SLOVENSKI STANDARD
oSIST prEN IEC 63595-1:2026

01-april-2026

Industrijska omrežja - Komunikacijska tehnologija 5G - 1. del: Izrazi, definicije in osnove

Industrial networks - 5G Communication Technology - Part 1: Terms, definitions and fundamentals

Ta slovenski standard je istoveten z: **prEN IEC 63595-1:2026**

ICS:

33.070.50	Globalni sistem za mobilno telekomunikacijo (GSM)	Global System for Mobile Communication (GSM)
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

oSIST prEN IEC 63595-1:2026 **en,fr,de**

65C/1381/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: **IEC 63595-1 ED1**	
DATE OF CIRCULATION: **2026-02-06**	CLOSING DATE FOR VOTING: **2026-05-01**
SUPERSEDES DOCUMENTS: **65C/1361/CD, 65C/1375/CC**	

IEC SC 65C : INDUSTRIAL NETWORKS	
SECRETARIAT: France	SECRETARY: Mr Alexandre NABAIS
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):
ASPECTS CONCERNED:	
☒ 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. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Industrial networks – 5G Communication Technology – Part 1: Terms, definitions and fundamentals

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

The Comment Resolution Meeting is scheduled for 24. to 26. June 2026 in Tokyo.

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- OSD NC roles overview
- How to add and submit comments to the IEC

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL NETWORKS – 5G Communication Technology – Part 1: Terms, definitions and fundamentals

FOREWORD

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IEC 63595-1 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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 parts in the IEC 63595 series [1] , 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.

INTRODUCTION

A production system uses an industrial automation and control system (3.1.32) (IACS). The local automation functions can be performed by a control system (3.1.20) . These can be for example a distributed control systems (DCS), typically used in industrial automation solution (3.1.34) of process control applications, programmable logic controller (PLC), typically used in factory automation solutions, etc. in combination with for example sensors, actors (e.g. drives. valves). A production system uses an industrial automation application (3.1.33). The industrial automation application (3.1.33) consists of industrial automation system (3.1.31) with default values of parameters. A industrial automation solution (3.1.34) has specific parameters assigned to a device instances.

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, commercial and consumer markets. These industrial application requirements are identified and provided in 5G-ACIA white papers that are referenced by the IEC 63595 [2] series.

The IEC 63595 [2] series 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, wireless communication devices can interfere with others on the same premises or environment, disturbing each other.

The IEC 63595 [2] series 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 [3]).

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.

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 "3GPP5G - RIT" and class "wireless industrial communication".

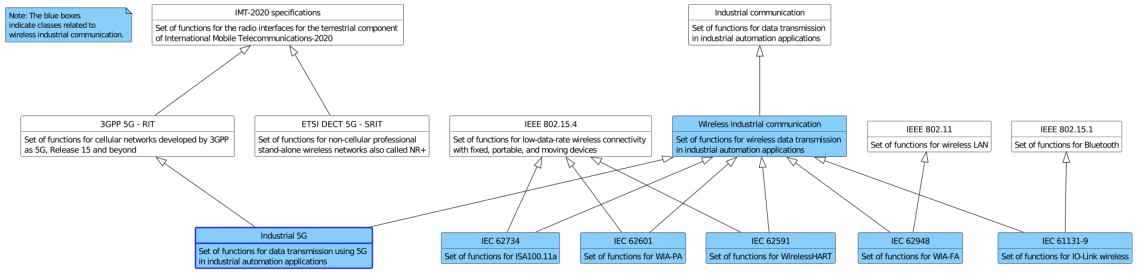

Figure 1 – 5G in the context of industrial communication

The IEC 63595 [2] series has the general title:

INDUSTRIAL NETWORKS - 5G COMMUNICATION TECHNOLOGY -

and has six parts:

a) Part 1: Terms, definitions and fundamentals
b) Part 2 TR: Use cases
c) Part 3: Features needed for industrial automation
d) Part 4: Deployment of 5G technology in an industrial automation plant
e) Part 5: Test methods
f) Part 6: Cyber security

NOTE This document is partly a copy of the IEC PAS 63595 [4]. The other parts contain potentially other elements of the IEC PAS 63595 [4].

Further reading:

IEC 60050 (all parts) [5], International Electrotechnical Vocabulary (IEV)

IEC 60050-712:1992 [6], International Electrotechnical Vocabulary (IEV) - Part 712: Antennas

IEC 60050-161:2018 [7], International Electrotechnical Vocabulary (IEV) - Part 161: Electromagnetic compatibility

IEC 60050-713:1998 [8], International Electrotechnical Vocabulary (IEV) - Part 713: Radiocommunications: transmitters, receivers, networks and operation

IEC 61158-2 [9], *Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition*

IEC 61158-5 (all parts) [10], *Industrial communication networks - Fieldbus specifications - Part 5-x: Application layer service definition - Type x elements*

IEC 61508 (all parts) [11], *Functional safety of electrical/electronic/programmable electronic safety-related systems*

IEC 61784-1 (all parts) [12], *Industrial communication networks - Profiles - Part 1: Fieldbus profiles*

IEC 61784-3 (all parts) [13], *Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions*

IEC 61918:2018 [14], *Industrial communication networks - Installation of communication networks in industrial premises*

IEC 62278:2002 [15], *Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS)*

IEC 62443 (all parts) [16], *Security for industrial automation and control systems*

IEC 62591:2016 [17], *Industrial networks - Wireless communication network and communication profiles - WirelessHART™*

IEC 62601, *Industrial networks - Wireless communication network and communication profiles - WIA-PAIEC 62601 [18]*

IEC 62657 (all parts) [19], *Industrial networks - Coexistence of wireless systems*

IEC 62657-3 [20], *Industrial networks - Coexistence of wireless systems - Part 3: Formal description of the automated coexistence management and application guidance*

IEC 62734:2014 [21], *Industrial networks - Wireless communication network and communication profiles - ISA 100.11a*

IEC 62890:2020 [22], *Industrial-process measurement, control and automation - Life-cycle-management for systems and components*

IEC 62948 [23], *Industrial networks - Wireless communication network and communication profiles - WIA-FA*

IEC/IEEE 60802 [24], *Time-Sensitive Networking Profile for Industrial Automation* [1]

ISO 5807:1985 [25], *Information processing — Documentation symbols and conventions for data, program and system flowcharts, program network charts and system resources charts*

ISO/IEC 2382-16:1996 [26][2], *Information technology - Vocabulary - Part 16: Information theory*

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1 Under preparation. Stage at the time of publication: IEC/IEEE FDIS 60802:2025.

2 Withdrawn.

ISO/IEC 27000 series [27], *Information technology - Security techniques - Information security management systems - Overview and vocabulary*

ITU-R BS.561-2 (07/86)[28], *Definitions of radiation in LF, MF and HF broadcasting bands*, available from Internet: <http://www.itu.int/rec/R-REC-BS.561-2-198607-I/en>

ETSI TR 100 027, V1.2.1 (1999-12)*[29]*, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Methods of measurement for private mobile radio equipment*

ETSI TR 102 889-2: 2011*[30]*, *Electromagnetic compatibility and Radio spectrum Matters (ERM); System Reference Document; Short Range Devices (SRD); Part 2: Technical characteristics for SRD equipment for wireless industrial applications using technologies different from Ultra-Wide Band (UWB)*

ETSI EN 300 328: 2019*[31]*, *Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU*

IEEE Std 802.1AS [32], *IEEE Standard for Local and Metropolitan Area Networks: Timing and Synchronization for Time-Sensitive Applications*

IEEE Std 802.1AB [33], *IEEE Standard for Local and Metropolitan Area Networks: Station and Media Access Control Connectivity Discovery*

IEEE Std 802.3 [34], *IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications*

IEEE Std 802.11 [35], *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*

IEEE Std 802.15.1:2005 [36], *IEEE Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 15.1: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Wireless Personal Area Networks (WPANs)*

IEEE Std 802.15.2: 2003 [37], *IEEE Recommended Practice for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 15.2: Coexistence of Wireless Personal Area Networks with Other Wireless Devices Operating in Unlicensed Frequency Bands*

IEEE Std 802.15.4 [38], *IEEE Standard for Local and metropolitan area networks - Part 15.4: Low-Rate Wireless Personal Area Networks (LR-WPANs)*

IEEE Std 1588 [39], *IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems*

Federal Standard 1037C, *Telecommunications: Glossary of Telecommunication Terms*. 07 August 1996, available at <http://www.its.bldrdoc.gov/fs-1037/fs-1037c.htm>[40]

ZVEI, Frankfurt, Germany, April 2009, *Coexistence of Wireless Systems in Automation Technology - Explanations on reliable parallel operation of wireless communication solutions[41]*

ITU Radio Regulations, edition of 2020, *Volume 1: Articles*, available at: <https://www.itu.int/pub/R-REG-RR-2020>[42]

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, available at <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014L0053>[43]

3GPPSINR 23.503; *Policy and charging control framework for the 5G System (5GS)*; Stage 2;: Online Available at https://portal.3gpp.org/[44]

Draft 3GPPTR 22.830; *Study on Business Role Models for Network Slicing*; V0.1.0, 10/2017[45]

3GPPSINR 38.201; NR; *Physical layer; General description*; V15.0.0; 12/2017; Online available at https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3211[46]

Draft 3GPPTR 22.821; *Feasibility Study on LAN Support in 5G; V2.0.0*; 03/2018; Online available at https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3281[47]

3GPPSINR 33.501, *3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Security architecture and procedures for 5G system* (Release 18)[48]

5G-ACIA white paper; *5G for Connected Industries and Automation*; Second Edition; Online available at https://5g-acia.org/whitepapers/5g-for-connected-industries-and-automation-second-edition/[49]

5G-ACIA white paper; *Key 5G Use Cases and Requirements*; Online available at https://5g-acia.org/whitepapers/key-5g-use-cases-and-requirements/[50]

5G-ACIA white paper; *A 5G Traffic Model for Industrial Use Cases*; Online available at https://5g-acia.org/whitepapers/a-5g-traffic-model-for-industrial-use-cases/[51]

5G-ACIA white paper; *5G for Automation in Industry*; Online available at https://5g-acia.org/whitepapers/5g-for-automation-in-industry/[52]

5G-ACIA white paper; *Security Aspects of 5G for Industrial Networks*; Online available at https://5g-acia.org/wp-content/uploads/2021/05/5G-ACIA_Security_Aspects_of_5G_for_Industrial_Networks_single-pages.pdf[53]

5G-ACIA white paper; *5G Non-Public Networks for Industrial Scenarios*; Online available at https://5g-acia.org/whitepapers/5g-non-public-networks-for-industrial-scenarios/[54]

5G-ACIA white paper; *Exposure of 5G Capabilities for Connected Industries and Automation Applications*; Online available at https://5g-acia.org/whitepapers/exposure-of-5g-capabilities-for-connected-industries-and-automation-applications-2/[55]

5G-ACIA white paper; *Integration of 5G with Time-Sensitive Networking for Industrial Communications*; Online available at https://5g-acia.org/wp-content/uploads/2021/05/5G-ACIA_Integration_of_5G_with_Time-Sensitive_Networking_for_Industrial_Communicatins_single-pages.pdf[56]

5G-ACIA white paper; *Integration of Industrial Ethernet Networks with 5G Networks*; Online available at https://5g-acia.org/whitepapers/integration-of-industrial-ethernet-networks-with-5g-networks/[57]

5G-ACIA white paper; *5GQoS for Industrial Automation*; Online available at https://5g-acia.org/whitepapers/5g-quality-of-service-for-industrial-automation/[58]

Draft 3GPPTR 22.804; Study on Communication for Automation in Vertical domains (CAV); V1.1.0; 12/2017; Online available at https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3187[59]

5G-ACIA white paper; *Industrial 5G Devices - Architecture and Capabilities*; Online available at https://5g-acia.org/whitepapers/industrial-5g-devices-architecture-and-capabilities/[60]

5G-ACIA white paper; *Service-Level Specifications (SLSs) for 5G Technology-Enabled Connected Industries*; Online available at https://5g-acia.org/whitepapers/service-level-specifications-slss-for-5g-technology-enabled-connected-industries/[61]

5G-ACIA white paper; *Performance Testing of 5G Systems for Industrial Automation*; Online available at https://5g-acia.org/whitepapers/performance-testing-of-5g-systems-for-industrial-automation/[62]

5G-ACIA white paper; *Selected Testing and Validation Considerations for Industrial Communication with 5G Technologies*; Online available at https://5g-acia.org/whitepapers/selected-testing-and-validation-considerations-for-industrial-communication-with-5g-technologies/[63]

3GPPSINR 22.104. *Service requirements for cyber-physical control applications in vertical domains*; Online available at https://www.3gpp.org/ftp/Specs/archive/22_series/22.104/[64]

P. Yazdani, G. Cainelli, L. Underberg, "*Virtual Automation Network Simulation (VANSIM): A tool for shared 5G campus networks in industrial working and co-working spaces*", 14th Colloquium on Communication in Automation, Magdeburg, Germany, November 21-22, 2023, Magdeburg, Germany. Online available at https://opendata.uni-halle.de/bitstream/1981185920/113597/1/08_KommA2023_V3-3_Yazdani%20et%20al..pdf[65]

G. Cainelli, "*Modeling and Management of Wireless Communication Systems based on Digital Twins*", , Ph.D. Dissertation, Otto-von-Guericke-Universität Magdeburg, Germany 2025[66]

Gustavo P. Cainelli, Parva Yazdani, Lisa Underberg, Ulrich Jumar, Carlos E. Pereira, " Modelling and Management of Wireless Communication Systems based on Digital Twins", IFAC World Congress 2023, Yokohama, JAPAN, 9 July - 14 July 2023, IFAC-PapersOnLine, Volume 56, Issue 2, 2023, Pages 2108-2114, ISSN 2405-8963, Online available at https://doi.org/10.1016/j.ifacol.2023.10.1113[67]

ISO/IEC 7498-1:1994, *Information technology — Open Systems Interconnection — Basic Reference Model: The Basic Model — Part 1 ISO/IEC 7498-1:1994 [68]*

ISO/IEC/IEEE 8802-3 [69], Telecommunications and exchange between information technology systems - Requirements for local and metropolitan area networks - Part 3: Standard for Ethernet

3GPPTR 22.804. Study on Communication for Automation in Vertical Domains; Online available at https://www.3gpp.org/ftp/Specs/archive/22_series/22.804/[70]