

INTERNATIONAL STANDARD

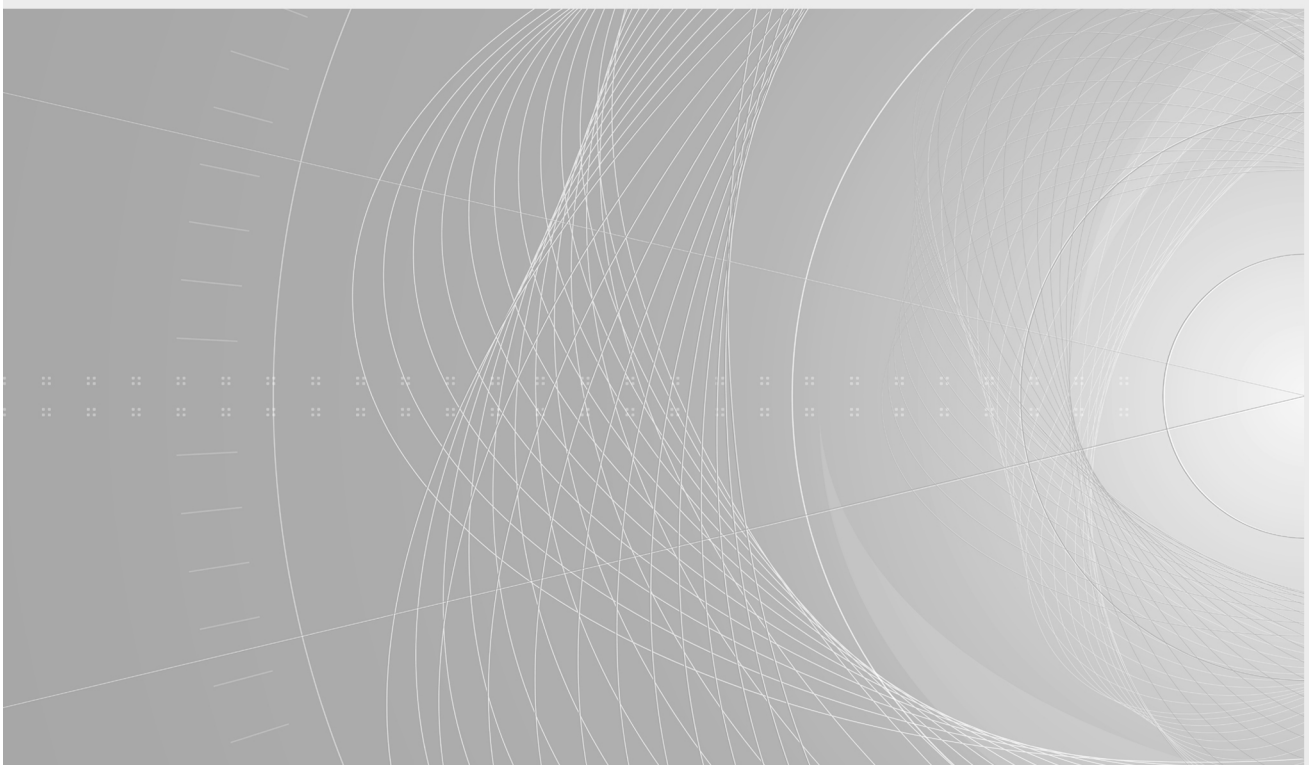
NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

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

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

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FOREWORD

This amendment has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this amendment is based on the following documents:

FDIS	Report on voting
65C/968/FDIS	65C/976/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
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INTRODUCTION

This Amendment 1 to the second edition includes the following significant technical changes:

- a) 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.

3 Terms, definitions, abbreviated terms and conventions

3.1 Terms and definitions

Replace the existing terms and definitions by the following:

3.1.1

adjacent channel interference

interference that occurs from wireless devices using adjacent frequency channels

3.1.2

adjacent channel selectivity

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

3.1.3**antenna gain**

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

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

3.1.4**antenna radiation pattern**

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

3.1.5**antenna type**

structure or device used to collect or radiate electromagnetic waves

3.1.6**application communication requirements**

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

3.1.7**automation application**

industrial automation application

application of measurement and automatic control in the industrial automation domain

3.1.8**automation application data length**

user data length

number of octets that are exchanged at the reference interface

3.1.9**availability**

<performance> ability of an item to be in a state to perform as required function under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided

Note 1 to entry: This ability depends on the combined aspects of the reliability performance, the maintainability performance, and the maintenance support performance.

Note 2 to entry: Required external resources, other than maintenance resources, do not affect the availability performance of the item.

[SOURCE: IEC 60050-191:1990, 191-02-05, modified – Deletion of third note to entry]

3.1.10**bandwidth**

frequency bandwidth

difference between upper cut-off frequency and lower cut-off frequency

3.1.11**bit rate of the physical link**

measure of the number of binary digits transferred per second

3.1.12**cellular topology**

cellular network topology

network topology where the geographical area is divided in cells

Note 1 to entry: A device can move from one cell to another cell. Devices that are in a cell communicate through a central hub. Hubs in different cells are interconnected.

3.1.13**center frequency**

geometric mean of lower cut-off frequency and upper cut-off frequency of a frequency channel

3.1.14**channel number**

unsigned integer number identifying a wireless communication channel in accordance to an authoritative document or rule

3.1.15**channel occupation**

time in which the medium is busy

Note 1 to entry: Beyond the pure transfer of user data, this time includes all time slices necessary to process the transmission protocol, for example to transfer an acknowledgement.

3.1.16**characteristic of the area of operation**

distinguishing properties of the area where the wireless communication network is operated

3.1.17**characteristic of wireless communication solution**

parameters of wireless communication solutions which are implementations of wireless communication systems and devices

3.1.18**characteristic of wireless device solution**

parameters related to individual nodes within a network implementing a wireless communication solution

3.1.19**characteristic of wireless device type**

specification of transmitter and receiver parameters

3.1.20**characteristic of wireless network solution**

parameters related to a network as a whole used implementing a wireless communication solution

3.1.21**characteristic of wireless system type**

parameters describing the kind of wireless communication system

3.1.22**characteristic of wireless system type and wireless device type**

parameters that characterize the model of a wireless system or a wireless device by providing the parameters to specify a wireless system type and a wireless device type

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3.1.23**coexistence**

wireless communication coexistence

state in which all wireless communication solutions of a plant using shared medium fulfil all their application communication requirements

Note 1 to entry: In IEEE 802.15.2-2003 [19] the coexistence is defined as a characteristic of a device.

3.1.24**coexistence assessment**

undertaking of an investigation in order to arrive at a judgment, based on evidence of the suitability of a set of products and their installation to achieve coexistence

3.1.25**coexistence management**

process to establish and to maintain coexistence that includes technical and organizational measures

3.1.26**coexistence management information**

parameters for the wireless coexistence management process

3.1.27**coexistence manager**

role of a nominated person to manage coexistence

3.1.28**coexistence planning**

process that describes the allocation of wireless communication resources (time, frequencies, coding, space) to each wireless communication system in order to achieve coexistence

3.1.29**communication load**

amount of user data to be transmitted from the automation application within a certain period of time

3.1.30**cut-off frequency**

frequency limit, nearest to the frequency where the spectral power density drops below a certain level, defining the frequency bandwidth

3.1.31**data throughput**

ratio of the number of user data per time period, transferred within a consumer at the reference interface to the application

3.1.32**device type information**

manufacturer name, manufacturer contact, the type and version of hardware and software

3.1.33**distance between wireless devices**

geographical distance between devices within a three-dimensional space

3.1.34**duty cycle**

ratio of the transmitter sequence referenced to a given observation time for the used frequency channel

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3.1.35**dwelt time**

period spent at a particular frequency during any single hop of a frequency hopping system

3.1.36**equivalent isotropic radiated power**

product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain)

[SOURCE: Radio Regulations (2012) – Art. 1 § 1.161, modified – Term modified from isotropically to isotropic and definition reformatted according to the ISO/IEC Directives Part 2]

3.1.37**effective radiated power**

product of the power supplied to the antenna and its gain relative to a half-wave dipole in a given direction

[SOURCE: Radio Regulations (2012) – Art. 1 § 1.162, modified – Deleted “(in a given direction)” and definition reformatted according to the ISO/IEC Directives Part 2]

3.1.38**electromagnetic interference****EMI**

degradation of the performance of an equipment, transmission channel or system caused by an electromagnetic disturbance

Note 1 to entry: In French, the terms "perturbation électromagnétique" and "brouillage électromagnétique" designate respectively the cause and the effect, and should not be used indiscriminately.

Note 2 to entry: In English, the terms "electromagnetic disturbance" and "electromagnetic interference" designate respectively the cause and the effect, and should not be used indiscriminately.

[SOURCE: IEC 60050-161:1990/AMD1:1997, 161-01-06, modified – Corrected mistakes in the Notes to entry]

3.1.39**frequency band**

range in the frequency spectrum that is assigned by regulatory organizations for use for specific applications or a group of applications

Note 1 to entry: The ITU as international regulatory organization assigns only radio communication services to a specific range in the frequency spectrum.

3.1.40**frequency channel**

span of the frequency spectrum which is characterized by lower cut-off frequency and upper cut-off frequency or by center frequency and bandwidth

3.1.41**frequency hopping procedure**

sequence of frequency channels used for transmission (hopping sequence) and dwell time

3.1.42**future expansion plan**

possible installation of new wireless communication solutions and buildings that can affect coexistence

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3.1.43**general plant characteristics**

parameters that characterizes the plant in general with respect to all wireless communication applications

3.1.44**geographical dimension of the plant**

length, width and height of the intended space of the wireless system

3.1.45**industrial automation application**

control or management systems used in industrial production, including supervisory control and data acquisition systems, distributed control systems, and other control system configurations often found in the industrial sectors and critical infrastructures

3.1.46**industrial communication network**

data communications sub-systems for industrial-process measurement and control as well as on instrumentation systems used for research, development or testing purposes

3.1.47**immunity**

ability of an item to continue operating properly in the event of an interference, up to a certain level of interference, and to be resilient above this level

Note 1 to entry: Immunity of an item is achieved by adding to the robustness of the item the ability to be resilient to interference.

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3.1.48**infrastructure device**

device that is essential for building up a wireless communication system according to a technology or standard, but not having an interface to an automation application

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EXAMPLE Router or base stations without interfaces to the wired industrial network or without automation application functions.

3.1.49**initiation of data transmission**

method that specifies how the application initiates the data transfer

3.1.50**intermodulation sensitivity**

levels of out-of-band interfering signals that, when mixed in the receiver front-end, produce an in-band third order non-linearity product

3.1.51**interference**

radio frequency interference

effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radio communication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy

[SOURCE: Database ITU Terms and Definitions]

3.1.52**industrial, scientific and medical application**

operation of equipment or appliances designed to generate and use locally radio frequency energy for industrial, scientific, medical, domestic or similar purposes, excluding applications in the field of telecommunications

[SOURCE: Radio Regulations (2012) – Art. 1 § 1.15]

3.1.53

jitter

time variation of an expected occurrence

Note 1 to entry: Examples are variation of transmission time and update time.

3.1.54

length of user data per transfer interval

number of the octets sent out during a transfer interval, where the octets that are added because of the requirements of the wireless communication protocol are subtracted

Note 1 to entry: The application data length affects the communication load and might account for the temporal separation of the wireless communication systems.

3.1.55

life-cycle

length of time from the start of the development phase of a product type to the product abandonment

[SOURCE: IEC 62890:—1, 3.1.19]

3.1.56

limitation from neighbours of the plant

description of the neighbors of the plant that are likely to cause limitations for wireless communication

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EXAMPLE High power radio source(s).

[IEC 62657-2:2017/AMD1:2019](https://standards.iteh.ai/catalog/standards/sist/37e10051-8c83-4481-90ab-cb70118ebeb/iec-62657-2-2017-amd1-2019)

3.1.57

linear topology

linear network topology

topology where the nodes are connected in series, with two nodes connected to only one other node and all others each connected to two other nodes (that is, connected in the shape of a line)

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Note 1 to entry: This topology corresponds to that of an open ring.

[SOURCE: IEC 61918:2013, 3.1.44, modified – Added an admitted term]

3.1.58

lower cut-off frequency

frequency furthest below the frequency of maximum power where the power spectral density drops below a certain level

3.1.59

mechanisms for adaptivity

measures to modify one or more of the systems operational parameters in order to improve the systems robustness against interferences and to minimize the medium utilization

3.1.60

maximum number of retransmissions

upper limit of how many times user data are allowed being retransmitted automatically by the communication stack because of transmission errors

¹ Under preparation. Stage at the time of publication: IEC 62890/FDIS:2019.

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3.1.61**mechanism for adaptivity**

technique or procedure to increase coexistence capability

3.1.62**medium access control mechanism**

transmission technique how to access the medium

Note 1 to entry: Examples are CSMA, TDMA, or combination of both.

3.1.63**mesh topology**

mesh network topology

topology in which redundant physically-diverse routing paths are available between each pair of network nodes

Note 1 to entry: Wireless mesh topology is usable to extend coverage via multi-hop capability and/or to facilitate communication reliability by providing redundant paths between devices.

[SOURCE: IEC 62734:2014, 3.1.2.95, modified – Added an admitted term]

3.1.64**metrics**

set of quantitative indicators corresponding to selected properties of a communication device, equipment, or wireless communication system

3.1.65**modulation**

process of varying one or more properties of a periodic waveform with a modulating signal that contains information to be transmitted

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3.1.66**natural environmental condition**

condition that surrounds the wireless device and wireless system

Note 1 to entry: Examples are temperature, humidity, air pressure.

3.1.67**network**

all of the media, connectors, repeaters, routers, gateways and associated node communication elements by which a given set of communicating devices are interconnected

[SOURCE: IEC 61158-2:2014, 3.1.30]

3.1.68**node**

end-point of a branch in a network

[SOURCE: IEC 61918:2013, 3.1.50]

3.1.69**other frequency user**

user which generates and uses radio frequency energy without having the objective of telecommunication

Note 1 to entry: Examples are welding machine, electrical drive and frequency converter.

3.1.70**out-of-band emission**

emission on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions

[SOURCE: Radio Regulations (2012) – Art. 1 § 1.144]

3.1.71**packet loss rate**

ratio of number of packets, transferred from the application at the reference interface within the producer, and the number of packets, transferred at the reference interface to the application within the consumer

3.1.72**performance requirements**

requirements describing the time and error behavior necessary to achieve the purpose of the automation application

3.1.73**physical link**

relation between radio transceivers (physical end points) of two wireless devices

3.1.74**plant**

managed facility, typically with a physically protected perimeter, hosting the physical process, operation, personnel, equipment

3.1.75**point-to-point topology**

point-to-point network topology
topology where two nodes are directly connected to each other

3.1.76**position of wireless device**

geographical position of the three dimensional space in absolute or relative coordinates where the device is located

3.1.77**power spectral density**

distribution as a function of frequency of the power per unit bandwidth of the spectral components of a signal or a noise having a continuous spectrum and a finite mean power

[SOURCE: IEC 60050-713:1998,713-09-12]

3.1.78**purpose of the automation application**

summary of the automation application supported by the wireless network to the extent needed to provide a useful overview of the requirements imposed on the wireless network

3.1.79**radio channel**

model considers the characteristic of the frequency channel, the environmental conditions, the distance between the wireless devices, the antenna characteristic

3.1.80**radio resource**

means used by multiple wireless communication solutions for the purpose of radio signal transmission