

ETSI EN 300 328 V2.1.1 (2016-11)



**Wideband transmission systems;
Data transmission equipment operating
in the 2,4 GHz ISM band and
using wide band modulation techniques;
Harmonised Standard covering the essential requirements
of article 3.2 of Directive 2014/53/EU**

PREVIEW
<https://standards.10000.org/standards/etsi/etsi-300-328-v2-1-1-2016-11>
4115-a990-a9236171-23b1-43b1-8121-200000000000

Reference

REN/ERM-TG11-011

Keywords

broadband, data, harmonised standard, ISM,
LAN, mobile, radio, regulation, spread spectrum,
SRD, testing, transmission, UHF

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/CommiteeSupportStaff.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.

Contents

Intellectual Property Rights	9
Foreword.....	9
Modal verbs terminology.....	9
Introduction	9
1 Scope	10
2 References	10
2.1 Normative references	10
2.2 Informative references.....	10
3 Definitions, symbols and abbreviations	11
3.1 Definitions.....	11
3.2 Symbols.....	13
3.3 Abbreviations	14
4 Technical requirements specifications	15
4.1 Environmental profile.....	15
4.2 Equipment types	15
4.2.1 Modulation types	15
4.2.2 Adaptive and non-adaptive equipment	15
4.2.3 Receiver categories	15
4.2.3.1 Introduction.....	15
4.2.3.2 Categorization	15
4.2.3.2.1 Receiver category 1	15
4.2.3.2.2 Receiver category 2	16
4.2.3.2.3 Receiver category 3	16
4.3 Conformance requirements	16
4.3.1 Requirements for Frequency Hopping equipment	16
4.3.1.1 Introduction.....	16
4.3.1.2 RF output power.....	16
4.3.1.2.1 Applicability	16
4.3.1.2.2 Definition.....	16
4.3.1.2.3 Limit	16
4.3.1.2.4 Conformance	16
4.3.1.3 Duty Cycle, Tx-sequence, Tx-gap.....	16
4.3.1.3.1 Applicability	16
4.3.1.3.2 Definition.....	17
4.3.1.3.3 Limit	17
4.3.1.3.4 Conformance	17
4.3.1.4 Accumulated Transmit Time, Frequency Occupation and Hopping Sequence.....	17
4.3.1.4.1 Applicability	17
4.3.1.4.2 Definition.....	17
4.3.1.4.3 Limit	17
4.3.1.4.4 Other Requirements.....	18
4.3.1.4.5 Conformance	18
4.3.1.5 Hopping Frequency Separation.....	19
4.3.1.5.1 Applicability	19
4.3.1.5.2 Definition.....	19
4.3.1.5.3 Limit	19
4.3.1.5.4 Conformance	19
4.3.1.6 Medium Utilization (MU) factor.....	19
4.3.1.6.1 Applicability	19
4.3.1.6.2 Definition.....	20
4.3.1.6.3 Limit	20
4.3.1.6.4 Conformance	20
4.3.1.7 Adaptivity (Adaptive Frequency Hopping).....	20
4.3.1.7.1 Applicability	20

4.3.1.7.2	Adaptive Frequency Hopping using LBT based DAA	20
4.3.1.7.3	Adaptive Frequency Hopping using other forms of DAA (non-LBT based)	22
4.3.1.7.4	Short Control Signalling Transmissions	23
4.3.1.8	Occupied Channel Bandwidth.....	23
4.3.1.8.1	Applicability	23
4.3.1.8.2	Definition.....	24
4.3.1.8.3	Limits	24
4.3.1.8.4	Conformance	24
4.3.1.9	Transmitter unwanted emissions in the out-of-band domain	24
4.3.1.9.1	Applicability	24
4.3.1.9.2	Definition.....	24
4.3.1.9.3	Limit	24
4.3.1.9.4	Conformance	24
4.3.1.10	Transmitter unwanted emissions in the spurious domain.....	25
4.3.1.10.1	Applicability	25
4.3.1.10.2	Definition.....	25
4.3.1.10.3	Limit	25
4.3.1.10.4	Conformance	25
4.3.1.11	Receiver spurious emissions	25
4.3.1.11.1	Applicability	25
4.3.1.11.2	Definition.....	25
4.3.1.11.3	Limit	25
4.3.1.11.4	Conformance	26
4.3.1.12	Receiver Blocking.....	26
4.3.1.12.1	Applicability	26
4.3.1.12.2	Definition.....	26
4.3.1.12.3	Performance Criteria	26
4.3.1.12.4	Limits	26
4.3.1.12.5	Conformance	27
4.3.1.13	Geo-location capability	27
4.3.1.13.1	Applicability	27
4.3.1.13.2	Definition.....	27
4.3.1.13.3	Requirements	28
4.3.2	Requirements for other types of Wide Band modulation.....	28
4.3.2.1	Introduction.....	28
4.3.2.2	RF output power.....	28
4.3.2.2.1	Applicability	28
4.3.2.2.2	Definition.....	28
4.3.2.2.3	Limit	28
4.3.2.2.4	Conformance	28
4.3.2.3	Power Spectral Density	28
4.3.2.3.1	Applicability	28
4.3.2.3.2	Definition.....	28
4.3.2.3.3	Limit	29
4.3.2.3.4	Conformance	29
4.3.2.4	Duty Cycle, Tx-sequence, Tx-gap.....	29
4.3.2.4.1	Applicability	29
4.3.2.4.2	Definition.....	29
4.3.2.4.3	Limit	29
4.3.2.4.4	Conformance	29
4.3.2.5	Medium Utilization (MU) factor.....	29
4.3.2.5.1	Applicability	29
4.3.2.5.2	Definition.....	29
4.3.2.5.3	Limit	30
4.3.2.5.4	Conformance	30
4.3.2.6	Adaptivity (adaptive equipment using modulations other than FHSS).....	30
4.3.2.6.1	Applicability	30
4.3.2.6.2	Non-LBT based Detect and Avoid	30
4.3.2.6.3	LBT based Detect and Avoid	31
4.3.2.6.4	Short Control Signalling Transmissions.....	34
4.3.2.7	Occupied Channel Bandwidth.....	34
4.3.2.7.1	Applicability	34

4.3.2.7.2	Definition.....	35
4.3.2.7.3	Limits	35
4.3.2.7.4	Conformance	35
4.3.2.8	Transmitter unwanted emissions in the out-of-band domain	35
4.3.2.8.1	Applicability	35
4.3.2.8.2	Definition.....	35
4.3.2.8.3	Limit	35
4.3.2.8.4	Conformance	35
4.3.2.9	Transmitter unwanted emissions in the spurious domain.....	36
4.3.2.9.1	Applicability	36
4.3.2.9.2	Definition.....	36
4.3.2.9.3	Limit	36
4.3.2.9.4	Conformance	36
4.3.2.10	Receiver spurious emissions	36
4.3.2.10.1	Applicability	36
4.3.2.10.2	Definition.....	36
4.3.2.10.3	Limit	36
4.3.2.10.4	Conformance	37
4.3.2.11	Receiver Blocking.....	37
4.3.2.11.1	Applicability	37
4.3.2.11.2	Definition.....	37
4.3.2.11.3	Performance Criteria	37
4.3.2.11.4	Limits	37
4.3.2.11.5	Conformance	38
4.3.2.12	Geo-location capability	38
4.3.2.12.1	Applicability	38
4.3.2.12.2	Definition.....	38
4.3.2.12.3	Requirements.....	39
5	Testing for compliance with technical requirements.....	39
5.1	Environmental conditions for testing.....	39
5.1.1	Introduction.....	39
5.1.2	Normal test conditions	39
5.1.2.1	Normal temperature and humidity	39
5.1.2.2	Normal power source	39
5.1.3	Extreme test conditions.....	39
5.2	Interpretation of the measurement results.....	39
5.3	Definition of other test conditions.....	40
5.3.1	Test mode.....	40
5.3.2	Antennas and transmit operating modes	40
5.3.2.1	Integrated and dedicated antennas.....	40
5.3.2.2	Smart antenna systems and related operating modes	41
5.3.2.2.1	Introduction	41
5.3.2.2.2	Operating mode 1 (single antenna).....	41
5.3.2.2.3	Operating mode 2 (multiple antennas, no beamforming)	41
5.3.2.2.4	Operating mode 3 (multiple antennas, with beamforming)	41
5.3.2.3	Configuration for testing	41
5.3.3	Adaptive and Non-adaptive equipment.....	41
5.3.4	Presentation of equipment	41
5.3.4.1	Introduction.....	41
5.3.4.2	Testing of stand-alone equipment	41
5.3.4.3	Testing of host connected equipment and plug-in radio equipment.....	42
5.3.4.3.1	Introduction	42
5.3.4.3.2	The use of a host or test jig for testing plug-in radio equipment	42
5.3.4.3.3	Testing of combinations	42
5.3.5	Conducted measurements, radiated measurements, relative measurements	43
5.4	Test procedures for essential radio test suites.....	43
5.4.1	Product Information.....	43
5.4.2	RF output power, Duty Cycle, Tx-sequence, Tx-gap, Medium Utilization	44
5.4.2.1	Test conditions	44
5.4.2.2	Test method.....	45
5.4.2.2.1	Conducted measurements	45

5.4.2.2.2	Radiated measurements	47
5.4.3	Power Spectral Density	47
5.4.3.1	Test conditions	47
5.4.3.2	Test method	48
5.4.3.2.1	Conducted measurement	48
5.4.3.2.2	Radiated measurement	50
5.4.4	Accumulated Transmit Time, Frequency Occupation and Hopping Sequence	50
5.4.4.1	Test conditions	50
5.4.4.2	Test method	50
5.4.4.2.1	Conducted measurements	50
5.4.4.2.2	Radiated measurements	52
5.4.5	Hopping Frequency Separation	52
5.4.5.1	Test conditions	52
5.4.5.2	Test method	52
5.4.5.2.1	Conducted measurements	52
5.4.5.2.2	Radiated measurements	55
5.4.6	Adaptivity (Channel access mechanism)	55
5.4.6.1	Test conditions	55
5.4.6.2	Test Method	55
5.4.6.2.1	Conducted measurements	55
5.4.6.2.2	Radiated measurements	63
5.4.7	Occupied Channel Bandwidth	64
5.4.7.1	Test conditions	64
5.4.7.2	Test method	64
5.4.7.2.1	Conducted measurement	64
5.4.7.2.2	Radiated measurement	64
5.4.8	Transmitter unwanted emissions in the out-of-band domain	65
5.4.8.1	Test conditions	65
5.4.8.2	Test method	65
5.4.8.2.1	Conducted measurement	65
5.4.8.2.2	Radiated measurement	66
5.4.9	Transmitter unwanted emissions in the spurious domain	67
5.4.9.1	Test conditions	67
5.4.9.2	Test method	67
5.4.9.2.1	Conducted measurement	67
5.4.9.2.2	Radiated measurement	69
5.4.10	Receiver spurious emissions	70
5.4.10.1	Test conditions	70
5.4.10.2	Test method	70
5.4.10.2.1	Conducted measurement	70
5.4.10.2.2	Radiated measurement	72
5.4.11	Receiver Blocking	72
5.4.11.1	Test conditions	72
5.4.11.2	Test Method	72
5.4.11.2.1	Conducted measurements	72
5.4.11.2.2	Radiated measurements	74

Annex A (informative):	Relationship between the present document and the essential requirements of Directive 2014/53/EU	75
-------------------------------	---	-----------

Annex B (normative):	Test sites and arrangements for radiated measurement	77
-----------------------------	---	-----------

B.1	Introduction	77
B.2	Radiation test sites	77
B.2.1	Open Area Test Site (OATS)	77
B.2.2	Semi Anechoic Room	78
B.2.3	Fully Anechoic Room (FAR)	79
B.2.4	Measurement Distance	80
B.3	Antennas	81
B.3.1	Introduction	81
B.3.2	Measurement antenna	81

B.3.3	Substitution antenna	81
B.4	Test fixture	81
B.4.1	Conducted measurements and use of test fixture	81
B.4.2	Description of the test fixture	82
B.4.3	Using the test fixture for relative measurements	82
B.5	Guidance on the use of radiation test sites	82
B.5.1	Introduction	82
B.5.2	Power supplies for a battery-only powered UUT	82
B.5.3	Site preparation	83
B.6	Coupling of signals.....	83
B.7	Interference Signal used for Adaptivity Tests	83
Annex C (normative): Measurement procedures for radiated measurement		85
C.1	Introduction	85
C.2	Radiated measurements in an OATS or SAR.....	85
C.3	Radiated measurements in a FAR	85
C.4	Substitution measurement	86
C.5	Guidance for testing technical requirements	86
C.5.1	Introduction	86
C.5.2	Test procedures and corresponding test sites	86
C.5.3	Guidance for testing Adaptivity (Channel Access Mechanism).....	87
C.5.3.1	Introduction.....	87
C.5.3.2	Measurement Set-up	87
C.5.3.3	Calibration of the measurement Set-up.....	87
C.5.3.4	Test method	88
C.5.4	Guidance for testing Receiver Blocking.....	88
C.5.4.1	Introduction.....	88
C.5.4.2	Measurement Set-up	88
C.5.4.3	Calibration of the measurement Set-up.....	88
C.5.4.4	Test method	89
Annex D (informative): Guidance for testing 2,4 GHz IEEE 802.11™ Equipment		90
D.1	Introduction	90
D.2	Possible Modulations	90
D.2.1	Introduction	90
D.2.2	Guidance for Testing	90
D.2.2.1	Introduction.....	90
D.2.2.2	Modulation Used for Conformance Testing	90
D.3	Possible Operating Modes.....	91
D.3.1	Introduction	91
D.3.2	Guidance for Testing.....	91
Annex E (informative): Application form for testing.....		93
E.1	Introduction	93
E.2	Information as required by ETSI EN 300 328 V2.1.1, clause 5.4.1.....	93
E.3	Configuration for testing (see clause 5.3.2.3 of ETSI EN 300 328 V2.1.1).....	98
E.4	Additional information provided by the manufacturer.....	98
E.4.1	Modulation	98
E.4.2	Duty Cycle.....	99
E.4.3	About the UUT	99
E.4.4	Additional items and/or supporting equipment provided	99

Annex F (informative):	Change History	100
History		101

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/d07aa0bd-96b2-4115-a990-a923671133b3/etsi-en-300-328-v2.1.1-2016-11>

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 Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).

The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.14] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive, and associated EFTA regulations.

National transposition dates	
Date of adoption of this EN:	14 November 2016
Date of latest announcement of this EN (doa):	28 February 2017
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 August 2017
Date of withdrawal of any conflicting National Standard (dow):	31 August 2018

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.

Introduction

The present document covers Wide Band Data Transmission equipment.

Examples of Wide Band Data Transmission equipment are equipments such as IEEE 802.11™ RLANs [i.3], Bluetooth® wireless technologies, Zigbee™, etc.

1 Scope

The present document applies to Wide Band Data Transmission equipment.

The present document also describes spectrum access requirements to facilitate spectrum sharing with other equipment.

Wide Band Data Transmission equipment covered by the present document is operated in accordance with the ERC Recommendation 70-03 [i.6], annex 3 or Commission Decision 2006/771/EC [i.7] (and its amendments).

This radio equipment is capable of operating in the band provided in table 1.

Table 1: Service frequency bands

	Service frequency bands
Transmit	2 400 MHz to 2 483,5 MHz
Receive	2 400 MHz to 2 483,5 MHz

Equipment using Ultra Wide Band (UWB) technology is not covered by the present document.

The present document contains requirements to demonstrate that radio equipment both effectively uses and supports the efficient use of radio spectrum in order to avoid harmful interference.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC.

[i.2] Void.

- [i.3] IEEE Std. 802.11™-2012: "IEEE Standard for Information Technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements. Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications".
- [i.4] IEEE Std. 802.15.4™-2011: "IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements. Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (WPANs)".
- [i.5] Void.
- [i.6] CEPT ERC Recommendation 70-03 (1997): "Relating to the use of Short Range Devices (SRD)".
- [i.7] Commission Decision 2006/771/EC of 9 November 2006 on harmonisation of the radio spectrum for use by short-range devices.
- [i.8] ETSI TR 102 273-2 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 2: Anechoic chamber".
- [i.9] ETSI TR 102 273-3 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 3: Anechoic chamber with a ground plane".
- [i.10] ETSI TR 102 273-4 (V1.2.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Improvement on Radiated Methods of Measurement (using test site) and evaluation of the corresponding measurement uncertainties; Part 4: Open area test site".
- [i.11] ETSI TR 100 028-2 (V1.4.1): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.12] Void.
- [i.13] Void.
- [i.14] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.15] ETSI TR 100 028-1 (V1.4.1) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in Directive 2014/53/EU [i.1] and the following apply:

adaptive equipment: equipment operating in an adaptive mode

adaptive frequency hopping: mechanism that allows a frequency hopping equipment to adapt to its radio environment by identifying channels that are being used and excluding them from the list of available channels

adaptive mode: mode in which equipment can adapt its medium access to its radio environment by identifying other transmissions present in the band

adjacent channel: channels on either side of the nominal channel separated by the nominal channel bandwidth

adjacent hopping frequency: neighbouring hopping frequency which is separated by the minimum hopping frequency separation

antenna assembly: combination of the antenna (integral or dedicated), its feeder (e.g. coaxial cable) and if applicable, its antenna connector and associated switching components

NOTE: The gain of an antenna assembly (G) in dBi, does not include the additional gain that may result out of beamforming. This term (antenna assembly) refers to an antenna connected to one transmit chain.

beamforming gain: additional (antenna) gain realized by using beamforming techniques in smart antenna systems

NOTE: Beamforming gain as used in the present document, does not include the gain of the antenna assembly.

blacklisted frequency: hopping frequency occupied by frequency hopping equipment without having transmissions during the dwell time

clear channel assessment: mechanism used by an equipment to identify other transmissions in the channel

combined equipment: any combination of non-radio equipment that requires a plug-in radio equipment to offer full functionality

dedicated antenna: removable antenna(s) assessed together with the radio equipment against the requirements of the present document

detect and avoid: mechanism which mitigates interference potential by avoiding use of frequencies upon detection of other transmissions on those frequencies

direct sequence spread spectrum: form of modulation where a combination of data to be transmitted and a known code sequence (chip sequence) is used to directly modulate a carrier

NOTE: The transmitted bandwidth is determined by the chip rate and the modulation scheme.

dwell time: time between frequency changes for Frequency Hopping equipment

NOTE: The Dwell Time might comprise transmit, receive and idle phases of the equipment.

energy detect: mechanism used by an LBT based adaptive equipment to determine the presence of other devices operating on the channel based on detecting the signal level of that other device

environmental profile: range of environmental conditions for the equipment

frame based equipment: equipment where the transmit/receive structure is not directly demand-driven but has fixed timing

frequency hopping spread spectrum: spread spectrum technique in which the equipment occupies a number of frequencies in time, each for some period of time, referred to as the dwell time

NOTE: Transmitter and receiver follow the same frequency hop pattern. The frequency range is determined by the lowest and highest hop positions and the bandwidth per hop position.

geo-location capability: capability of equipment to determine its geographical location

hopping frequency: any of the (centre) frequencies defined within the hopping sequence of an FHSS equipment

host equipment: any equipment which has complete user functionality when not connected to the radio equipment part and to which the radio equipment part provides additional functionality and to which connection is necessary for the radio equipment part to offer functionality

idle period: period in time following a transmission sequence during which the equipment does not transmit

integral antenna: antenna designed as a fixed part of the equipment, without the use of an external connector and which cannot be disconnected from the equipment by a user with the intent to connect another antenna

NOTE: An integral antenna may be fitted internally or externally. In the case where the antenna is external, a non-detachable cable may be used. An antenna using internal connectors to connect to the internal radio part (e.g. printed circuit board) is considered to be an integral antenna.

Listen Before Talk (LBT): mechanism by which an equipment first applies CCA before using the channel

load based equipment: equipment where the transmit/receive structure is demand-driven

multi-radio equipment: radio, host or combined equipment using more than one radio transceiver

necessary bandwidth: width of the frequency band which is just sufficient to ensure the transmission of information at the rate and with the quality required under specified conditions

nominal channel bandwidth: band of frequencies assigned to a single channel

NOTE: The Nominal Channel Bandwidth is declared by the manufacturer as outlined in clause 5.4.1.

operating frequency: nominal frequency at which the equipment can be operated

NOTE: Equipment may be adjustable for operation at more than one operating frequency.

out-of-band emission: emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding emissions in the spurious domain

plug-in radio equipment: radio equipment module intended to be used with or within host, combined or multi-radio equipment, using their control functions and power supply

power envelope: RF power versus frequency contour

power spectral density: mean power in a given reference bandwidth

receive chain: receiver circuit with an associated antenna assembly

NOTE: Two or more receive chains are combined in a smart antenna assembly.

smart antenna systems: equipment that combines multiple transmit and/or receive chains with a signal processing function to increase the throughput and/or to optimize its radiation and/or reception capabilities

NOTE: These are techniques such as spatial multiplexing, beamforming, cyclic delay diversity, MIMO, etc.

spurious emissions: emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

stand-alone radio equipment: equipment that is intended primarily as communications equipment and that is normally used on a stand-alone basis

transmission burst: period in time during a transmission during which the transmitter is continuously on

transmit chain: transmitter circuit with an associated antenna assembly

NOTE: Two or more transmit chains are combined in a smart antenna system.

ultra wide band technology: technology for short-range radiocommunication, involving the intentional generation and transmission of radio-frequency energy that spreads over a very large frequency range, which may overlap several frequency bands allocated to radiocommunication services

wide band modulation: modulation such as FHSS, DSSS, OFDM, etc.

3.2 Symbols

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

A_{ch}	number of active transmit chains
BW_{CHAN}	Channel Bandwidth
dBm	dB relative to 1 milliwatt
dBp	dB relative to peak power