wise linear MER curve:** MER - versus -  $E_b/N_t$  curve in which the MER vertical axis is in log scale and the  $E_b/N_t$  horizontal axis is in linear scale expressed in dB, obtained by interpolating adjacent test data samples with straight lines

**pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted by a CDMA Base Station or mobile station

NOTE: A pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength comparisons between Base Stations for determining when to handoff.

**pilot PN sequence:** pair of modified maximal length PN sequences used to spread the forward CDMA channel and the reverse CDMA channel

NOTE: Different Base Stations are identified by different pilot PN sequence offsets.

**PN chip:** one bit in the PN sequence

**PN sequence (PseudoNoise sequence):** periodic binary sequence

**power control bit:** bit sent in every 1,25 ms interval on the forward traffic channel, to signal the mobile station to increase or decrease its transmit power

**power control group:** 1,25 ms interval on the forward traffic channel and the reverse traffic channel

NOTE: See also power control bit.

**power controlled access mode:** mode used on the enhanced access channel where a mobile station transmits an enhanced Access preamble, an enhanced access header, and enhanced access data in the enhanced access probe using closed loop power control

**power up function:** method by which the mobile station increases its output power to support location services

**preamble:** See access channel preamble, enhanced access channel preamble, reverse common control channel preamble and reverse traffic channel preamble.

**primary paging channel:** default code channel (code channel 1) assigned for paging on a CDMA channel

**PUF probe:** one or more consecutive frames on the reverse traffic channel within which the mobile station transmits the PUF pulse

**PUF pulse:** portion of PUF probe which may be transmitted at elevated output power

**PUF target frequency:** CDMA frequency to which the Base Station directs a mobile station for transmitting the PUF probe

**quick paging channel:** uncoded, spread, and On-Off-Keying (OOK) modulated spread spectrum signal sent by a Base Station to inform mobile stations operating in the slotted mode during the idle state whether to receive the forward common control channel or the paging channel starting in the next forward common control channel or paging channel frame

**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 3GPP2 C.S0002-D [2], clauses 2.1.3 and 3.1.3.

**received signal quality indicator:** reverse traffic channel measure of signal quality related to the received  $E_b/N_0$  (see also  $E_b$ )

**reservation access mode:** mode used on the enhanced access channel and reverse common control channel where a mobile station transmits an enhanced access preamble and an enhanced access header in the enhanced access probe

NOTE: The enhanced access data is transmitted on a reverse common control channel using closed loop power control.

**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.

**reverse common control channel:** portion of a reverse CDMA channel used for the transmission of digital control information from one or more mobile stations to a Base Station

NOTE: The reverse common control channel can operate in a reservation access mode or designated access mode. It can be power controlled in the reservation access mode or designated access mode, and may support soft handoff in the reservation access mode.

**reverse common control channel preamble:** non-data bearing portion of the reverse common control channel sent by the mobile station to assist the Base Station in initial acquisition and channel estimation

**reverse dedicated control channel:** portion of a radio configuration 3 through 6 reverse traffic channel used for the transmission of higher-level data and control information from a mobile station to a Base Station

**reverse fundamental channel:** portion of a reverse traffic channel which carries higher-level data and control information from a mobile station to a Base Station

**reverse pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA mobile station

NOTE: A reverse pilot channel provides a phase reference for coherent demodulation and may provide a means for signal strength measurement.

**reverse power control subchannel:** subchannel on the reverse pilot channel used by the mobile station to control the power of a Base Station when operating on the forward traffic channel with radio configurations 3 through 9

**reverse supplemental channel:** portion of a radio configuration 3 through 6 reverse traffic channel which operates in conjunction with the reverse fundamental channel or the reverse dedicated control channel in that reverse traffic channel to provide higher data rate services, and on which higher-level data is transmitted

**reverse supplemental code channel:** portion of a radio configuration 1 and 2 reverse traffic channel which operates in conjunction with the reverse fundamental channel in that reverse traffic channel, and (optionally) with other reverse supplemental code channels to provide higher data rate services, and on which higher-level data is transmitted

**reverse test application protocol:** test application protocol allowing reverse link performance characterizations in Type 2 cdma2000 systems

**reverse traffic channel:** traffic channel on which data and signalling are transmitted from a mobile station to a Base Station

NOTE: The reverse traffic channel is composed of up to one reverse dedicated control channel, up to one reverse fundamental channel, zero to two reverse supplemental channels, and zero to seven reverse supplemental code channels.

**reverse traffic channel preamble:** non-data bearing portion of the reverse pilot channel sent by the mobile station to aid the Base Station in initial acquisition and channel estimation for the reverse dedicated control channel and reverse fundamental channel

NOTE: See 3GPP2 C.S0029-B [9].

**RF carrier:** direct-sequence spread RF channel

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

**service option 2:** loopback service option for radio configuration 1

NOTE: See TIA/EIA-126-D [4].

**service option 9:** loopback service option for radio configuration 2

NOTE: See TIA/EIA-126-D [4].

**service option 30:** mobile station data loopback test mode for Multiplex Option 1 supplemental channel

NOTE: See TIA/EIA-126-D [4].

**service option 31:** mobile station data loopback test mode for Multiplex Option 2 supplemental channel

NOTE: See TIA/EIA-126-D [4].

**service option 32:** test data service option for radio configurations 3 through 6 on the reverse traffic channel and radio configurations 3 through 9 on the forward traffic channel

NOTE: See TIA-870 [5].



**service option 54:** Markov service option for radio configurations 1 through 6 on the reverse traffic channel and radio configurations 1 through 9 on the forward traffic channel

NOTE: See TIA/EIA/IS-871 [6].

**service option 55:** loopback service option for radio configurations 1 through 6 on the reverse traffic channel and radio configurations 1 through 9 on the forward traffic channel

NOTE: See TIA/EIA-126-D [4].

**servicing frequency:** CDMA frequency on which a mobile station is currently communicating with one or more Base Stations

**slot:** duration of time specified by 1,6 ms

**slotted mode:** operation mode of the mobile station in which the mobile station monitors only selected slots on the paging channel

**soft handoff:** handoff occurring while the mobile station is in the mobile station control on the traffic channel state

NOTE: This handoff is characterized by commencing communications with a new Base Station on the same CDMA frequency assignment before terminating communications with the old Base Station. See hard handoff.

**space time spreading:** forward link transmission method which transmits all forward link channel symbols on multiple antennas and spreads the symbols with complementary Walsh or quasi-orthogonal functions

**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:** 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:** 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.

**symbol:** See code symbol and modulation symbol.

**sync channel:** code channel 32 in the forward CDMA channel, which transports the synchronization message to the mobile station

**system time:** time reference used by the system

NOTE: System time is synchronous to UTC time (except for leap seconds) and uses the same time origin as Global Positioning System (GPS) time. All Base Stations use the same system time (within a small error). Mobile stations use the same system time, offset by the propagation delay from the Base Station to the mobile station. See also Universal Co-ordinated Time.

**time reference:** reference established by the mobile station that is synchronous with the earliest arriving multipath component used for demodulation

**traffic channel:** communication path between a mobile station and a Base Station 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.

**transmit diversity pilot channel:** unmodulated, direct-sequence spread spectrum signal transmitted continuously by a CDMA Base Station to support forward link transmit diversity

NOTE: The pilot channel and the transmit diversity pilot channel provide phase references for coherent demodulation of forward link CDMA channels which employ transmit diversity.

**turbo code:** type of error-correcting code

NOTE: A code symbol is based on the outputs of the two recursive convolutional codes (constituent codes) of the turbo code.

**Type 1 cdma2000 systems:** cdma2000 spread spectrum systems

NOTE: See 3GPP2 C.S0002-D [2].

**Type 2 cdma2000 systems:** cdma2000 High Rate Packet Data systems

NOTE: See TIA-856 [7].

**universal coordinated time:** 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

**up-link:** signal path where the mobile transmits and the Base Station receives

NOTE: Also referred to as the reverse link.

**user equipment:** mobile station supporting operation in cdma2000 spread spectrum systems

NOTE: See 3GPP2 C.S0002-D [2], 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 [7], referred to herein as operation in Type 2 cdma2000 system; and mobile station supporting operation in Type 1 and Type 2 cdma2000 systems.

**valid power control bit:** valid power control bit is sent on the forward traffic channel in the second power control group following the corresponding reverse traffic channel power control group which was not gated off and in which the signal was estimated

NOTE: See 3GPP2 C.S0002-D [2], clause 3.1.3.1.10.

**walsh function:** one of  $2^N$  time orthogonal binary functions

NOTE: The functions are orthogonal after mapping "0" to 1 and "1" to -1.

## 3.2 Symbols

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

$\Omega$	Ohm
$\Delta f$	Separation between the carrier centre frequency and the nominal -3 dB point of the measuring filter closest to the carrier frequency
bit/s	bits per second
$\frac{\text{BCCH } E_c}{I_{\text{or}}}$	ratio of the average transmit energy-per-PN energy-per-PNchip for the broadcast control channel to the total transmit power spectral density
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

**$E_b$**  combined energy per bit at the Base Station RF input port or the mobile station antenna connector

**NOTE:** For radio configurations 1 and 2, this is the received energy of the access channel or traffic channel. For the enhanced access channel with radio configurations 3 through 6, this is the combined energy of the enhanced access channel and the reverse pilot channel. For the reverse common control channel with radio configurations 3 through 6, this is the combined energy of the reverse common control channel and the reverse pilot channel. For the reverse traffic channel with radio configurations 3 through 6, this is the combined energy of the reverse traffic channel, the reverse pilot channel, and the reverse power control subchannel. See also  $E_b/N_0$ .

**$E_b/N_0$**  ratio in dB of the combined received energy per bit to the total received noise-plus-interference power in the received CDMA bandwidth divided by 1,23 MHz for spreading rate 1 and 3,69 MHz for spreading rate 3 (see also  $E_b$ )

**$E_b/N_t$**  ratio in dB of the combined received energy per bit to the effective noise power spectral density

**$E_c$**  average energy accumulated over one PN chip period

**$E_c/I_{or}$**  ratio in dB between the energy accumulated over one PN chip period ( $E_c$ ) to the total transmit power spectral density

**$E_c/I_o$**  ratio in dB between the pilot energy accumulated over one PN chip period ( $E_c$ ) to the total power spectral density ( $I_o$ ) in the received bandwidth

**$\frac{FCACH E_c}{I_{or}}$**  ratio of the average transmit energy-per-PN chip for the forward common assignment channel to the total transmit power spectral density

**$\frac{FCCCH E_c}{I_{or}}$**  ratio of the average transmit energy-per-PN chip for the forward common control channel to the total transmit power spectral density

**$\frac{FCPCCH E_c}{I_{or}}$**  ratio of the average transmit energy-per-PN chip for the forward common power control channel to the total transmit power spectral density

**GHz** GigaHertz ( $10^9$  Hertz)

**$I_o$**  total received power spectral density, including signal and interference, as measured at the mobile or Base Station antenna connector

**$I_{oc}$**  power spectral density of a band-limited white noise source (simulating interference from other cells) as measured at the mobile station antenna connector. For test cases where multiple channels or cells are specified, this power spectral density does not include power from these multiple channels or cells

**$I_{or}$**  total transmit power spectral density of the forward CDMA channel at the Base Station antenna connector. For transmit diversity test cases, it shall be the total combined transmit power spectral density of the forward CDMA channel from both the main and transmit diversity Base Station antenna connectors

**$\hat{I}_{or}$**  received power spectral density of the forward CDMA channel as measured at the mobile station antenna connector

**kHz** kiloHertz ( $10^3$  Hertz)

mbar	millibar ( $10^{-3}$ Bar)
MHz	MegaHertz ( $10^6$ Hertz)
Mcps	Megachips per second ( $10^6$ chips per second)
$\mu$ s	microsecond ( $10^{-6}$ second)
ms	millisecond ( $10^{-3}$ second)
ns	nanosecond ( $10^{-9}$ second)
$N_0$	effective inband noise or interference power spectral density
OCNS $E_c$	average energy-per-PN chip for the OCNS
$\frac{\text{OCNS } E_c}{I_{\text{or}}}$	ratio of the average transmit energy-per-PN chip for the OCNS to the total transmit power spectral density
Pa	Pascal
Paging $E_c$	average energy-per-PN chip for the paging channel
$\frac{\text{Paging } E_c}{I_{\text{or}}}$	ratio of the average transmit energy-per-PN chip for the paging channel to the total transmit power spectral density
Pilot $E_c$	average energy-per-PN chip for the pilot channel
Pilot $\frac{E_c}{I_o}$	ratio of the combined pilot energy per chip, $E_c$ , to the total received power spectral density (noise and signals), $I_o$ , of at most $K$ usable multipath components at the mobile station antenna connector. $K$ is the number of demodulating elements supported by the mobile station
$\frac{\text{Pilot } E_c}{I_{\text{or}}}$	ratio of the average transmit energy-per-PN chip for the pilot channel to the total transmit power spectral density
Power Control $E_c$	average energy-per-PN chip for the power control subchannel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9 600 bit/s or 14 400 bit/s data rate, the following equations apply: <ul style="list-style-type: none"> <li>- for radio configuration 1, it is equal to <math>\frac{v}{11+v} \times</math> (total forward traffic channel energy-per-PN chip), where <math>v</math> equals 1 for 9 600 bit/s, <math>v</math> equals 2 for 4 800 bit/s, <math>v</math> equals 4 for 2 400 bit/s, and <math>v</math> equals 8 for 1 200 bit/s traffic data rate.</li> <li>- For radio configuration 2, it is equal to <math>\frac{v}{23+v}</math> (total forward traffic channel energy-per-PN chip), where <math>v</math> equals 1 for 14 400 bit/s, <math>v</math> equals 2 for 7 200 bit/s, <math>v</math> equals 4 for 3 600 bit/s, and <math>v</math> equals 8 for 1 800 bit/s traffic data rate.</li> <li>- For radio configurations 3, 4, 6 and 7, it is equal to <math>\frac{v}{11+v}</math> (total forward traffic channel energy-per-PN chip), where <math>v</math> equals 1 for 9 600 bit/s, <math>v</math> equals 2 for 4 800 bit/s, <math>v</math> equals 4 for 2 700 bit/s, and <math>v</math> equals 8 for 1 500 bit/s traffic data rate.</li> </ul>

- For radio configurations 5, 8 and 9, it is equal to  $\frac{v}{11+v}$  (total forward traffic channel energy-per-PN chip), where  $v$  equals 1 for 14 400 bit/s,  $v$  equals 2 for 7 200 bit/s,  $v$  equals 4 for 3 600 bit/s, and  $v$  equals 8 for 1 800 bit/s traffic data rate. The total forward traffic channel is comprised of traffic data and a power control sub-channel

$\frac{\text{Power Control } E_c}{I_{\text{or}}}$  ratio of the average transmit energy-per-PN chip for the power control subchannel to the total transmit power spectral density

$\frac{\text{Quick Paging } E_c}{I_{\text{or}}}$  ratio of the average transmit energy-per-PN chip for the quick paging channel to the total transmit power spectral density

Supplemental  $E_c$  average energy-per-PN chip for one forward supplemental code channel

Supplemental  $\frac{E_c}{I_{\text{or}}}$  ratio of the average transmit energy-per-PN chip for one forward supplemental to the total transmit power spectral density

Sync  $E_c$  average energy-per-PN chip for the sync channel

$\frac{\text{Sync } E_c}{I_{\text{or}}}$  ratio of the average transmit energy-per-PN chip for the sync channel to the total transmit power spectral density

Traffic  $E_c$  average energy-per-PN chip for the forward fundamental channel. For the case when the power control sub-channel is assumed to be transmitted at the same power level that is used for the 9 600 bit/s or 14 400 bit/s data rate, the following equations apply:

- For radio configuration 1, it is equal to  $\frac{11}{11+v}$  (total forward fundamental channel energy-per-PN chip), where  $v$  equals 1 for 9 600 bit/s,  $v$  equals 2 for 4 800 bit/s,  $v$  equals 4 for 2 400 bit/s, and  $v$  equals 8 for 1 200 bit/s traffic data rate.
- For radio configuration 2, it is equal to  $\frac{23}{23+v}$  (total forward fundamental channel energy-per-PN chip), where  $v$  equals 1 for 14 400 bit/s,  $v$  equals 2 for 7 200 bit/s,  $v$  equals 4 for 3 600 bit/s, and  $v$  equals 8 for 1 800 bit/s traffic data rate. The total forward fundamental channel is comprised of traffic data and a power control sub-channel.
- For radio configurations 3, 4, 6 and 7, it is equal to  $\frac{11}{11+v}$  (total forward traffic channel energy-per-PN chip), where  $v$  equals 1 for 9 600 bit/s,  $v$  equals 2 for 4 800 bit/s,  $v$  equals 4 for 2 700 bit/s, and  $v$  equals 8 for 1 500 bit/s traffic data rate.
- For radio configurations 5, 8 and 9, it is equal to  $\frac{11}{11+v}$  (total forward traffic channel energy-per-PN chip), where  $v$  equals 1 for 14 400 bit/s,  $v$  equals 2 for 7 200 bit/s,  $v$  equals 4 for 3 600 bit/s, and  $v$  equals 8 for 1 800 bit/s traffic data rate. The total forward traffic channel is comprised of traffic data and a power control sub-channel

$\frac{\text{Traffic } E_c}{I_{\text{or}}}$  ratio of the average transmit energy-per-PN chip for the forward traffic channel to the total transmit power spectral density

ppm parts per million

### 3.3 Abbreviations

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

1XDO	Spreading rate 1 Data Optimized System
AC	Access Channel
AWGN	Additive White Gaussian Noise
BC	Band Class
BIH	Bureau International l'Heure
BS	Base Station
BTS	Base Transceiver Station
CDMA	Code Division Multiple Access
CRC	Cyclic Redundancy Code
CW	Continuous Waveform
DC	Direct Current
DCS	Digital Cellular System
DTx	Discontinuous Transmission
E-UTRA	Evolved Universal Terrestrial Radio Access
EMC	ElectroMagnetic Compatibility
FCS	Frame Check Sequence
FER	Frame Error Rate
FTAP	Forward Test Application Protocol
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HRPD	High Rate Packet Data
IF	Intermediate Frequency
MAC	Medium Access Control
MER	Message Error Rate

NOTE:  $MER = 1 - \frac{\text{Number of good messages received}}{\text{Number of messages transmitted}}$

MSC	Mobile Switching Centre
OCNS	Orthogonal Channel Noise Simulator
OOK	On-Off-Keying
PCS	Personal Communication System
PER	Packet Error Rate

NOTE:  $PER = 1 - \frac{\text{Number of good packets received}}{\text{Number of packets transmitted}}$

PPP	Point-to-Point Protocol
PN	PseudoNoise
PUF	Power Up Function
R&TTE	Radio and Telecommunications Terminal Equipment
RA	Reverse Activity
RC	Radio Configuration
RF	Radio Frequency
RPC	Reverse Power Control
RTAP	Reverse Test Application Protocol
Rx	Receiver
TDD	Time Division Duplex
Tx	Transmitter
UE	User Equipment
UMB	Ultra Mobile Broadband
UTC	Universal Time Coordinated
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

#### 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 Stations (BS) seven essential parameters in addition to those in EN 301 908-1 [10] 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 (see note)
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 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 conducted spurious emissions
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
NOTE: These technical requirements are all applicable for Base Station operation in Type 1 cdma2000 spread spectrum systems as defined in 3GPP2 C.S0002-D [2], and for Base Station (access network) operation in Type 2 cdma2000 High Rate Packet Data Systems as defined in TIA-856 [7].	

NOTE: Base stations operating in Type 2 cdma2000 High Rate Packet Data Systems as defined in TIA-856 [7], are also termed access networks in the present document. Access networks defined herein always use spreading rate 1 and are data optimized (1XDO).

The technical requirements in the present document apply for Base stations supporting Type 1 and Type 2 cdma2000 systems in the declared operating bands. Base stations supporting UMB shall fulfil the requirements in EN 301 908-17 [11].

#### 4.2.2 Transmitter conducted spurious emissions

##### 4.2.2.1 Definition

Conducted spurious emissions are emissions at frequencies that are outside the assigned CDMA Channel or HRPD channel, measured at the Base Station RF output port.

When operating in Type 2 cdma2000 systems, Base Station HRPD Channel conducted spurious emissions shall be measured for two test conditions:

- Case 1: continuous data mode (no idle slots).
- Case 2: idle mode (all idle slots, except the control channel).

NOTE: Inhibiting control channel transmissions is optional for case 2.

#### 4.2.2.2 Limits

The spurious emissions shall be less than the limits specified in tables 4.2.2.2-1 to 4.2.2.2-4. The spurious emissions limits in tables 4.2.2.2-1 to 4.2.2.2-4 shall be met when transmitting on a single or all RF carriers supported by the Base Station and configured in accordance with the manufacturer's specification as indicated by the entries in the column "Active carriers".

**Table 4.2.2.2-1: Transmitter spurious emission limits for BC 6, 8 and 13**

For $ \Delta f $ within the range	Active carriers	Emission limit
885 kHz to 1,25 MHz	Single	-45 dBc/30 kHz
1,25 MHz to 1,45 MHz	All	-13 dBm/30 kHz
1,45 MHz to 2,25 MHz	All	$-[13 + 17 \times (\Delta f - 1,45 \text{ MHz})]$ dBm/30 kHz
2,25 MHz to 4,00 MHz	All	-13 dBm/1 MHz
> 4,00 MHz	All	-36 dBm/1 kHz; 9 kHz < f < 150 kHz -36 dBm/10 kHz; 150 kHz < f < 30 MHz -36 dBm/100 kHz; 30 MHz < f < 1 GHz
4,00 MHz to 16,0 MHz	All	-30 dBm/30 kHz; 1 GHz < f < 12,75 GHz
16,0 MHz to 19,2 MHz	All	-30 dBm/300 kHz; 1 GHz < f < 12,75 GHz
> 19,2 MHz	All	-30 dBm/1 MHz; 1 GHz < f < 12,75 GHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = centre frequency - closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the centre frequency of the highest carrier - closer measurement edge frequency (f) and for negative $\Delta f$ as the centre frequency of the lowest carrier - closer measurement edge frequency (f).		



Table 4.2.2.2-2: Additional transmitter spurious emission limits

Measurement frequency	Active carriers	Emission limit	For protection of	Note
921 MHz to 960 MHz	All	-57 dBm/100 kHz	GSM900 MS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 9
876 MHz to 915 MHz	Single	-61 dBm/100 kHz	GSM900 BS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 9 since it is covered by the requirement in table 4.2.2.2-4
1 805 MHz to 1 880 MHz	All	-47 dBm/100 kHz	DCS1800 MS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 8
1 710 MHz to 1 785 MHz	Single	-61 dBm/100 kHz	DCS1800 BS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 8 since it is covered by the requirement in table 4.2.2.2-4
1 900 MHz to 1 920 MHz 2 010 MHz to 2 025 MHz 2 570 MHz to 2 610 MHz	All	-52 dBm/1 MHz	IMT-2000 CDMA TDD	
2 110 MHz to 2 170 MHz	All	-52 dBm/1 MHz	IMT-2000 CDMA multi-carrier and IMT-2000 CDMA direct spread MS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 6 since it is covered by the requirement in table 4.2.2.2-4
1 920 MHz to 1 980 MHz	Single	-49 dBm/1 MHz	IMT-2000 CDMA multi-carrier and IMT-2000 CDMA direct spread BS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 6
2 620 MHz to 2 690 MHz	All	-52 dBm/1 MHz	IMT-2000 CDMA multi-carrier and IMT-2000 CDMA direct spread MS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 13 since it is covered by the requirement in table 4.2.2.2-4
2 500 MHz to 2 570 MHz	Single	-49 dBm/1MHz	IMT-2000 CDMA multi-carrier and IMT-2000 CDMA direct spread BS receive frequency range	This requirement does not apply to a cdma2000 BTS operating in BC 13

Table 4.2.2.2-3: Transmitter spurious emission limits for BC 9

For $ \Delta f $ Within the Range	Applies to Multiple Carriers	Emission Limit
750 kHz to 1,98 MHz	No	-45 dBc/30 kHz
1,98 MHz to 4,00 MHz	No	-60 dBc/30 kHz; $P_{out} \geq 33$ dBm -27 dBm/30 kHz; $28$ dBm $\leq P_{out} < 33$ dBm -55 dBc/30 kHz; $P_{out} < 28$ dBm
> 4,00 MHz	Yes	-36 dBm/1 kHz      9 kHz < f < 150 kHz -36 dBm/10 kHz      150 kHz < f < 30 MHz -36 dBm/100 kHz      30 MHz < f < 1 GHz -30 dBm/1 MHz      1 GHz < f < 12,75 GHz
4,00 to 6,40 MHz	Yes	-36 dBm/1 kHz      30 MHz < f < 1 GHz
6,40 to 16 MHz	Yes	-36 dBm/10 kHz      30 MHz < f < 1 GHz
> 16 MHz	Yes	-36 dBm/100 kHz      30 MHz < f < 1 GHz
NOTE: All frequencies in the measurement bandwidth shall satisfy the restrictions on $ \Delta f $ where $\Delta f$ = center frequency, closer measurement edge frequency (f). The emissions requirements shall apply for all values of $\Delta f$ regardless of whether the measurement frequency falls inside or outside of the band or block edge. Compliance with the -46 dBm/6,25 kHz limit is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral power in a 6,25 kHz segment. For multiple-carrier testing, $\Delta f$ is defined for positive $\Delta f$ as the center frequency of the highest carrier, closer measurement edge frequency (f) and for negative $\Delta f$ as the center frequency of the lowest carrier, closer measurement edge frequency (f).		

Table 4.2.2.2-4: Spurious emissions limits for protection of a BS receiver

Operating band	Band	Emission Limit
BC 6	1 920 MHz to 1 980 MHz	-86 dBm/1 MHz
BC 8	1 710 MHz to 1 785 MHz	-86 dBm/1 MHz
BC 9	880 MHz to 915 MHz	-86 dBm/1 MHz
BC 13	2 500 MHz to 2 570 MHz	-86 dBm/1 MHz

### 4.2.2.3 Conformance

Conformance tests described in clause 5.3.1 shall be carried out.

## 4.2.3 Maximum output power

### 4.2.3.1 Definition

Maximum output power is the mean power delivered to a load with resistance equal to the nominal load impedance of the transmitter.

Within each slot for Base Stations operating in Type 2 cdma2000 systems, the Pilot, MAC and Traffic or Traffic control channels shall be time-division multiplexed. All time-division multiplexed channels shall be transmitted at equal power. For Base Stations operating in Type 2 cdma2000 systems, this test measures the time response of the mean output power for non-idle slots and the mean power at the RF output port.

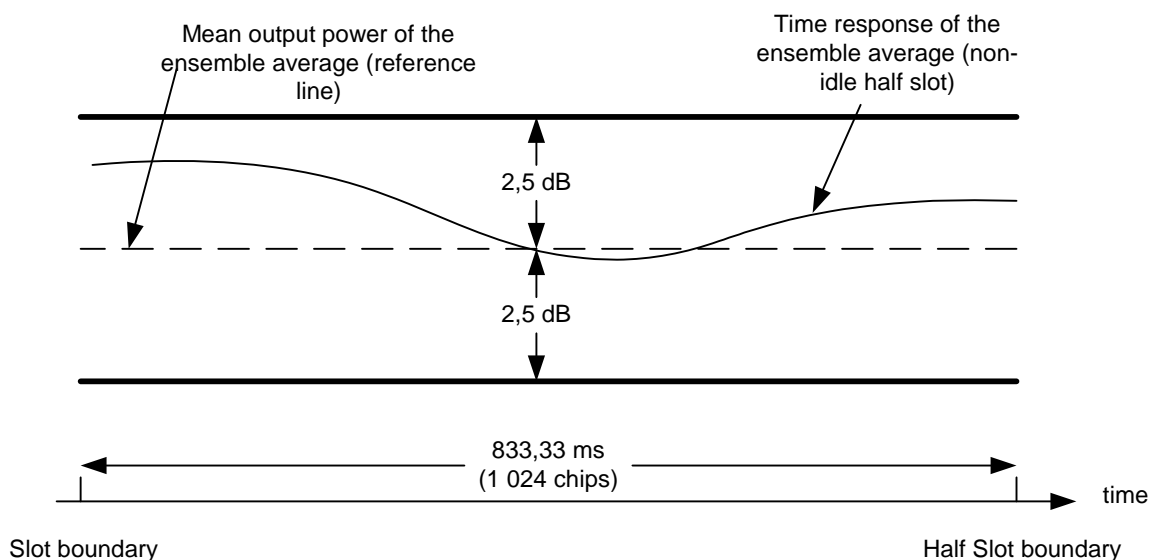
### 4.2.3.2 Limits

#### 4.2.3.2.1 Base stations operating in Type 1 cdma2000 systems

The maximum output power shall remain within +2 dB and -4 dB of the manufacturer's rated power for the equipment.

#### 4.2.3.2.2 Base stations operating in Type 2 cdma2000 systems

Given an ensemble of non-idle half slots, the time response of the ensemble average shall be within the limits shown in figure 4.2.3.2.2-1.



**Figure 4.2.3.2.2-1: Transmission envelope mask (average non-idle half slot)**

The mean power shall remain +2 dB and -4 dB of the manufacturer's rated power for the equipment.

#### 4.2.3.3 Conformance

Conformance tests described in clause 5.3.2 shall be carried out.

### 4.2.4 Inter-Base Station transmitter intermodulation

#### 4.2.4.1 Definition

Inter-Base Station transmitter intermodulation (inter-Base Station and inter-sector are synonymous) occurs when an external signal source is introduced to the antenna connector of the Base Station. This test verifies that transmitter conducted spurious emissions are still met with the presence of the interfering source.

For Base Stations operating in Type 2 cdma2000 systems, inter-sector transmitter intermodulation is measured for all combinations of idle and non-idle slots in one sector and the other under three test conditions:

- **Case 1:** measures the spurious emissions level having both sectors transmitting idle slots.
- **Case 2:** measures the spurious emissions level having the sector under test transmitting non-idle slots and the other sector transmitting idle slots.
- **Case 3:** measures the spurious emissions level having the sector under test transmitting idle slots and the other sector transmitting non-idle slots.
- **Case 4:** measures the spurious emissions level having both sectors transmitting non-idle slots.

#### 4.2.4.2 Limits

The Base Station shall meet the limits for transmitter conducted spurious emission requirements in clause 4.2.2.2.

#### 4.2.4.3 Conformance

Conformance tests described in clause 5.3.3 shall be carried out.

## 4.2.5 Receiver conducted spurious emissions

### 4.2.5.1 Definition

Conducted spurious emissions are spurious emissions generated or amplified in the Base Station equipment and appearing at the receiver RF input ports.

This requirement only applies if the Base Station is equipped with a separate RF input port.

### 4.2.5.2 Limits

The conducted spurious emissions shall be:

- 1) Less than -80 dBm, measured in a 30 kHz resolution bandwidth at the Base Station RF input ports, for frequencies within the Base Station receiver band (see table 1-1).
- 2) Less than -60 dBm, measured in a 30 kHz resolution bandwidth at the Base Station RF input ports, for frequencies within the Base Station transmit band (see table 1-1).
- 3) Less than -57 dBm, measured in a 100 kHz resolution bandwidth at the Base Station RF input ports, for frequencies from 30 MHz to 1 GHz with the exception of frequencies used by the BS between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency when the BS is operating in spreading rate 1 mode, and 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency when the BS is operating in spreading rate 3 mode.
- 4) Less than -47 dBm, measured in a 1 MHz resolution bandwidth at the Base Station RF input ports, for all other frequencies in the range from 1 GHz to 12,75 GHz with the exception of frequencies used by the BS between 4 MHz below the first carrier frequency and 4 MHz above the last carrier frequency when the BS is operating in spreading rate 1 mode, and 12,5 MHz below the first carrier frequency and 12,5 MHz above the last carrier frequency when the BS is operating in spreading rate 3 mode.

NOTE: HRPD access networks, BS operating in Type 2 cdma2000 systems, always use spreading rate 1.

### 4.2.5.3 Conformance

Conformance tests described in clause 5.3.4 shall be carried out.

## 4.2.6 Receiver blocking characteristics

### 4.2.6.1 Definition

Receiver blocking is a measure of the ability to receive a CDMA signal or an HRPD signal on the assigned channel frequency in the presence of a single tone that is offset from the centre frequency of the assigned channel on frequencies other than those of the adjacent channels.

### 4.2.6.2 Limits

#### 4.2.6.2.1 Base stations operating in Type 1 cdma2000 systems

The output power of the mobile station simulator shall increase by no more than 3 dB from the measurement in step 8) of clause 5.3.5.1.

#### 4.2.6.2.2 Base stations operating in Type 2 cdma2000 systems

As steps 7) and 9) are performed in clause 5.3.5.2, the increase in access terminal output power (relative to step 5)) shall be less than 3 dB.

### 4.2.6.3 Conformance

Conformance tests described in clause 5.3.5 shall be carried out.

## 4.2.7 Intermodulation spurious response attenuation

### 4.2.7.1 Definition

The intermodulation spurious response attenuation is a measure of a receiver's ability to receive a CDMA signal or an HRPD signal on its assigned channel frequency in the presence of two interfering CW tones. These tones are separated from the assigned channel frequency and are separated from each other such that the third order mixing of the two interfering CW tones can occur in the non-linear elements of the receiver, producing an interfering signal in the band of the desired CDMA signal.

For the case of multiple adjacent carrier receivers, the test places the CW tones outside the bandwidth of the receiver, which is approximately  $n \times 1,25$  MHz, where  $n$  is the number of adjacent carriers.

### 4.2.7.2 Limits

#### 4.2.7.2.1 Base stations operating in Type 1 cdma2000 systems

The output power of the mobile station simulator shall increase by no more than 3 dB and the FER shall be less than 1,5 % with 95 % confidence (see ANSI/TIA-97 [1], clause 6.8).

#### 4.2.7.2.2 Base stations operating in Type 2 cdma2000 systems

The output power of the access terminal simulator shall increase by no more than 3 dB and the PER measured in steps 5) and 8) shall be less than 1,5 % with 95 % confidence (see 3GPP2 C.S0032-B [8], clause 6.8).

### 4.2.7.3 Conformance

Conformance tests described in clause 5.3.6 shall be carried out.

## 4.2.8 Adjacent channel selectivity

### 4.2.8.1 Definition

Adjacent channel selectivity is a measure of the ability to receive a CDMA signal or an HRPD signal on the assigned channel frequency in the presence of another interfering CDMA signal that is offset from the centre frequency of the assigned channel by  $\pm 2,5$  MHz for spreading rate 1 or  $\pm 5$  MHz for spreading rate 3.

### 4.2.8.2 Limits

#### 4.2.8.2.1 Base stations operating in Type 1 cdma2000 systems

The output power of the mobile station simulator shall increase by no more than 3 dB and the FER shall be less than 1,5 % with 95 % confidence (see ANSI/TIA-97 [1], clause 6.8).

#### 4.2.8.2.2 Base stations operating in Type 2 cdma2000 systems

The output power of the access terminal simulator shall increase by no more than 3 dB and the PER measured in steps 5) and 7) shall be less than 1,5 % with 95 % confidence (see 3GPP2 C.S0032-B [8], clause 6.8).

### 4.2.8.3 Conformance

Conformance tests described in clause 5.3.7 shall be carried out.

---

## 5 Testing for compliance with technical requirements

### 5.1 Conditions for testing

#### 5.1.1 Introduction

Tests defined in the present document shall be carried out at representative points within the boundary limits of the declared 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 standard test conditions except where otherwise stated (see ANSI/TIA-97 [1] or 3GPP2 C.S0032-B [8]). For a definition of standard test conditions and for guidance on the use of other test conditions to be used in order to show compliance reference can be made to annex C.

#### 5.1.2 Standard equipment under test

##### 5.1.2.1 Basic equipment

The equipment under test shall be assembled and any necessary adjustments shall be made in accordance with the manufacturer's instructions for the mode of operation required. When alternative modes are available, the equipment shall be assembled and adjusted in accordance with the relevant instructions. A complete series of measurements shall be made for each mode of operation.

##### 5.1.2.2 Ancillary equipment

The Base Station equipment may include ancillary equipment during tests if the ancillary equipment is normally used in the operation of the equipment under test. This would include power supplies, cabinets, antenna couplers, and receiver multi-couplers.

### 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 shall be used to decide whether an equipment meets the requirements of the present document;
- the value of the measurement uncertainty or the accuracy of each piece of test equipment used for the measurement of each parameter shall be included in the test report; only test equipment meeting the performance requirements for standard test equipment as defined in ANSI/TIA-97 [1], clause 6.4 or 3GPP2 C.S0032-B [8], clause 6.4, shall be used;
- the test set-up of each test shall be equivalent to the test set-up descriptions in ANSI/TIA-97 [1], clause 6.5 or 3GPP2 C.S0032-B [8], clause 6.5;
- the recorded value of the measurement uncertainty or the recorded value of the accuracy of each piece of test equipment shall be equal to or better than the figures in ANSI/TIA-97 [1], clause 6.4 or 3GPP2 C.S0032-B [8], clause 6.4.

### 5.3 Essential radio test suites

This clause describes the test suites for type 1 and type 2 cdma2000 systems. UMB Base Station test suites are in EN 301 908-17 [11].

### 5.3.1 Transmitter conducted spurious emissions

#### 5.3.1.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

- 1) Connect a spectrum analyser (or other suitable test equipment) to each Base Station RF output port, using an attenuator or directional coupler if necessary.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 11).
- 3) Configure the Base Station to transmit a single carrier and perform steps 4) through 6).
- 4) Set the Base Station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and traffic channels as stated in ANSI/TIA-97 [1], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer.
- 5) Measure the power level at the carrier frequency.
- 6) Measure the spurious emission levels.
- 7) If the Base Station supports two carriers through a single RF output port with a carrier-to-carrier spacing of 1,25 MHz, configure the Base Station to transmit two adjacent carriers and perform steps 10) and 11).
- 8) If the Base Station supports two carriers through a single RF output port with a carrier-to-carrier spacing of greater than 1,25 MHz, configure the Base Station to transmit two non-adjacent carriers and perform steps 10) and 11).
- 9) If the Base Station supports three or more carriers through a single RF output port, configure the Base Station to transmit all carriers with the smallest carrier-to-carrier spacing specified by the manufacturer and perform steps 10) and 11).
- 10) Set the Base Station to transmit multiple signals modulated with a combination of Pilot, Sync, Paging, and traffic channels as stated in ANSI/TIA-97 [1], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer for the multiple-carrier configuration under test.
- 11) Measure the spurious emission levels.

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

#### 5.3.1.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-1 for a functional block diagram of the test setup.

- 1) Connect the sector under test and an access terminal simulator as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-1. The AWGN generators are not applicable in this test.
- 2) Connect a spectrum analyser (or other suitable test equipment) to the sector RF output port, using an attenuator or directional coupler if necessary.
- 3) For each band class that the sector supports, configure the sector to operate in that band class and perform steps 4) through 13).

##### **Case 1 (Continuous Data Mode):**

- 4) Configure the sector to transmit continuous non-idle slots: Set up a test application session. Open a connection and configure the test application FTAP so that the forward traffic channel data rate 2 457,6 kbit/s. Configure the MAC Channel with 14 active MAC indices, i.e. the RA Channel and 13 RPC Channels.
- 5) The carrier power shall be adjusted to the maximum level as specified by the manufacturer.
- 6) Measure the average carrier power. Record the value for use in case 2.

- 7) Measure the spurious emission levels using appropriate resolution bandwidths consistent with the limits given in the tables in clause 4.2.2.2. Averaging of up to 25 sweeps may be used.

#### Case 2 (Idle Mode):

- 8) Configure the sector to transmit a continuous stream of idle slots, except for the control channel, which may either be transmitted or inhibited. Configure 14 active MAC indices on the MAC Channel, i.e. the RA Channel and 13 RPC Channels. Set idle-mode gain to the minimum value specified by the manufacturer.
- 9) Set up the measurement equipment so that the following time windows are measured: The active measurement shall be during a window that starts and stops between 5  $\mu$ s and 15  $\mu$ s before and after the MAC and pilot channel transmissions.
- 10) Measure the average carrier power of gated transmission during these MAC-Pilot-MAC windows.
- 11) Measure the average spurious emissions levels during these MAC-Pilot-MAC windows using appropriate resolution bandwidth at the offset frequencies specified in the tables in clause 4.2.2.2.
- 12) For limits specified in dBc: compare the measurements in step 11) with the carrier power measurements in step 10).
- 13) For limits specified in dBm: If the gated power measured in step 10) is lower than the carrier power measured in step 6) by more than 1 dB, add a correction factor equal to the difference of the carrier power levels, to the gated power measurements in steps 10) and 11).

NOTE: Case 2 measurements may be made using a spectrum analyser with time gated and RMS detection capabilities, by RF/IF triggering on alternate half-slots with delay to the next half-slot.

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

## 5.3.2 Maximum output power

### 5.3.2.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

Test environment: normal and extreme (for guidance see annex C).

- 1) Connect the power measuring equipment to the Base Station RF output port.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) and 4).
- 3) Set the Base Station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and traffic channels as stated in ANSI/TIA-97 [1], clause 6.5.2.
- 4) Measure the mean power at the RF output port.

The results obtained shall be compared to the limits in clause 4.2.3.2.1 in order to prove compliance.

### 5.3.2.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-1 for a functional block diagram of the test setup.

- 1) Configure both the sector under test and an access terminal simulator as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-1.
- 2) Connect the power measuring equipment to the sector RF output port.
- 3) For each band class that the sector supports, configure the sector to operate in that band class and perform steps 4) and 5).



- 4) Set up a test application session. Open a connection and configure the test application FTAP so that the forward traffic channel data rate corresponds to 2 457,6 kbit/s. Configure the MAC channel with 14 MAC indices, i.e. the RA channel and 13 RPC channels.
- 5) Measure the time response and the mean power of the sector output power averaged over at least 100 non-idle half slots. The power is measured at the sector's RF output port.

The results obtained shall be compared to the limits in clause 4.2.3.2.2 in order to prove compliance.

### 5.3.3 Inter-Base Station transmitter intermodulation

#### 5.3.3.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

- 1) Connect a spectrum analyser (or other suitable test equipment) and the external Base Station to the Base Station RF output port, using attenuators or directional couplers if necessary as shown in ANSI/TIA-97 [1], figure 6.5.1-9.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 6).
- 3) Set the Base Station under test to transmit a signal modulated with a combination of Pilot, Sync, Paging, and traffic channels as stated in ANSI/TIA-97 [1], clause 6.5.2. Total power at the RF output port shall be the maximum power as specified by the manufacturer.
- 4) Set the second Base Station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and traffic channels as stated in ANSI/TIA-97 [1], clause 6.5.2 with a total power that is 30 dB less than the power of the other Base Station with an offset of 1,25 MHz between the centre of the CDMA centre frequencies for spreading rate 1 or 3,75 MHz between the centre of the CDMA centre frequencies for spreading rate 3.
- 5) Measure the power level at the carrier frequency.
- 6) Measure the spurious emission level at the image of the Base Station transmitter and the interference source. The image is centred at a frequency of 2 times the centre frequency of the Base Station under test minus the centre frequency of the second Base Station. The bandwidth of the image is the same as the bandwidth of the radio configuration in effect.

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

#### 5.3.3.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems 2

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-8 for a functional block diagram of the test setup.

- 1) Connect the two sectors under test and two access terminal simulators as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-8. Configure the setup so that sector 2 total power is 30 dB less than the power of sector 1 with offsets of +1,25 MHz and -1,25 MHz between the centre of the CDMA centre frequencies.
- 2) Connect a spectrum analyser (or other suitable test equipment) to the sector 1 RF output port, using an attenuator or directional coupler if necessary.
- 3) For each band class that the sector supports, configure the sector to operate in that band class and perform steps 4) through 19).

##### Case 1:

- 4) Set sector 1 to transmit Pilot, MAC and control channels (no connection is needed to allow having more idle slots).
- 5) Set sector 2 to transmit Pilot, MAC and control channels (no connection is needed to allow having more idle slots).
- 6) Measure the mean power level at the carrier frequency.

- 7) Measure the spurious emission levels in the range specified in clause 4.2.2.2.

**Case 2:**

- 8) Open a connection between sector 1 and access terminal simulator 1. Set access terminal simulator 1 to request non-null data rates for the duration of the test.
- 9) Set sector 2 to transmit Pilot, MAC and control channels (no connection is needed to allow having more idle slots).
- 10) Measure the mean power level at the carrier frequency.
- 11) Measure the spurious emission levels in the range specified in clause 4.2.2.2.

**Case 3:**

- 12) Set sector 1 to transmit Pilot, MAC and control channels (no connection is needed to allow having more idle slots).
- 13) Open a connection between sector 2 and access terminal simulator 2. Set access terminal simulator 2 to request non-null data rates for the duration of the test.
- 14) Measure the mean power level at the carrier frequency.
- 15) Measure the spurious emission levels in the range specified in clause 4.2.2.2.

**Case 4:**

- 16) Open a connection between sector 1 and access terminal simulator 1. Set access terminal simulator 1 to request non-null data rates for the duration of the test.
- 17) Open a connection between sector 2 and access terminal simulator 2. Set access terminal simulator 2 to request non-null data rates for the duration of the test.
- 18) Measure the mean power level at the carrier frequency.
- 19) Measure the spurious emission levels in the range specified in clause 4.2.2.2. The results obtained shall be compared to the limits in clause 4.2.4.2 in order to prove compliance.

## 5.3.4 Receiver conducted spurious emissions

### 5.3.4.1 Test procedure for Base Stations supporting operation in Type 1 or Type 2 cdma2000 systems

- 1) Connect a spectrum analyser (or other suitable test equipment) to a receiver RF input port.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 5).
- 3) Disable all transmitter RF outputs.
- 4) Perform step 5) for all receiver input ports.
- 5) Sweep the spectrum analyser over a frequency range from 30 MHz to 12,75 GHz and measure the spurious emission level.

The results obtained shall be compared to the limits in clause 4.2.5.2 in order to prove compliance.

## 5.3.5 Receiver blocking characteristics

### 5.3.5.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

- 1) Configure the Base Station under test and a mobile station simulator as shown in ANSI/TIA-97 [1], figure 6.5.1-3.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 13). In steps 10), 11) and 13), the frequency boundaries  $f_1$  to  $f_4$  should be selected from table 5.3.5.1-1 for the band class of operation.
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) If the Base Station supports demodulation of radio configuration 1 or 2, set up a call using fundamental channel test mode 1 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 13).
- 5) If the Base Station supports demodulation of radio configuration 3 or 4, set up a call using fundamental channel test mode 3 or dedicated control channel test mode 3 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 13).
- 6) If the Base Station supports demodulation of radio configuration 5 or 6, set up a call using fundamental channel test mode 7 or dedicated control channel test mode 7 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 13).
- 7) Transmit random data to the mobile station simulator at full data rate.
- 8) Measure the mobile station simulator output power.
- 9) Adjust the CW generator power to be 75 dB above the mobile station simulator output power at the RF input ports as measured in step 8).
- 10) If the Base Station is operating with spreading rate 1 step the CW Tone frequency from  $f_1$  to  $f_2$  at 1 MHz intervals but skip frequencies closer than 2,5 MHz to the carrier frequency and measure the mobile station simulator output power at the Base Station receiver.
- 11) If the Base Station is operating with spreading rate 3 step the CW Tone frequency from  $f_1$  to  $f_2$  at 1 MHz intervals but skip frequencies closer than 10 MHz to the carrier frequency and measure the mobile station simulator output power at the Base Station receiver.
- 12) Adjust the CW generator power to be 100 dB above the mobile station simulator output power at the RF input ports as measured in step 8).
- 13) Step the CW Tone frequency from 1 MHz to  $f_3$  and  $f_4$  to 12 750 MHz in 1 MHz steps and measure the mobile station simulator output power at the Base Station receiver.

The results obtained shall be compared to the limits in clause 4.2.6.2.1 in order to prove compliance.

**Table 5.3.5.1-1: Operating-band dependent frequency ranges for receiver blocking test**

Operating Band	$f_1$ (MHz)	$f_2$ (MHz)	$f_3$ (MHz)	$f_4$ (MHz)
BC 6	1 900	2 000	1 899	2 001
BC 8	1 690	1 805	1 689	1 806
BC 9	860	925	859	926
BC 13	2 480	2 590	2 479	2 591

### 5.3.5.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-3 for a functional block diagram of the test setup.

- 1) Configure the sector under test and an access terminal simulator as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-3.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 10). In steps 7) and 9), the frequency boundaries  $f_1$  to  $f_4$  should be selected from table 5.3.5.1-1 for the band class of operation.
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) Set up a test application session. Open a connection and configure the test application RTAP so that the reverse data channel data rate corresponds to 9,6 kbit/s.
- 5) Measure the access terminal simulator output power at the RF input ports of the sector.
- 6) Adjust the CW generator power to be 75 dB above the access terminal simulator output power at the RF input ports as measured in step 5).
- 7) Step the CW tone frequency from  $f_1$  to  $f_2$  at 1 MHz intervals but skip frequencies closer than 5 MHz to the carrier frequency and perform step 10).
- 8) Adjust the CW generator power to be 100 dB above the access terminal simulator output power at the RF input ports as measured in step 5).
- 9) Step the CW tone frequency from 1 MHz to  $f_3$  and from  $f_4$  to 12 750 MHz in 1 MHz steps and perform step 10).
- 10) Measure the access terminal simulator output power at each frequency step of the CW tone.

The results obtained shall be compared to the limits in clause 4.2.6.2.2.

## 5.3.6 Intermodulation spurious response attenuation

### 5.3.6.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

Refer to ANSI/TIA-97 [1], figure 6.5.1-4 for a functional block diagram of the test setup.

- 1) Configure the Base Station under test and a mobile station simulator as shown in ANSI/TIA-97 [1], figure 6.5.1-4.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 11).
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) If the Base Station supports demodulation of radio configuration 1, 2, 3, or 4, set up a call using fundamental channel test mode 1 or 3 or dedicated control channel test mode 3 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 6) through 11).
- 5) If the Base Station supports demodulation of radio configuration 5 or 6, set up a call using fundamental channel test mode 7 or dedicated control channel test mode 7 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 6) through 11).
- 6) Transmit random data to the mobile station simulator at full data rate.
- 7) Measure the mobile station simulator output power.

- 8) For each block of  $n$  adjacent (1,23 MHz or 1,25 MHz spacing) carriers (including  $n = 1$ ), define the lowest frequency,  $f_1$ , as the lowest CDMA frequency assignment and the highest frequency,  $f_2$ , as the highest CDMA frequency assignment and perform steps 9) through 11).
- 9) Perform steps 10) and 11) with the CW generators adjusted to  $(f_2 + 1,25 \text{ MHz})$  and  $(f_2 + 2,05 \text{ MHz} + i \times 1,25 \text{ MHz})$ , and  $(f_1 - 1,25 \text{ MHz})$  and  $(f_1 - 2,05 \text{ MHz} - i \times 1,25 \text{ MHz})$  from the CDMA frequency assignment, where  $i = 0, 1, \dots, n-1$ .
- 10) Adjust the CW generator powers to be 70 dB above the mobile station simulator output power at the RF input ports as measured in step 7).
- 11) Measure the mobile station simulator output power and the FER of the Base Station receiver.

The results obtained shall be compared to the limits in clause 4.2.7.2.1 in order to prove compliance.

### 5.3.6.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-4 for a functional block diagram of the test setup.

- 1) Configure the sector under test and an access terminal simulator as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-4.
- 2) For each band class that the sector supports, configure the sector to operate in that band class and perform steps 3) through 8).
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) Set up a test application session. Open a connection and configure the test application RTAP so that the reverse data channel data rate corresponds to 9,6 kbit/s.
- 5) Measure the access terminal simulator output power at the RF input ports of the sector, and the packet error rate at the access network.
- 6) With the sector operating in band class 6, 8 and 13 perform steps 7) and 8) with the CW generators adjusted to offsets of +1,25 MHz and +2,05 MHz, and -1,25 MHz and -2,05 MHz from the CDMA frequency assignment. With the sector operating in band class 9 perform steps 7) and 8) with the CW generators adjusted to offsets of +900 kHz and +1,7 MHz, and -900 kHz and -1,7 MHz from the CDMA frequency assignment.
- 7) Adjust the CW generator powers to be 72 dB above the access terminal simulator output power at the RF input ports as measured in step 5).
- 8) Measure the access terminal simulator output power and the packet error rate at the access network. The results obtained shall be compared to the limits in clause 4.2.7.2.2 in order to prove compliance.

## 5.3.7 Adjacent channel selectivity

### 5.3.7.1 Test procedure for Base Stations supporting operation in Type 1 cdma2000 systems

Refer to ANSI/TIA-97 [1], figure 6.5.1-8 for a functional block diagram of the test setup.

- 1) Configure the Base Station under test and a mobile station simulator as shown in ANSI/TIA-97 [1], figure 6.5.1-8.
- 2) For each band class that the Base Station supports, configure the Base Station to operate in that band class and perform steps 3) through 11).
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.

- 4) If the Base Station supports demodulation of radio configuration 1 or 2, set up a call using fundamental channel test mode 1 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 11).
- 5) If the Base Station supports demodulation of radio configuration 3 or 4, set up a call using fundamental channel test mode 3 or dedicated control channel test mode 3 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 11).
- 6) If the Base Station supports demodulation of radio configuration 5 or 6, set up a call using fundamental channel test mode 7 or dedicated control channel test mode 7 (see ANSI/TIA-97 [1], clause 1.3) and perform steps 7) through 11).
- 7) Transmit random data to the assigned mobile station simulator at full data rate.
- 8) Measure the assigned mobile station simulator output power.
- 9) If the Base Station is operating with spreading rate 1, perform step 11) with the interfering mobile station simulator adjusted to offsets of +2,5 MHz and -2,5 MHz from the CDMA frequency assignment with an output power at the RF input ports of -53 dBm. The interfering mobile station simulator shall be one mobile station transmitting a full rate RC 3 signal.
- 10) If the Base Station is operating with spreading rate 3, perform step 11) with the interfering mobile station simulator adjusted to offsets of +5 MHz and -5 MHz from the CDMA frequency assignment with an output power at the RF input ports of -49 dBm. The interfering mobile station simulator shall be one mobile station transmitting a full rate RC 5 signal.
- 11) Measure the assigned mobile station simulator output power and FER of the Base Station receiver.

The results obtained shall be compared to the limits in clause 4.2.8.2.1 in order to prove compliance.

### 5.3.7.2 Test procedure for Base Stations supporting operation in Type 2 cdma2000 systems

Refer to 3GPP2 C.S0032-B [8], figure 6.5.1-9 for a functional block diagram of the test setup.

- 1) Configure the sector under test and the two access terminal simulators as shown in 3GPP2 C.S0032-B [8], figure 6.5.1-9.
- 2) For each band class that the sector supports, configure the sector to operate in that band class and perform steps 3) through 7).
- 3) Adjust the equipment to ensure path losses of at least 100 dB. All power control mechanisms shall be enabled and set at nominal values.
- 4) Set up a test application session. Open a connection between the sector under test and access terminal simulator 1, and configure the test application RTAP so that the reverse data channel data rate corresponds to 153,6 kbit/s.
- 5) Measure the access terminal simulator 1 output power referenced to the sector RF input ports, and the packet error rate at the access network.
- 6) Adjust access terminal simulator 2 to offsets of +2,5 MHz and -2,5 MHz from the CDMA frequency assignment of access terminal simulator 1 and with an output power of -53 dBm referenced to the sector RF input ports.
- 7) Measure the access terminal simulator output power referenced to the sector RF input ports, and the packet error rate at the access network.

The results obtained shall be compared to the limits in clause 4.2.8.2.2 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)**

<b>Harmonized Standard EN 301 908-5</b>						
The following requirements and test specifications are relevant to the presumption of conformity under the article 3.2 of the R&TTE Directive						
<b>Requirement</b>			<b>Requirement Conditionality</b>		<b>Test Specification</b>	
<b>No</b>	<b>Description</b>	<b>Reference: Clause No</b>	<b>U/C</b>	<b>Condition</b>	<b>E/O</b>	<b>Reference: Clause No</b>
1	Transmitter conducted spurious emissions	4.2.2	U		E	5.3.1
2	Maximum output power	4.2.3	U		E	5.3.2
3	Inter-Base Station transmitter intermodulation	4.2.4	U		E	5.3.3
4	Receiver conducted spurious emissions	4.2.5	U		E	5.3.4
5	Receiver blocking characteristics	4.2.6	U		E	5.3.5
6	Intermodulation spurious response attenuation	4.2.7	U		E	5.3.6
7	Adjacent channel selectivity	4.2.8	U		E	5.3.7

### 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 (normative): Base station Configurations

### B.1 Receiver diversity

For the tests in clause 5, the requirement applies at each receiver antenna connector. If the manufacturer has declared the receiver paths to be equivalent, it is sufficient to apply the specified test signal at any one of the receiver antenna connectors, with the remaining receiver(s) disabled or their antenna connectors being terminated.

---

### B.2 Duplexers

The requirements of the present document shall be met with a duplexer fitted, if a duplexer is supplied as part of the BS. If the duplexer is supplied as an option by the manufacturer, sufficient tests should be repeated with and without the duplexer fitted to verify that the BS meets the requirements of the present document in both cases.

The following tests should be performed with the duplexer fitted, and without it fitted if this is an option:

- 1) clause 5.3.2 maximum output power, for the highest static power step only, if this is measured at the antenna connector;
- 2) clause 5.3.1, output RF spectrum emissions; outside the BS transmit band;
- 3) clause 5.3.3, inter-Base Station transmitter intermodulation; for the testing of conformance, the carrier frequencies should be selected to minimize intermodulation products from the transmitters falling in receive channels. The remaining tests may be performed with or without the duplexer fitted.

NOTE 1: When performing receiver tests with a duplexer fitted, it is important to ensure that the output from the transmitters does not affect the test apparatus. This can be achieved using a combination of attenuators, isolators and filters.

NOTE 2: When duplexers are used, intermodulation products will be generated, not only in the duplexer but also in the antenna system. The intermodulation products generated in the antenna system are not controlled by the specifications, and may degrade during operation (e.g. due to moisture ingress). Therefore, to ensure continued satisfactory operation of a BS, an operator will normally select CDMA channel numbers to minimize intermodulation products falling on receive channels. For testing of complete conformance, an operator may specify the CDMA channel numbers to be used.

---

### B.3 Power supply options

If the BS is supplied with a number of different power supply configurations, it may not be necessary to test RF parameters for each of the power supply options, provided that it can be demonstrated that the range of conditions over which the equipment is tested is at least as great as the range of conditions due to any of the power supply configurations.

This applies particularly if a BS contains a DC rail which can be supplied either externally or from an internal mains power supply. In this case, the conditions of extreme power supply for the mains power supply options can be tested by testing only the external DC supply option. The range of DC input voltages for the test should be sufficient to verify the performance with any of the power supplies, over its range of operating conditions within the BS, including variation of mains input voltage, temperature and output current.

## B.4 Ancillary RF amplifiers

The requirements of the present document shall be met with the ancillary RF amplifier fitted. At tests according to clause 5 for Tx and Rx respectively, the ancillary amplifier is connected to the BS by a connecting network (including any cable(s), attenuator(s), etc.) with applicable loss to make sure the appropriate operating conditions of the ancillary amplifier and the BS. The applicable connecting network loss range is declared by the manufacturer. Other characteristics and the temperature dependence of the attenuation of the connecting network are neglected. The actual attenuation value of the connecting network is chosen for each test as one of the applicable extreme values. The lowest value is used unless otherwise stated.

Sufficient tests should be repeated with the ancillary amplifier fitted and, if it is optional, without the ancillary RF amplifier to verify that the BS meets the requirements of the present document in both cases.

When testing, the following tests should be repeated with the optional ancillary amplifier fitted according to table B.4-1, where x denotes that the test is applicable:

**Table B.4-1: Table of tests applicable to Ancillary RF Amplifiers**

	Clause	Tx amplifier only	Rx amplifier only	Tx/Rx amplifiers combined (see note)
<b>Receiver Tests</b>	5.3.4		X	
	5.3.5		X	X
	5.3.6		X	X
<b>Transmitter Tests</b>	5.3.1	X		X
	5.3.2	X		X
	5.3.3	X		X
NOTE: Combining can be by duplex filters or any other network. The amplifiers can either be in Rx or Tx branch or in both. Either one of these amplifiers could be a passive network.				

In test according to clause 5.3.2, the highest applicable attenuation value is applied.

## B.5 BS using antenna arrays

A BS may be configured with a multiple antenna port connection for some or all of its transceivers or with an antenna array related to one cell (not one array per transceiver). This clause applies to a BS which meets at least one of the following conditions:

- the transmitter output signals from one or more transceiver appear at more than one antenna port; or
- there is more than one receiver antenna port for a transceiver or per cell and an input signal is required at more than one port for the correct operation of the receiver thus the outputs from the transmitters as well as the inputs to the receivers are directly connected to several antennas (known as "aircombining"); or

NOTE: Diversity reception does not meet this requirement.

- transmitters and receivers are connected via duplexers to more than one antenna.

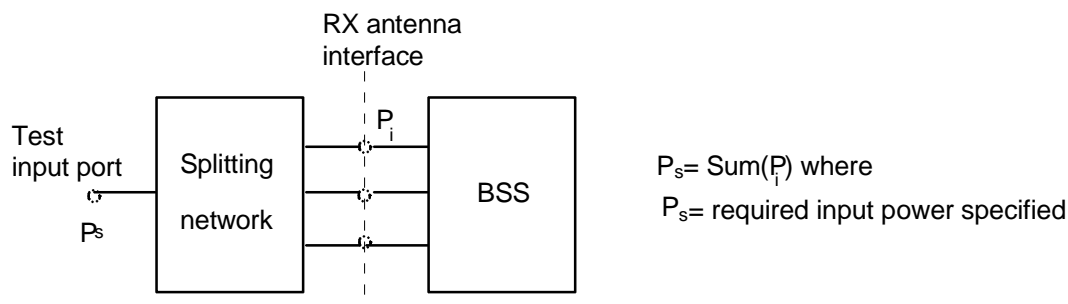
If a BS is used, in normal operation, in conjunction with an antenna system which contains filters or active elements which are necessary to meet the UTRA requirements, the conformance tests may be performed on a system comprising the BS together with these elements, supplied separately for the purposes of testing. In this case, it must be demonstrated that the performance of the configuration under test is representative of the system in normal operation, and the conformance assessment is only applicable when the BS is used with the antenna system.

For conformance testing of such a BS, the following procedure may be used.

## B.5.1 Receiver tests

For each test, the test signals applied to the receiver antenna connectors shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) specified in the test.

An example of a suitable test configuration is shown in figure B.5.1-1.



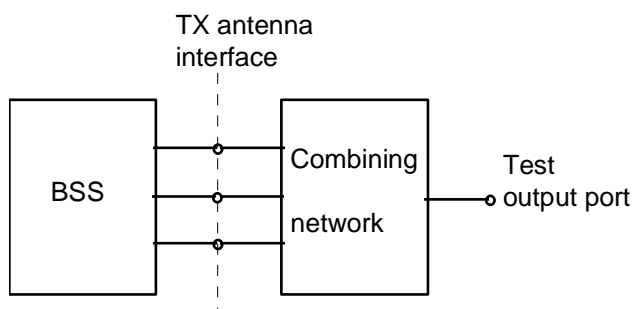
**Figure B.5.1-1: Receiver test set-up**

For spurious emissions from the receiver antenna connector, the test may be performed separately for each receiver antenna connector.

## B.5.2 Transmitter tests

For each test, the test signals applied to the transmitter antenna connectors ( $P_i$ ) shall be such that the sum of the powers of the signals applied equals the power of the test signal(s) ( $P_s$ ) specified in the test. This may be assessed by separately measuring the signals emitted by each antenna connector and summing the results, or by combining the signals and performing a single measurement. The characteristics (e.g. amplitude and phase) of the combining network should be such that the power of the combined signal is maximized.

An example of a suitable test configuration is shown in figure B.5.2-1.



**Figure B.5.2-1: Transmitter test set-up**

For inter-Base Station transmitter intermodulation, the test may be performed separately for each transmitter antenna connector.

---

## Annex C (informative): Environmental profile and standard test conditions

### C.1 Introduction

The following clause contains a copy of the description of environmental requirements as specified in ANSI/TIA-97 [1], clause 5, and 3GPP2 C.S0032-B [8], clause 5 and a definition of standard test conditions ANSI/TIA-97 [1], clause 6, and 3GPP2 C.S0032-B [8], clause 6. This should provide some guidance on how the environmental profile can be declared for the purpose of the present document.

---

### C.2 CDMA environmental requirements

#### C.2.1 Temperature and power supply voltage

##### C.2.1.1 Definition

The temperature and voltage ranges denote the ranges of ambient temperature and power supply input voltages over which the Base Station will operate and meet the requirements of the present document. The ambient temperature is the average temperature of the air surrounding the Base Station equipment. The power supply voltage is the voltage applied at the input terminals of the Base Station equipment. The manufacturer is to specify the temperature range and the power supply voltage over which the equipment is to operate.

##### C.2.1.2 Method of measurement

The Base Station equipment should be installed in its normal configuration (i.e. in its normal cabinet or rack mounting arrangement with all normally supplied covers installed) and placed in a temperature chamber. Optionally, the equipment containing the frequency determining element(s) may be placed in the temperature chamber if the frequency stability is to be maintained over a different temperature from that specified for the rest of the base-station equipment.

The temperature chamber should be stabilized at the manufacturer's highest specified operating temperature and then should be operated in accordance with the standard duty cycle test conditions specified in ANSI/TIA-97 [1], clause 6, and over the power supply input voltage range specified by the manufacturer. With the Base Station equipment operating, the temperature is to be maintained at the specified test temperature without forced circulation of air from the temperature chamber being directly applied to the Base Station equipment.

During the entire duty cycle, the transmitter frequency accuracy, timing reference, output power, and waveform quality should be measured as specified in ANSI/TIA-97 [1], clause 4.

Turn the Base Station equipment off, stabilize the equipment in the chamber at room temperature, and repeat the above measurements after a 15 min standby warm up period.

Turn the Base Station equipment off, stabilize the equipment in the chamber at the coldest operating temperature specified by the manufacturer, and repeat the above measurements above after a 15 min standby warm up period.

For transmitter frequency stability measurements, the above procedure should be repeated every 10 °C over the operating temperature range specified by the manufacturer. The equipment should be allowed to stabilize at each step before a frequency measurement is made.

### C.2.1.3 Minimum standard

Over the ambient temperature and power supply ranges specified by the manufacturer, the operation of the Base Station equipment should conform to the limits shown in table C.2.1.3-1.

**Table C.2.1.3-1: Environmental test limits**

Parameter	Limit (see note 1)	Reference in ANSI/TIA-97 [1]	Limit (see note 2)	Reference in 3GPP2 C.S0032-B [8]
Frequency Tolerance	±0,05 ppm	4.1.2	±0,05 ppm	4.1.2
Time Reference	±10 µs	4.2.1.1	±10 µs	4.2.1.1
Pilot Waveform Quality	$\rho > 0,912$	4.2.2	$\rho > 0,97$	4.2.2
RF Power Output Variation	+2 dB, -4 dB	4.3.1	±1,5 dB	4.3.1
NOTE 1: These limits are all applicable for Base Station operation in Type 1 cdma2000 spread spectrum systems as defined in 3GPP2 C.S0002-D [2].				
NOTE 2: These limits are applicable to Base Station (access network) operation in Type 2 cdma2000 High Rate Packet Data Systems as defined in TIA-856 [7].				

## C.2.2 High humidity

### C.2.2.1 Definition

The term "high humidity" denotes the relative humidity at which the Base Station will operate with no more than a specified amount of degradation in performance.

### C.2.2.2 Method of measurement

The Base Station equipment, after having been adjusted for normal operation under standard test conditions, should be placed, inoperative (i.e. switched off), in a humidity chamber with the humidity maintained at 0,024 gm H<sub>2</sub>O/g Dry Air at 50 °C (40 % relative humidity) for a period of not less than eight hours. While in the chamber and at the end of this period, the Base Station should be switched on and its transmitting equipment should be tested for frequency accuracy, timing reference, output power, and waveform quality. No readjustment of the Base Station equipment should be allowed during this test.

### C.2.2.3 Minimum standard

Under the above humidity conditions, the operation of the Base Station equipment should conform to the limits specified in table C.2.1.3-1.

---

## C.3 Standard test conditions

### C.3.1 Standard environmental test conditions

Measurements under standard atmospheric conditions should be carried out under any combination of the following conditions:

- Temperature: +15 °C to +35 °C;
- Relative humidity: 45 % to 75 %;
- Air pressure: 86 000 Pa to 106 000 Pa (860 mbar to 1 060 mbar).

If desired, the results of the measurements can be corrected by calculation to the standard reference temperature of 25 °C and the standard reference air pressure of 101 300 Pa (1 013 mbar).

## C.3.2 Standard conditions for the primary power supply

### C.3.2.1 General

The standard test voltages should be those specified by the manufacturer as minimum, normal, and maximum operating values. The voltage should not deviate from the stated values by more than  $\pm 2$  % during a series of measurements carried out as part of one test on the same equipment.

### C.3.2.2 Standard DC test voltage from accumulator batteries

The standard (or nominal) DC test voltage battery specified by the manufacturer should be equal to the standard test voltage of the type of accumulator to be used multiplied by the number of cells minus an average DC power cable loss value that the manufacturer determines as being typical (or applicable) for a given installation. Since accumulator batteries may or may not be under charge and, in fact, may be in a state of discharge when the equipment is being operated, the manufacturer should also test the equipment at anticipated voltage extremes above and below the standard voltage. The test voltages should not deviate from the stated values by more than  $\pm 2$  % (nominal float voltage) during a series of measurements carried out as part of one test on the same equipment.

### C.3.2.3 Standard AC voltage and frequency

For equipment that operates from the AC mains, the standard AC test voltage should be equal to the nominal voltage specified by the manufacturer. If the equipment is provided with different input taps, the one designated "nominal" should be used. The standard test frequency and the test voltage should not deviate from their nominal values by more than  $\pm 2$  %.

The equipment should operate without degradation with input voltage variations of up to  $\pm 10$  % and should maintain its specified transmitter frequency stability for input voltage variations of up to  $\pm 15$  %. The frequency range over which the equipment is to operate should be specified by the manufacturer.

---

## 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

ETSI TR 100 028 (V1.4.1): "Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics".

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).

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (LV Directive).

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



---

## History

<b>Document history</b>				
V1.1.1	January 2002	Publication		
V2.2.1	October 2003	Publication		
V3.2.1	September 2007	Publication		
V4.1.1	April 2009	Public Enquiry	PE 20090828:	2009-04-30 to 2009-08-28
V4.1.2	December 2009	Vote	V 20100219:	2009-12-21 to 2010-02-19
V4.2.1	March 2010	Publication		