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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial networks – Coexistence of wireless systems – Part 2: Coexistence management

Réseaux industriels – Coexistence des systèmes sans fil – Partie 2: Gestion de coexistence



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Industrial networks – Coexistence of wireless systems – Part 2: Coexistence management

Réseaux industriels – Coexistence des systèmes sans fil – Partie 2: Gestion de coexistence

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL NETWORKS – COEXISTENCE OF WIRELESS SYSTEMS –

Part 2: Coexistence management

FOREWORD

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

This fourth edition cancels and replaces the third edition published in 2022. This edition constitutes a technical revision.

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

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;

b) alignment of some definitions and specifications to be consistent with the new IEC 62657-3 and IEC 62657-4;

c) edition 3 of this document was published in June 2022. Some comments were made in the last development stages of this document asking for explanations on how the parts of the IEC 62657 series were structured and how they were related to each other. Resolution of these comments was deferred until a next edition, which means this edition.

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

Draft	Report on voting
65C/1329/FDIS	65C/1337/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all the parts of the IEC 62657 series, under the general title *Industrial networks – Coexistence of wireless systems,* can be found on the IEC website.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

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

- process automation, covering for example the following industry branches:
  - oil and gas, refining,
  - chemical,
  - pharmaceutical,
  - mining,
  - pulp and paper,
  - water and wastewater,
  - steel,
- electric power such as:
  - power generation (for example wind turbine),
  - power transmission and distribution (grid),
- factory automation, covering for example the following industry branches:
  - food and beverage,
  - automotive,
  - machinery,
  - semiconductor.

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

Industrial premises can contain a variety of wireless communication technologies and other sources of radio emissions.

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

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

In industrial automation, many different wireless communication systems can operate in the same premises. Examples of these communication systems are IEC 62591 [1][1] (WirelessHART®[2]), IEC 62601 [2] (WIA-PA) and IEC 62734 [3] (ISA100.11a). All these communication systems use IEEE 802.15.4 [4] for the process automation applications. Other examples of wireless communication systems are specified in the IEC 61784-1 series [5] and IEC 61784-2 series [6] CP that use IEEE 802.11 [7] and IEEE 802.15.1 [8] for factory automation applications. Different to wired fieldbuses, the wireless communication devices can interfere with others on the same premises or environment, disturbing each other. Other sources of radio energy in these bands, often at high energy levels, include radiated process heating, plastic welding, plasma lamps, and microwave irradiation devices.

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

This document describes the management of independent radio sources that use the same transmission medium. The management within a wireless communication system is not the subject of this document. It is assumed that the standard of a wireless system regulates it, for example by a medium access control mechanism.

The IEC 62657 series has four parts:

- Part 1: Wireless communication requirements and spectrum considerations,
- Part 2: Coexistence management,
- Part 3: Formal description of the automated coexistence management and application guidance,
- Part 4: Coexistence management with central coordination of wireless applications.

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

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

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

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

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[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 NETWORKS – COEXISTENCE OF WIRELESS SYSTEMS –

Part 2: Coexistence management

1 Scope

This part of IEC 62657

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

This document provides a major contribution to national and regional regulations by supporting to fulfil the requirements using coexistence management.

2 Normative references

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

IEC 62443 (all parts), *Security for industrial automation and control systems*

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

IEC 62657-3:2022, *Industrial networks – Coexistence of wireless systems – Part 3: Formal description of the automated coexistence management and application guidance*

IEC 62657-4:—, *Industrial networks – Coexistence of wireless systems – Part 4: Coexistence management with central coordination of wireless applications*[3]

[3] Under preparation. Stage at the time of publication: IEC/FDIS 62657-4:2024.