



SLOVENSKI STANDARD
oSIST prEN IEC 62657-2:2020
01-november-2020

**Industrijska komunikacijska omrežja - Brežična komunikacijska omrežja - 2. del:
Upravljanje soobstoja**

Industrial communication networks - Wireless communication networks - Part 2:
Coexistence management

Industrielle Kommunikationsnetze - Funk-Kommunikationsnetze - Teil 2: Koexistenz-
Management

Réseaux de communication industriels - Réseaux de communication sans fil - Partie 2:
Gestion de coexistence

iTeh STANDARD PREVIEW
(standards.iteh.ai)
oSIST prEN IEC 62657-2:2020
<https://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c791357bd88f/osist-pr-en-iec-62657-2-2020>

Ta slovenski standard je istoveten z: prEN IEC 62657-2:2020

ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.110	Omreževanje	Networking

oSIST prEN IEC 62657-2:2020

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN IEC 62657-2:2020](https://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c781357bdb8f/osist-pren-iec-62657-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c781357bdb8f/osist-pren-iec-62657-2-2020>



PROJECT NUMBER: IEC 62657-2 ED3	
DATE OF CIRCULATION: 2020-09-18	CLOSING DATE FOR VOTING: 2020-12-11
SUPERSEDES DOCUMENTS: 65C/1009/CD, 65C/1040/CC	

IEC SC 65C : INDUSTRIAL NETWORKS	
SECRETARIAT: France	SECRETARY: Ms Valérie DEMASSIEUX
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 3D	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c781357bdb8f/osist-pren-iec-62657-2-2020 The CENELEC members are invited to vote through the CENELEC online voting system.	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

Industrial communication networks - Wireless communication networks - Part 2: Coexistence management

PROPOSED STABILITY DATE: 2025

NOTE FROM TC/SC OFFICERS:

NC comments on this CDV will be resolved during the next SC65C/WG17 meeting scheduled on January 11th-13th, 2021, tentatively in Frankfurt (Germany) (location to be confirmed by September 2020, or replaced by a series of web meetings).

Copyright © 2020 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

FOREWORD	7
INTRODUCTION	9
1 Scope	11
2 Normative references	11
3 Terms, definitions, abbreviated terms and conventions	11
3.1 Terms and definitions	11
3.2 Abbreviated terms	26
3.3 Conventions	27
4 Coexistence concept in industrial automation	27
4.1 Overview	27
4.2 Objective	28
4.3 Necessity to implement a coexistence management	31
4.4 Interference potential	33
4.5 Ancillary conditions	34
4.6 Requirements to wireless devices for support of coexistence management	35
4.7 Concepts	35
4.7.1 Manual coexistence management	35
4.7.2 Automated non-collaborative coexistence management	36
4.7.3 Automated collaborative coexistence management	36
4.8 Best practices to achieve coexistence	37
4.9 Coexistence conceptual model	39
4.10 Coexistence management and selection of a wireless solution	41
4.11 Coexistence management system	43
5 Coexistence management parameters	44
5.1 General	44
5.1.1 Definition and usage of parameters	44
5.1.2 Physical link	44
5.2 Adjacent channel selectivity	44
5.3 Antenna gain	45
5.4 Antenna radiation pattern	45
5.5 Antenna type	45
5.6 Communication availability	45
5.7 Communication reliability	46
5.8 Bit rate of physical link	46
5.9 Centre frequency	46
5.10 Area of operation	46
5.11 Communication load	46
5.12 Cut-off frequency	48
5.13 Data throughput	49
5.14 Distance between wireless devices	49
5.15 Duty cycle	50
5.16 Dwell time	52
5.17 Equivalent isotropic radiated power	53
5.18 Equivalent radiated power	54
5.19 Frequency band	54

5.20	Frequency bandwidth	54
5.21	Frequency channel	54
5.22	Frequency hopping procedure	55
5.23	Future expansion plan	55
5.24	Geographical dimension of the plant	55
5.25	Infrastructure device	56
5.26	Initiation of data transmission	56
5.27	Interference type	56
5.28	Intervisibility	56
5.29	ISM application	57
5.30	Length of user data per transfer interval	57
5.31	Limitation from neighbours of the plant	57
5.32	Maximum number of retransmissions	57
5.33	Mechanism for adaptivity	57
5.34	Medium access control mechanism	58
5.35	Modulation	58
5.36	Natural environmental condition	58
5.37	Network topology	58
5.38	Object movement	59
5.39	Operating time between failures	59
5.40	Packet loss ratio	59
5.41	Position of wireless devices	59
5.42	Power spectral density	60
5.43	Purpose of the automation application	60
5.44	Receiver blocking	60
5.45	Receiver maximum input level	61
5.46	Receiver sensitivity	61
5.47	Regional radio regulations	61
5.48	Relative movement	61
5.49	Response time	62
5.50	Security level	62
5.51	Spatial coverage of the wireless communication system	62
5.52	Spatial extent of the application	62
5.53	Spurious response	63
5.54	Survival time	63
5.55	Total radiated power	63
5.56	Transfer interval	63
5.57	Transmission gap	64
5.58	Transmission time	65
5.59	Transmitter output power	68
5.60	Transmitter sequence	68
5.61	Transmitter spectral mask	69
5.62	Update time	70
5.63	Wireless device density	71
5.64	Wireless device type information	71
5.65	Wireless communication solution density	72
5.66	Wireless technology or standard	72
6	Coexistence management information structures	72
6.1	General	72

6.2	General plant characteristic	74
6.2.1	General	74
6.2.2	General plant characteristic	74
6.2.3	Passive environmental influences	74
6.2.4	Active environmental influences.....	75
6.3	Application communication requirements	76
6.3.1	Overview	76
6.3.2	Requirements influencing the characteristic of wireless solutions	77
6.3.3	Performance requirements.....	77
6.4	Wireless system type and wireless device type	78
6.4.1	Overview	78
6.4.2	Wireless system type.....	79
6.4.3	Wireless device type.....	79
6.5	Wireless solution	82
6.5.1	Overview	82
6.5.2	Wireless system solution	82
6.5.3	Wireless device solution	83
6.6	Application related influencing parameters.....	84
7	Coexistence management process	86
7.1	General.....	86
7.1.1	Overview.....	86
7.1.2	Documentation	86
7.1.3	Suitable documentation method.....	88
7.1.4	Application of tools	88
7.2	Establishment of a coexistence management system.....	88
7.2.1	Nomination of a coexistence manager.....	88
7.2.2	Responsibility of a coexistence manager	89
7.2.3	Support by radio experts.....	89
7.2.4	Training	89
7.3	Maintaining coexistence management system.....	90
7.4	Phases of a coexistence management process	90
7.4.1	Investigation phase.....	90
7.4.2	Planning phase.....	93
7.4.3	Implementation phase.....	95
7.4.4	Operation phase	96
7.4.5	Maintenance.....	97
8	Coexistence parameter templates.....	98
	Bibliography.....	103
	Figure 1 – Issues of consideration	30
	Figure 2 – Applications using frequency spectrum	31
	Figure 3 – Progression of expense to achieve coexistence corresponding to the application classes	35
	Figure 4 – Separation of wireless systems according to frequency and time	38
	Figure 5 – Coexistence conceptual model.....	40
	Figure 6 – Flow chart of the coexistence conceptual model.....	41
	Figure 7 – Selection of a wireless system in the coexistence management process	43
	Figure 8 – Communication load in case of two wireless devices	47

Figure 9 – Communication load in the case of several wireless devices	48
Figure 10 – Cut-off frequencies derived from maximum power level	49
Figure 11 – Distance of the wireless devices	50
Figure 12 – Duty cycle	51
Figure 13 – Maximum dwell time	53
Figure 14 – Power spectral density of an IEEE 802.15.4 system	60
Figure 15 – Communication cycle, application event interval and machine cycle	64
Figure 16 – Transmission gap	65
Figure 17 – Example of the density functions of transmission time	66
Figure 18 – Example of the distribution functions of transmission time	67
Figure 19 – Transmitter sequence	69
Figure 20 – Transmitter spectral mask of an IEEE 802.15.4 system	70
Figure 21 – Example of distribution functions of the update time	71
Figure 22 – Principle for use of coexistence parameters	73
Figure 23 – Parameters to describe the general plant characteristic	74
Figure 24 – Parameters to describe application communication requirements	76
Figure 25 – Parameters to describe wireless system type and device type	78
Figure 26 – Example of power spectral density and transmitter spectral mask	80
Figure 27 – Example of medium utilization in time and frequency	80
Figure 28 – Parameters to describe a wireless communication solution	82
Figure 29 – Planning of a wireless system in the coexistence management process	94
Figure 30 – Implementation and operation of a wireless system in the coexistence management process	97
Table 1 – Example of a classification of application communication requirements	29
Table 2 – Application profile dependent observation time values	51
Table 3 – Parameter options for frequency channel	55
Table 4 – Hierarchy of the characteristics	72
Table 5 – List of parameters used to describe the general plant characteristic	74
Table 6 – List of parameters used to describe the passive environmental influences	75
Table 7 – List of parameters used to describe the active environmental influences	75
Table 8 – List of parameters used to describe the interference type	76
Table 9 – List of parameters used to describe the requirements influencing the characteristic of wireless solutions	77
Table 10 – List of characteristic parameters	77
Table 11 – List of parameters used to describe the wireless system type	79
Table 12 – List of parameters used to describe the transmitter of a wireless device type 81	
Table 13 – List of parameters used to describe the receiver of a wireless device type	81
Table 14 – List of parameters used to describe a wireless solution	83
Table 15 – List of general parameters used to describe the wireless device solution	83
Table 16 – List of parameters used to describe the transmitter of a wireless device solution	83
Table 17 – List of parameters used to describe the receiver of a wireless device solution	84

Table 18 – List of relevant characteristic parameters	85
Table 19 – List of relevant statistical values of characteristic parameters.....	85
Table 20 – Template used to describe the general plant characteristic.....	98
Table 21 – Template used to describe the application communication requirements	99
Table 22 – Template used to describe the wireless system type	99
Table 23 – Template used to describe a wireless device type	100
Table 24 – Template used to describe the wireless system solution.....	100
Table 25 – Template used to describe a wireless device solution.....	101
Table 26 – Template used to describe the relevant characteristic parameters for the coexistence management	102
Table 27 – Template used to describe the relevant statistical values of characteristic parameters	102
Table 28 – Template used to describe an interference type	102

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN IEC 62657-2:2020](https://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c781357bdb8f/osist-pren-iec-62657-2-2020)

<https://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-c781357bdb8f/osist-pren-iec-62657-2-2020>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
WIRELESS COMMUNICATION NETWORKS –****Part 2: Coexistence management**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62657-2 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This third edition cancels and replaces the second edition published in 2017 and its Amendment 1 published in 2019. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- alignment of some definitions and specifications of coexistence parameters in order to facilitate their future inclusion in the IEC Common Data Dictionary (IEC CDD) maintained by the IEC;
- alignment of some definitions and specifications to be consistent to the new Part 3 and Part 4.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/XX/FDIS	65C/XX/RVD

55
56 Full information on the voting for the approval of this International Standard can be found in the
57 report on voting indicated in the above table.

58 This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

59 A list of all the parts of the IEC 62657 series, under the general title *Industrial communication*
60 *networks – Wireless communication networks*, can be found on the IEC website.

61 The committee has decided that the contents of this document will remain unchanged until the
62 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
63 the specific document. At this date, the document will be

- 64 • reconfirmed,
- 65 • withdrawn,
- 66 • replaced by a revised edition, or
- 67 • amended.

68

69 The National Committees are requested to note that for this document the stability date
70 is 2025.

71 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED
72 AT THE PUBLICATION STAGE.

73

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

74

75

76

INTRODUCTION

77 The overall market for wireless communication solutions spans a range of diverse applications,
78 with differing performance and functional requirements. Within this overall market, the industrial
79 automation domain could include:

- 80 • process automation, covering for example the following industry branches:
 - 81 – oil and gas, refining,
 - 82 – chemical,
 - 83 – pharmaceutical,
 - 84 – mining,
 - 85 – pulp & paper,
 - 86 – water & wastewater,
 - 87 – steel
- 88 • electric power such as:
 - 89 – power generation (for example wind turbine),
 - 90 – power transmission and distribution (grid),
- 91 • factory automation, covering for example the following industry branches:
 - 92 – food and beverage,
 - 93 – automotive,
 - 94 – machinery,
 - 95 – semiconductor.

96 Industrial automation requirements for wireless communication systems are different from those
97 of, for example, the telecommunications, commercial and consumer markets. These industrial
98 automation requirements are identified and provided in IEC 62657-1.

99 Industrial premises may contain a variety of wireless communication technologies and other
100 sources of radio emissions.

101 This document is intended for designers and persons responsible for production and process
102 plants, system integrators and mechanical engineers having to integrate and start up wireless
103 systems in machines and plants, and producers of industrial wireless solutions. In particular, it
104 is intended to motivate exchange of information between automation and radio engineers.

105 Many wireless industrial automation applications are also located in physical environments over
106 which the operator/owner can exert control. That is, within a physical facility where the presence
107 and operation of all radio emitting devices are under the control of a single entity. This allows
108 wireless management strategies to be employed which are not feasible for equipment installed
109 in public or other unmanaged areas.

110

111

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN IEC 62657-2:2020
<http://standards.iteh.ai/catalog/standards/sist/8882982f-01e8-4b0f-bd8a-7813577db88f/sist-pr-en-iec-62657-2-2020>

112 In industrial automation, many different wireless communication systems may operate in the
113 same premises. Examples of these communication systems are IEC 62591 [8]¹
114 (WirelessHART^{®2}), IEC 62601 [9] (WIA-PA) and IEC 62734 [10] (ISA100.11a); all these
115 communication systems use IEEE 802.15.4 [19] for the process automation applications. Other
116 examples of wireless communication systems are specified in IEC 61784-1 [4] and IEC 61784-2
117 [5] CPs that use IEEE 802.11 [17] and IEEE 802.15.1 [18] for factory automation applications.
118 Different to wired fieldbuses, the wireless communication devices can interfere with others on
119 the same premises or environment, disturbing each other. Other sources of radio energy in
120 these bands, often at high energy levels, include radiated process heating, plastic welding,
121 plasma lamps, and microwave irradiation devices.

122 Clearly, without a means to manage the coexistence of these varied emitters, it would be
123 problematic to ensure that wireless systems meet the time-criticality and other performance
124 requirements of industrial automation.

125 The IEC 62657 series has four parts:

- 126 • Part 1: Wireless communication requirements and spectrum considerations
- 127 • Part 2: Coexistence management
- 128 • Part 3: Formal description of the automated coexistence management and application
129 guidance
- 130 • Part 4: Coexistence management with central coordination of wireless applications

131 IEC 62657-1 provides general requirements for industrial automation and spectrum
132 considerations that are the basis for industrial communication solutions. This document
133 specifies the coexistence management of wireless devices to ensure predictable performance.
134 It is intended to facilitate harmonization of future adjustments to international, national, and
135 local regulations.

136 This document provides the coexistence management concept and process. Based on the
137 coexistence management process, a predictable assuredness of coexistence can be achieved
138 for a given spectrum with certain application requirements. This document describes
139 mechanisms to manage the potential mutual interference that might occur due to the operation
140 of multiple wireless devices in a plant.

141 This document provides guidance to the users of wireless systems on selection and proper use
142 of wireless systems. To provide suitable wireless devices to the market, it also serves vendors
143 in describing the behaviors of wireless devices to build wireless systems matching the
144 application requirements.

145 This document is based on analyses of a number of International Standards, which focus on
146 specific technologies. The intention of this standard is not to invent new parameters but to use
147 already defined ones and to be technology independent.

148

¹ Numbers in square brackets refer to the bibliography.

² WirelessHART is the registered trade name of the FieldComm Group, see www.fieldcommgroup.org. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

INDUSTRIAL COMMUNICATION NETWORKS – WIRELESS COMMUNICATION NETWORKS –

Part 2: Coexistence management

149
150
151
152
153
154
155

1 Scope

157 This document:

- 158 • specifies the fundamental assumptions, concepts, parameters, and procedures for wireless
159 communication coexistence;
- 160 • specifies coexistence parameters and how they are used in an application requiring wireless
161 coexistence;
- 162 • provides guidelines, requirements, and best practices for wireless communication's
163 availability and performance in an industrial automation plant; it covers the life-cycle of
164 wireless communication coexistence;
- 165 • helps the work of all persons involved with the relevant responsibilities to cope with the
166 critical aspects at each phase of life-cycle of the wireless communication coexistence
167 management in an industrial automation plant. Life-cycle aspects include: planning, design,
168 installation, implementation, operation, maintenance, administration and training;
- 169 • provides a common point of reference for wireless communication coexistence for industrial
170 automation sites as a homogeneous guideline to help the users assess and gauge their
171 plant efforts;
- 172 • deals with the operational aspects of wireless communication coexistence regarding both
173 the static human/tool-organization and the dynamic network self-organization.

174 This document provides a major contribution to national and regional regulations. It does not
175 exempt devices from conforming to all requirements of national and regional regulations.

2 Normative references

177 The following documents are referred to in the text in such a way that some or all of their content
178 constitutes requirements of this document. For dated references, only the edition cited applies.
179 For undated references, the latest edition of the referenced document (including any
180 amendments) applies.

181 IEC 62657-1:2017, *Industrial communication networks – Wireless communication networks –*
182 *Wireless communication requirements and spectrum considerations*

183 IEC 62657-4, *Industrial communication networks - Wireless communication networks - Part 4:*
184 *Coexistence management with central coordination of wireless applications*

185 IEC 62443 (all parts), *Industrial communication networks – Network and system security*

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

188 For the purposes of this document, the following terms and definitions apply.

189 ISO and IEC maintain terminological databases for use in standardization at the following
190 addresses:

- 191 • IEC Electropedia: available at <http://www.electropedia.org/>
- 192 • ISO Online browsing platform: available at <http://www.iso.org/obp>

193 3.1.1

194 **active environmental influence**

195 influence on the signal propagation through interfering of the wireless communication
196 application or wireless application

197 EXAMPLE Welding machines, electrical drives or frequency converters, but also other wireless communication
198 devices through using a similar frequency band, the same of nearby channels, the power spectral density and the
199 duty cycle.

200 3.1.2

201 **adjacent channel interference**

202 interference that occurs from wireless devices using adjacent frequency channels

203 3.1.3

204 **adjacent channel selectivity**

205 ability of a radio receiver to respond to the desired signal and to reject signals in adjacent
206 frequency channels

207 3.1.4

208 **antenna gain**

209 ratio of the power required at the input of a reference antenna to the power supplied to the input
210 of the given antenna to produce, in a given direction, the same field strength at the same
211 distance

212 [SOURCE: Federal Standard 1037C:1996, modified – Deletion of “loss-free” before “reference
213 antenna”, deletion of the two notes and synonyms]. [21]

214 3.1.5

215 **antenna radiation pattern**

216 variation of the field intensity of an antenna as an angular function with respect to the axis

217 3.1.6

218 **antenna type**

219

220 kind of part of a radio transmitting or receiving system which is designed to provide the required
221 coupling between a transmitter or a receiver and the medium in which the radio wave
222 propagates

223 NOTE 1: In practice, the terminals of the antenna or the points to be considered as the interface between the antenna
224 and the transmitter or receiver should be specified.

225 NOTE 2 If a transmitter or receiver is connected to its antenna by a feed line, the antenna may be considered to be
226 a transducer between the guided waves of the feed line and the radiated waves in space.

227 [SOURCE: IEC 60050-712:1990, 712-01-01, modified - Addition of "kind of" at front]

228 3.1.7

229 **application communication requirements**

230 quantitative requirements specifying the required conditions and the required characteristics of
231 wireless communication solutions at the communication interface that is met in order to achieve
232 the purpose of the automation application

- 233 **3.1.8**
 234 **area of operation**
 235 distinguishing properties of the area where the wireless communication system is operated
- 236 **3.1.9**
 237 **automated collaborative coexistence management**
 238 tool supported collaborative coexistence management with defined interfaces between the tool
 239 and the wireless communication system
- 240 Note 1 to entry: The tool can be according to IEC 62657-4
- 241 **3.1.10**
 242 **automation application**
 243 **industrial automation application**
 244 application of measurement and automatic control in the industrial automation domain
- 245 **3.1.11**
 246 **automation application data length**
 247 user data length
 248 number of octets that are exchanged at the reference interface
- 249 **3.1.12**
 250 **bit rate of the physical link**
 251 measure of the number of binary digits transferred per second
- 252 **3.1.13**
 253 **cellular topology**
 254 **cellular network topology**
 255 network topology where the geographical area is divided in cells
- 256 Note 1 to entry: A device can move from one cell to another cell. Devices that are in a cell communicate through a
 257 central hub. Hubs in different cells are interconnected.
- 258 **3.1.14**
 259 **center frequency**
 260 geometric mean of lower cut-off frequency and upper cut-off frequency of a frequency channel
- 261 **3.1.15**
 262 **channel number**
 263 unsigned integer number identifying a wireless communication channel in accordance to an
 264 authoritative document or rule
- 265 **3.1.16**
 266 **channel occupation**
 267 time interval in which the medium is busy
- 268 Note 1 to entry: Beyond the pure transfer of user data, this time includes all time slices necessary to process the
 269 transmission protocol, for example to transfer an acknowledgement.
- 270 **3.1.17**
 271 **coexistence**
 272 wireless communication coexistence
 273 state in which all wireless communication solutions of a plant using shared medium fulfil all their
 274 application communication requirements
- 275 Note 1 to entry: In IEEE 802.15.2-2003 [19] the coexistence is defined as a characteristic of a device.