

ETSI TS 136 104 V11.15.0 (2016-04)



LTE;
**Evolved Universal Terrestrial Radio Access (E-UTRA);
Base Station (BS) radio transmission and reception
(3GPP TS 36.104 version 11.15.0 Release 11)**



Reference

RTS/TSGR-0436104vbf0

Keywords

LTE

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

The present document can be downloaded from:
<http://www.etsi.org/standards-search>

The present document may be made available in electronic versions and/or in print. The content of any electronic and/or print versions of the present document shall not be modified without the prior written authorization of ETSI. In case of any existing or perceived difference in contents between such versions and/or in print, the only prevailing document is the print of the Portable Document Format (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

<https://portal.etsi.org/TB/ETSIDeliverableStatus.aspx>

If you find errors in the present document, please send your comment to one of the following services:
<https://portal.etsi.org/People/CommitteeSupportStaff.aspx>

Copyright Notification

No part may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm except as authorized by written permission of ETSI.

The content of the PDF version shall not be modified without the written authorization of ETSI.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2016.
All rights reserved.

DECT™, PLUGTESTS™, UMTS™ and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI 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.

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 (<https://ipr.etsi.org/>).

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 Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under
<http://webapp.etsi.org/key/queryform.asp>.

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

"**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

Contents

Intellectual Property Rights	2
Foreword.....	2
Modal verbs terminology.....	2
Foreword.....	7
1 Scope	8
2 References	8
3 Definitions, symbols and abbreviations	9
3.1 Definitions	9
3.2 Symbols.....	11
3.3 Abbreviations	12
4 General	13
4.1 Relationship between minimum requirements and test requirements	13
4.2 Base station classes	13
4.3 Regional requirements.....	14
4.4 Applicability of requirements.....	14
4.5 Requirements for BS capable of multi-band operation	15
5 Operating bands and channel arrangement.....	16
5.1 General	16
5.2 Void.....	16
5.3 Void.....	16
5.4 Void.....	16
5.5 Operating bands.....	16
5.6 Channel bandwidth.....	18
5.7 Channel arrangement.....	21
5.7.1 Channel spacing.....	21
5.7.1A CA Channel spacing	21
5.7.2 Channel raster	21
5.7.3 Carrier frequency and EARFCN.....	21
5.8 Requirements for contiguous and non-contiguous spectrum.....	22
6 Transmitter characteristics	23
6.1 General	23
6.2 Base station output power	23
6.2.1 Minimum requirement	24
6.2.2 Additional requirement (regional)	24
6.2.3 Home BS output power for adjacent UTRA channel protection.....	24
6.2.4 Home BS output power for adjacent E-UTRA channel protection.....	25
6.2.5 Home BS Output Power for co-channel E-UTRA protection	26
6.3 Output power dynamics.....	27
6.3.1 RE Power control dynamic range	27
6.3.1.1 Minimum requirements	27
6.3.2 Total power dynamic range	28
6.3.2.1 Minimum requirements	28
6.4 Transmit ON/OFF power	28
6.4.1 Transmitter OFF power	28
6.4.1.1 Minimum Requirement	28
6.4.2 Transmitter transient period.....	29
6.4.2.1 Minimum requirements	29
6.5 Transmitted signal quality	29
6.5.1 Frequency error.....	29
6.5.1.1 Minimum requirement	29
6.5.2 Error Vector Magnitude.....	30
6.5.3 Time alignment error	30
6.5.3.1 Minimum Requirement	30

6.5.4	DL RS power	30
6.5.4.1	Minimum requirements	31
6.6	Unwanted emissions	31
6.6.1	Occupied bandwidth	31
6.6.1.1	Minimum requirement	31
6.6.2	Adjacent Channel Leakage power Ratio (ACLR)	31
6.6.2.1	Minimum requirement	32
6.6.2.2	Cumulative ACLR requirement in non-contiguous spectrum	33
6.6.3	Operating band unwanted emissions	35
6.6.3.1	Minimum requirements for Wide Area BS (Category A)	36
6.6.3.2	Minimum requirements for Wide Area BS (Category B)	39
6.6.3.2.1	Category B requirements (Option 1)	39
6.6.3.2.2	Category B (Option 2)	42
6.6.3.2A	Minimum requirements for Local Area BS (Category A and B)	44
6.6.3.2B	Minimum requirements for Home BS (Category A and B)	45
6.6.3.2C	Minimum requirements for Medium Range BS (Category A and B)	46
6.6.3.3	Additional requirements	48
6.6.4	Transmitter spurious emissions	50
6.6.4.1	Mandatory Requirements	51
6.6.4.1.1	Spurious emissions (Category A)	51
6.6.4.1.2	Spurious emissions (Category B)	51
6.6.4.2	Protection of the BS receiver of own or different BS	51
6.6.4.2.1	Minimum Requirement	52
6.6.4.3	Additional spurious emissions requirements	52
6.6.4.3.1	Minimum Requirement	52
6.6.4.4	Co-location with other base stations	63
6.6.4.4.1	Minimum Requirement	63
6.7	Transmitter intermodulation	73
6.7.1	Minimum requirement	73
6.7.2	Additional requirement for Band 41	73
7	Receiver characteristics	74
7.1	General	74
7.2	Reference sensitivity level	74
7.2.1	Minimum requirement	75
7.3	Dynamic range	76
7.3.1	Minimum requirement	76
7.4	In-channel selectivity	77
7.4.1	Minimum requirement	78
7.5	Adjacent Channel Selectivity (ACS) and narrow-band blocking	79
7.5.1	Minimum requirement	79
7.6	Blocking	82
7.6.1	General blocking requirement	82
7.6.1.1	Minimum requirement	82
7.6.2	Co-location with other base stations	87
7.6.2.1	Minimum requirement	87
7.7	Receiver spurious emissions	96
7.7.1	Minimum requirement	96
7.8	Receiver intermodulation	97
7.8.1	Minimum requirement	97
8	Performance requirement	101
8.1	General	101
8.2	Performance requirements for PUSCH	102
8.2.1	Requirements in multipath fading propagation conditions	102
8.2.1.1	Minimum requirements	102
8.2.2	Requirements for UL timing adjustment	110
8.2.2.1	Minimum requirements	110
8.2.3	Requirements for high speed train	110
8.2.3.1	Minimum requirements	111
8.2.4	Requirements for HARQ-ACK multiplexed on PUSCH	111
8.2.4.1	Minimum requirement	112

8.3	Performance requirements for PUCCH	112
8.3.1	DTX to ACK performance	112
8.3.1.1	Minimum requirement	112
8.3.2	ACK missed detection requirements for single user PUCCH format 1a	113
8.3.2.1	Minimum requirements	113
8.3.3	CQI performance requirements for PUCCH format 2	114
8.3.3.1	Minimum requirements	114
8.3.4	ACK missed detection requirements for multi user PUCCH format 1a	114
8.3.4.1	Minimum requirement	114
8.3.5	ACK missed detection requirements for PUCCH format 1b with Channel Selection	115
8.3.5.1	Minimum requirements	115
8.3.6	ACK missed detection requirements for PUCCH format 3	115
8.3.6.1	Minimum requirements	115
8.3.7	NACK to ACK requirements for PUCCH format 3	116
8.3.7.1	Minimum requirement	116
8.3.8	CQI performance requirements for PUCCH format 2 with DTX detection	116
8.3.8.1	Minimum requirements	117
8.4	Performance requirements for PRACH	117
8.4.1	PRACH False alarm probability	117
8.4.1.1	Minimum requirement	117
8.4.2	PRACH detection requirements	117
8.4.2.1	Minimum requirements	117

Annex A (normative): Reference measurement channels119

A.1	Fixed Reference Channels for reference sensitivity and in-channel selectivity (QPSK, R=1/3)	119
A.2	Fixed Reference Channels for dynamic range (16QAM, R=2/3).....	120
A.3	Fixed Reference Channels for performance requirements (QPSK 1/3)	120
A.4	Fixed Reference Channels for performance requirements (16QAM 3/4)	121
A.5	Fixed Reference Channels for performance requirements (64QAM 5/6)	121
A.6	PRACH Test preambles	121
A.7	Fixed Reference Channels for UL timing adjustment (Scenario 1)	122
A.8	Fixed Reference Channels for UL timing adjustment (Scenario 2)	122
A.9	Multi user PUCCH test.....	122
A.10	PUCCH transmission on two antenna ports test.....	123

Annex B (normative): Propagation conditions.....124

B.1	Static propagation condition.....	124
B.2	Multi-path fading propagation conditions	124
B.3	High speed train condition	125
B.4	Moving propagation conditions.....	126
B.5	Multi-Antenna channel models	127
B.5.1	Definition of MIMO Correlation Matrices	127
B.5.2	MIMO Correlation Matrices at High, Medium and Low Level.....	128

Annex C (normative): Characteristics of the interfering signals.....131

Annex D (normative): Environmental requirements for the BS equipment132

Annex E (normative): Error Vector Magnitude133

E.1	Reference point for measurement.....	133
E.2	Basic unit of measurement	133

E.3	Modified signal under test.....	134
E.4	Estimation of frequency offset	134
E.5	Estimation of time offset	134
E.5.1	Window length	134
E.6	Estimation of TX chain amplitude and frequency response parameters	135
E.7	Averaged EVM	136
Annex F (Informative):	Unwanted emission requirements for multi-carrier BS	138
F.1	General	138
F.2	Multi-carrier BS of different E-UTRA channel bandwidths	138
F.3	Multi-carrier BS of E-UTRA and UTRA.....	138
Annex G (Informative):	Regional requirement for protection of DTT	139
Annex H (Informative):	Change history	140
History		149

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
 - 1 presented to TSG for information;
 - 2 presented to TSG for approval;
 - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document establishes the minimum RF characteristics and minimum performance requirements of E-UTRA Base Station (BS).

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

- [1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".
- [2] ITU-R Recommendation SM.329: "Unwanted emissions in the spurious domain".
- [3] ITU-R Recommendation M.1545: "Measurement uncertainty as it applies to test limits for the terrestrial component of International Mobile Telecommunications-2000".
- [4] 3GPP TS 36.141: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing".
- [5] ITU-R recommendation SM.328: "Spectra and bandwidth of emissions".
- [6] 3GPP TS 25.104: "Base Station (BS) radio transmission and reception (FDD)".
- [7] 3GPP TS 25.105: "Base Station (BS) radio transmission and reception (TDD)".
- [8] 3GPP TR 25.942: "RF system scenarios".
- [9] 3GPP TR 36.942: "E-UTRA RF system scenarios".
- [10] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Channels and Modulation".
- [11] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures".
- [12] ECC/DEC/(09)03 "Harmonised conditions for MFCN in the band 790-862 MHz", 30 Oct. 2009

- [13] IEC 60721-3-3 (2002): "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 3: Stationary use at weather protected locations".
- [14] IEC 60721-3-4 (1995): "Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 4: Stationary use at non-weather protected locations".
- [15] 3GPP TS 37.104: "E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) radio transmission and reception".