



**SLOVENSKI STANDARD**  
**SIST EN 300 328 V2.2.2:2020**

**01-januar-2020**

---

**Širokopasovni prenosni sistemi - Oprema za prenos podatkov v frekvenčnem pasu 2,4 GHz - Harmonizirani standard za dostop do radijskega spektra**

Wideband transmission systems - Data transmission equipment operating in the 2,4 GHz band - Harmonised Standard for access to radio spectrum

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

**Ta slovenski standard je istoveten z: <sup>SIST EN 300 328 V2.2.2:2020</sup> ETSI EN 300 328 V2.2.2 (2019-07)**

<https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020>

**ICS:**

33.060.99	Druga oprema za radijske komunikacije	Other equipment for radiocommunications
-----------	---------------------------------------	---

**SIST EN 300 328 V2.2.2:2020**                      **en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 300 328 V2.2.2:2020

<https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020>

# ETSI EN 300 328 V2.2.2 (2019-07)



**Wideband transmission systems;  
Data transmission equipment operating in the 2,4 GHz band;  
Harmonised Standard for access to radio spectrum**

[SIST EN 300 328 V2.2.2:2020](https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020>

---

**Reference**

REN/ERM-TG11-12

---

**Keywords**

broadband, data, harmonised standard, 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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

---

**Important notice**

<https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca024105419/sist-en-300-328-v2-2-2020>  
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 prevailing version of an ETSI deliverable is the one made publicly available in PDF format at [www.etsi.org/deliver](http://www.etsi.org/deliver).

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.

© ETSI 2019.  
All rights reserved.

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

**oneM2M™** logo is a trademark of ETSI registered for the benefit of its Members and of the oneM2M Partners.

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

# Contents

Intellectual Property Rights .....	8
Foreword.....	8
Modal verbs terminology.....	8
Introduction .....	9
1 Scope .....	10
2 References .....	10
2.1 Normative references .....	10
2.2 Informative references.....	10
3 Definition of terms, symbols and abbreviations.....	11
3.1 Terms.....	11
3.2 Symbols.....	13
3.3 Abbreviations .....	14
4 Technical requirements specifications .....	14
4.1 Environmental profile.....	14
4.2 Equipment types.....	15
4.2.1 Wideband Data Transmission equipment 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
4.2.4 Antenna types .....	16
4.3 Conformance requirements.....	16
4.3.1 Requirements for Frequency Hopping (FHSS) 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 .....	17
4.3.1.3 Duty Cycle, Tx-sequence, Tx-gap.....	17
4.3.1.3.1 Applicability .....	17
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.....	18
4.3.1.4.3 Limit .....	18
4.3.1.4.4 Conformance .....	19
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 .....	20
4.3.1.6 Medium Utilization (MU) factor.....	20
4.3.1.6.1 Applicability .....	20
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 FHSS).....	20
4.3.1.7.1 Applicability.....	20

4.3.1.7.2	Adaptive FHSS using LBT.....	21
4.3.1.7.3	Adaptive FHSS using DAA.....	22
4.3.1.7.4	Short Control Signalling Transmissions.....	23
4.3.1.8	Occupied Channel Bandwidth.....	24
4.3.1.8.1	Applicability.....	24
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.....	25
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.....	28
4.3.1.13	Geo-location capability.....	28
4.3.1.13.1	Applicability.....	28
4.3.1.13.2	Definition.....	28
4.3.1.13.3	Requirements.....	28
4.3.2	Requirements for other types of Wideband Data Transmission equipment (non-FHSS equipment).....	28
4.3.2.1	Introduction.....	28
4.3.2.2	RF output power.....	29
4.3.2.2.1	Applicability.....	29
4.3.2.2.2	Definition.....	29
4.3.2.2.3	Limit.....	29
4.3.2.2.4	Conformance.....	29
4.3.2.3	Power Spectral Density.....	29
4.3.2.3.1	Applicability.....	29
4.3.2.3.2	Definition.....	29
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.....	30
4.3.2.4.3	Limit.....	30
4.3.2.4.4	Conformance.....	30
4.3.2.5	Medium Utilization (MU) factor.....	30
4.3.2.5.1	Applicability.....	30
4.3.2.5.2	Definition.....	30
4.3.2.5.3	Limit.....	31
4.3.2.5.4	Conformance.....	31
4.3.2.6	Adaptivity (non-FHSS).....	31
4.3.2.6.1	Applicability.....	31
4.3.2.6.2	Adaptive non-FHSS using DAA.....	31
4.3.2.6.3	Adaptive non-FHSS using LBT.....	32
4.3.2.6.4	Short Control Signalling Transmissions.....	35
4.3.2.7	Occupied Channel Bandwidth.....	35
4.3.2.7.1	Applicability.....	35

4.3.2.7.2	Definition.....	35
4.3.2.7.3	Limits .....	35
4.3.2.7.4	Conformance .....	36
4.3.2.8	Transmitter unwanted emissions in the out-of-band domain .....	36
4.3.2.8.1	Applicability .....	36
4.3.2.8.2	Definition.....	36
4.3.2.8.3	Limit .....	36
4.3.2.8.4	Conformance .....	36
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 .....	37
4.3.2.9.4	Conformance .....	37
4.3.2.10	Receiver spurious emissions .....	37
4.3.2.10.1	Applicability .....	37
4.3.2.10.2	Definition.....	37
4.3.2.10.3	Limit .....	37
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.....	38
4.3.2.11.3	Performance Criteria .....	38
4.3.2.11.4	Limits .....	38
4.3.2.11.5	Conformance .....	39
4.3.2.12	Geo-location capability .....	39
4.3.2.12.1	Applicability .....	39
4.3.2.12.2	Definition.....	40
4.3.2.12.3	Requirements.....	40
5	Testing for compliance with technical requirements.....	40
5.1	Environmental conditions for testing .....	40
5.1.1	Introduction.....	40
5.1.2	Normal test conditions.....	40
5.1.2.1	Normal temperature and humidity.....	40
5.1.2.2	Normal power source.....	40
5.1.3	Extreme test conditions.....	40
5.2	Void.....	40
5.3	Definition of other test conditions.....	41
5.3.1	Test mode.....	41
5.3.2	Antennas and transmit operating modes .....	41
5.3.2.1	Integrated and dedicated antennas.....	41
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).....	42
5.3.2.3	Configuration for testing.....	42
5.3.3	Adaptive and Non-adaptive equipment.....	42
5.3.4	Presentation of equipment .....	42
5.3.5	Conducted measurements, radiated measurements, relative measurements .....	42
5.4	Test procedures for essential radio test suites.....	42
5.4.1	Product Information.....	42
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.....	44
5.4.2.2.1	Conducted measurements .....	44
5.4.2.2.2	Radiated measurements .....	46
5.4.3	Power Spectral Density.....	47
5.4.3.1	Test conditions .....	47
5.4.3.2	Test method.....	47
5.4.3.2.1	Conducted measurement.....	47
5.4.3.2.2	Radiated measurement.....	49

STANDARD PREVIEW  
(standards.itech.ai)

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 .....	51
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 .....	54
5.4.6	Adaptivity (Channel access mechanism) .....	54
5.4.6.1	Test conditions .....	54
5.4.6.2	Test Method .....	54
5.4.6.2.1	Conducted measurements .....	54
5.4.6.2.2	Radiated measurements .....	62
5.4.7	Occupied Channel Bandwidth .....	63
5.4.7.1	Test conditions .....	63
5.4.7.2	Test method .....	63
5.4.7.2.1	Conducted measurement .....	63
5.4.7.2.2	Radiated measurement .....	64
5.4.8	Transmitter unwanted emissions in the out-of-band domain .....	64
5.4.8.1	Test conditions .....	64
5.4.8.2	Test method .....	64
5.4.8.2.1	Conducted measurement .....	64
5.4.8.2.2	Radiated measurement .....	66
5.4.9	Transmitter unwanted emissions in the spurious domain .....	66
5.4.9.1	Test conditions .....	66
5.4.9.2	Test method .....	66
5.4.9.2.1	Conducted measurement .....	66
5.4.9.2.2	Radiated measurement .....	68
5.4.10	Receiver spurious emissions .....	69
5.4.10.1	Test conditions .....	69
5.4.10.2	Test method .....	69
5.4.10.2.1	Conducted measurement .....	69
5.4.10.2.2	Radiated measurement .....	71
5.4.11	Receiver Blocking .....	71
5.4.11.1	Test conditions .....	71
5.4.11.2	Test Method .....	71
5.4.11.2.1	Conducted measurements .....	71
5.4.11.2.2	Radiated measurements .....	73

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

<b>Annex B (normative):</b>	<b>Test sites and arrangements for radiated measurement .....</b>	<b>77</b>
-----------------------------	---	-----------

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
<b>Annex C (normative): Measurement procedures for radiated measurement .....</b>		<b>85</b>
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.....	89
C.5.4.4	Test method .....	89
<b>Annex D (informative): Guidance for testing 2,4 GHz IEEE 802.11™ Equipment.....</b>		<b>90</b>
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
<b>Annex E (informative): Application form for testing.....</b>		<b>93</b>
E.1	Introduction .....	93
E.2	Information as required by ETSI EN 300 328 V2.2.2, clause 5.4.1.....	93
E.3	Configuration for testing (see clause 5.3.2.3 of ETSI EN 300 328 V2.2.2).....	98
E.4	Additional information provided by the manufacturer.....	98
E.4.1	Modulation .....	98
E.4.2	Duty Cycle.....	98
E.4.3	About the UUT .....	98
E.4.4	Additional items and/or supporting equipment provided .....	99
<b>Annex F (informative): Change History .....</b>		<b>100</b>
History .....		101

---

## Intellectual Property Rights

### Essential patents

IPRs essential or potentially essential to normative deliverables 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.

### Trademarks

The present document may include trademarks and/or tradenames which are asserted and/or registered by their owners. ETSI claims no ownership of these except for any which are indicated as being the property of ETSI, and conveys no right to use or reproduce any trademark and/or tradename. Mention of those trademarks in the present document does not constitute an endorsement by ETSI of products, services or organizations associated with those trademarks.

---

## 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]. <https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020>

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:	1 July 2019
Date of latest announcement of this EN (doa):	31 October 2019
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	30 April 2020
Date of withdrawal of any conflicting National Standard (dow):	31 October 2021

---

## 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 Wideband Data Transmission equipment.

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 300 328 V2.2.2:2020](https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/387c4ddb-4cd3-4840-b19f-ca769a7d5479/sist-en-300-328-v2-2-2-2020>

# 1 Scope

The present document applies to Wideband Data Transmission equipment.

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

Wideband 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.

NOTE: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

## 2 References

### 2.1 Normative references

References are specific, identified by date of publication and/or edition number or version number. Only the cited version applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <https://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 802.11™-2016: "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 802.15.4™-2015: "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: "Relating to the use of Short Range Devices (SRD)".
- [i.7] Commission Decision 2006/771/EC on harmonisation of the radio spectrum for use by short-range devices.
- [i.8] ETSI TR 102 273-2 (V1.2.1) (12-2001): "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) (12-2001): "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) (12-2001): "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2".
- [i.12] ETSI EG 203 367 (V1.1.1) (06-2016): "Guide to the application of harmonised standards covering articles 3.1b and 3.2 of the Directive 2014/53/EU (RED) to multi-radio and combined radio and non-radio equipment".
- [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 Definition of terms, symbols and abbreviations

### 3.1 Terms

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

**adaptive equipment:** equipment using a mechanism which allows it to adapt to its radio environment by identifying frequencies that are being used by other equipment

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

**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

**antenna assembly gain:** in-band antenna assembly gain (G) in dBi which does not include the additional gain that may result out of beamforming.

NOTE: 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 FHSS equipment without having transmissions during the dwell time

**Clear Channel Assessment (CCA):** mechanism used by an equipment to identify other transmissions in the channel

**combined equipment:** combination of a non-radio product and one or more radio equipments whereby the radio equipment(s) is (are) incorporated into the non-radio product in a permanently affixed manner

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

**Detect And Avoid (DAA):** mechanism which mitigates interference potential by avoiding use of frequencies upon detection of other transmissions on those frequencies

**dwell time:** time between frequency changes for FHSS 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 demand-driven but has fixed timing

**Frequency Hopping Spread Spectrum (FHSS) equipment:** equipment using a frequency hopping technique in which it 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.

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

**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:** combined equipment with more than one radio equipment

**Nominal Channel Bandwidth:** bandwidth of frequencies assigned to a single channel

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

**non-adaptive equipment:** equipment not capable of adapting to its radio environment by identifying frequencies that are being used by other equipment

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

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

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

**power envelope:** RF power versus frequency contour

**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 transmission and/or reception capabilities

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

**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

**wideband data transmission equipment:** equipment using modulation or spreading techniques resulting in a wideband signal

NOTE: Examples of such techniques include 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
dB <sub>r</sub>	dB relative to peak power
dBW	dB relative to 1 Watt
F	Frequency
$F_{HS}$	Hopping Frequency Separation
GHz	GigaHertz
Hz	Hertz
kHz	kiloHertz
MHz	MegaHertz
mW	milliWatt
ms	millisecond
MS/s	Mega Samples per second
N	Number of hopping frequencies
P	Power
$P_{out}$	RF Output Power
TxOff	Transmitter Off
TxOn	Transmitter On