IEC PAS 63595

Edition 1.0 2025-09

PUBLICLY AVAILABLE SPECIFICATION

Industrial networks - 5G communication technology - General considerations

ICS 25.040.40; 33.020

ISBN 978-2-8327-0693-0

IEC PAS 63595:2025-09(en)

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IEC 63595 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is a Publicly Available Specification.

The text of this Publicly Available Specification is based on the following documents:

Draft	Report on voting
65C/1354/DPAS	65C/1362/RVDPAS

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 Publicly Available Specification 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 parts in the IEC 63595 series, published under the general title *Industrial networks – 5G communication technology*, 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- withdrawn, or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.

NOTE In accordance with ISO/IEC Directives, Part 1, IEC PASs are automatically withdrawn after 4 years.

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 can include:

– process automation, covering for example the following industry branches:
  - oil and gas, refining,
  - chemical,
  - pharmaceutical,
  - mining,
  - pulp & paper,
  - water & 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.

Application communication requirements for industrial wireless communication systems are different from those of, for example, the telecommunications, and commercial and consumer markets. These industrial application requirements are identified and provided in 5G-ACIA white papers that are referenced by this document.

This document provides general requirements for industrial automation and spectrum considerations that are the basis for industrial communication solutions.

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

In industrial automation, many different wireless communication solutions can operate in the same premises. Different to wired fieldbuses, the wireless communication devices can interfere with others on the same premises or environment, disturbing each other.

This document is intended to provide considerations on cellular wireless communication systems according to the specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020) for being applicable in wireless communication system of industrial automation plants (see ITU-R M.2150-1:02/2022).

In Figure 1, a UML class diagram is used to categorize the term Industrial 5G, along with other examples of standards for industrial wireless communications. Accordingly, Industrial 5G refers to a set of functions for wireless data transmission using 5G in industrial automation applications. In this context, only the 3rd Generation Partnership Project (3GPP) 5G radio interface technologies (RIT) according to the detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020) are considered 3GPP TR22.832.

The 3GPP is a collaborative project that brings together standardization organizations from around the world to create globally acceptable specifications for mobile networks. As its name implies, it was first created to establish such specifications for the third generation (3G) of mobile systems. It has continued its work for subsequent generations, including the one considered here, the fifth generation (5G).

As an application of cellular networks in industrial automation, the class "Industrial 5G" inherits from both class "3GPP 5G – RIT" and class "wireless industrial communication".

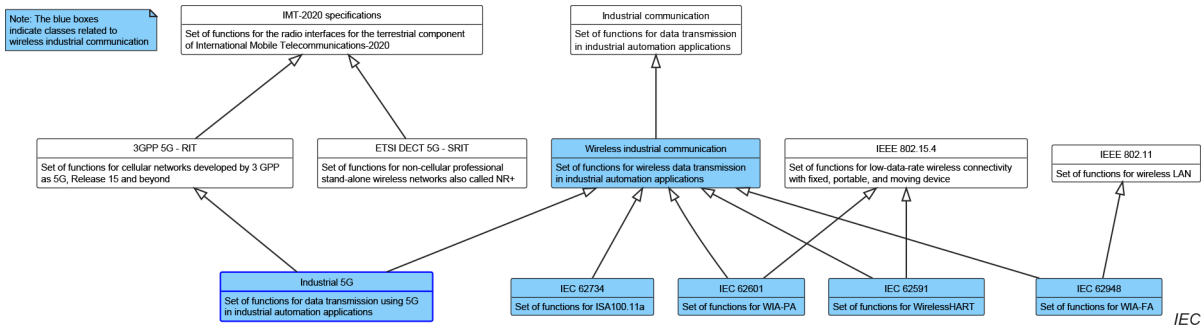

Figure 1 – 5G in the context of industrial communication

1 Scope

This document defines wireless communication systems based on 5G and beyond technologies applicable for industrial process measurement and control applications. Based on common terminology, generic descriptions, and use cases, this document provides requirements for related users, designers, and device manufacturers.

This document considers cellular wireless communication systems according to the specifications of the terrestrial radio interfaces of International Mobile Telecommunications-2020 (IMT-2020) developed by 3GPP as 5G Release 15 and beyond (see ITU-R M.2150-1:02/2022).

NOTE 1 Non-cellular professional stand-alone wireless communication systems, also called NR+, are not considered.

NOTE 2 The PAS is a pre-standard and can be converted into a series of documents for users, designers, and device manufacturers.

2 Normative references

There are no normative references in this document.