



ISO/IEC 20924

Edition 3.0 2024-02
REDLINE VERSION

INTERNATIONAL STANDARD



Internet of things (IoT) and digital twin – Vocabulary

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 ISO/IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IECNORM.COM : Click to view the full PDF of ISO/IEC 10004:2024 RLV



ISO/IEC 20924

Edition 3.0 2024-02
REDLINE VERSION

INTERNATIONAL STANDARD



Internet of things (IoT) and digital twin – Vocabulary

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.020

ISBN 978-2-8322-8333-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
3.1 General terms	5
3.2 Internet of Things specific terms	10
3.3 Digital twin specific terms	12
Bibliography.....	15

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV

INTERNET OF THINGS (IoT) AND DIGITAL TWIN – VOCABULARY

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
- 2) The formal decisions or agreements of IEC and ISO 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 and ISO National bodies.
- 3) IEC and ISO documents have the form of recommendations for international use and are accepted by IEC and ISO National bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC and ISO documents is accurate, IEC and ISO 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 and ISO National bodies undertake to apply IEC and ISO documents transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC and ISO document and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC and ISO do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC and ISO marks of conformity. IEC and ISO are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this document.
- 7) No liability shall attach to IEC and ISO or their directors, employees, servants or agents including individual experts and members of its technical committees and IEC and ISO National bodies 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 ISO/IEC document or any other IEC and ISO documents.
- 8) Attention is drawn to the Normative references cited in this document. Use of the referenced publications is indispensable for the correct application of this document.
- 9) IEC and ISO draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC and ISO take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC and ISO had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> and www.iso.org/patents. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition ISO/IEC 20924:2021. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

ISO/IEC 20924 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC joint technical committee 1: Information technology. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

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

- a) addition of new terms which are used in other ISO/IEC IoT related standards;
- b) update of some definitions to align with current usage in IoT standards;
- c) extension of digital twin related vocabularies with title and scope changes.

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

Draft	Report on voting
JTC1-SC41/386/FDIS	JTC1-SC41/404/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 the ISO/IEC Directives, JTC 1 Supplement available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

IMPORTANT – The "colour inside" logo on the cover page of this document 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.

INTERNET OF THINGS (IoT) AND DIGITAL TWIN – VOCABULARY

1 Scope

This document provides a definition of Internet of Things and digital twin along with a set of terms and definitions. This document is a terminology foundation for the Internet of Things and digital twin.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 General terms

3.1.1

application

software designed to fulfil a particular purpose

[SOURCE: ISO/IEC 24713-2:2008, 4.1, modified – "program or piece of" has been ~~removed~~ deleted from the beginning of the definition.]

3.1.2

architecture

~~<system>~~ set of fundamental concepts or properties of ~~a system~~ an entity in its environment embodied in its elements, relationships, and in the principles of its design and evolution

Note 1 to entry: Governing principles are covered in the architecture description and are not part of the architecture.

[SOURCE: ISO/IEC/IEEE 42010:2011/2022, 3.2, modified – "set of" has been added to the beginning of the definition, "and governing principles for the realization and evolution of this entity and its related life cycle processes" has been deleted from the end of the definition, and Note 1 to entry has been added.]

3.1.3

asset

entity (3.1.17) that has potential or actual value ~~and is either owned by or under the custody of~~ to an individual, an organization, a government, or other groups

**3.1.4
availability**

property of being accessible and usable upon demand by an authorized *entity* (3.1.17)

Note 1 to entry: *IoT systems* (3.2.15) can include both *human users* (3.1.18) and service components as "authorized entities".

[SOURCE: ISO/IEC 27000:2018, 3.7]

~~**3.1.6
characteristic**~~

~~abstraction of a property of an *entity* or of a set of entities~~

~~[SOURCE: ISO 18104:2014, 3.1.4]~~

**3.1.5
cloud computing**

paradigm for enabling *network* (3.1.24) access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on demand

[SOURCE: ~~ISO/IEC 17788:2014, 3.2.5~~ ISO/IEC 22123-1:2023, 3.1.1, modified – Notes 1 and 2 to entry have been deleted.]

**3.1.6
cloud service**

one or more capabilities offered via *cloud computing* (3.1.5) invoked using a defined *interface* (3.1.22)

[SOURCE: ~~ISO/IEC 17788:2014, 3.2.8~~ ISO/IEC 22123-1:2023, 3.1.2]

**3.1.7
cloud service provider**

party ~~which makes cloud services available~~ that is acting in a cloud service provider role

[SOURCE: ~~ISO/IEC 17788:2014, 3.2.15~~ ISO/IEC 22123-1:2023, 3.3.3]

**3.1.8
cloud service provider role
CSP role**

set of activities that make cloud services available

[SOURCE: ISO/IEC 22123-1:2023, 3.3.15]

~~**3.1.10
compliance**~~

~~conformance to rules, such as those defined by a law, a regulation, a standard, or a policy~~

**3.1.9
component**

modular, deployable, and replaceable part of a system

[SOURCE: ISO 14813-5:2010, B.1.31, modified – "that encapsulates implementation and exposes a set of interfaces" has been deleted from the end of the definition.]

**3.1.10
confidentiality**

property that *information* (3.1.21) is not made available or disclosed to unauthorized individuals, entities, or processes

[SOURCE: ISO/IEC 27000:2018, 3.10]

3.1.11

data

symbol or symbols represented in a digital and formalized manner suitable for communication, storage, interpretation or processing

3.1.12

data store

persistent repository for ~~digital~~ *data* (3.1.11)

Note 1 to entry: A data store can be accessed by a single *entity* (3.1.17) or shared by multiple entities via a *network* (3.1.24) or other connection.

3.1.13

digital entity

~~computational element and/or data element~~

entity (3.1.17) that exists in the digital realm

Note 1 to entry: A digital entity can exist in several forms, including a *cloud service* (3.1.6) or as a *service* (3.1.28) in a data centre, or as a *network* (3.1.24) element or as an *IoT gateway* (3.2.14).

3.1.14

discovery service

service (3.1.28) to find resources, entities or services based on a specification, *keywords*, *search terms*, or *tags* of the desired target

Note 1 to entry: A discovery service can be used by a *human user* (3.1.18) or a *digital user* (3.2.4).

3.1.15

endpoint

component (3.1.8) that exposes ~~or~~ and uses one or more *network* (3.1.24) *interfaces* (3.1.22)

3.1.16

endpoint address

<endpoint> ~~value~~ character or group of characters that can be used to identify an *endpoint* (3.1.15), which can designate the originating source or destination of *data* (3.1.11) being transmitted

3.1.17

entity

anything (physical or non-physical) having a distinct existence

[SOURCE: ISO/IEC 15459-3:2014, 3.1]

~~3.1.19~~

~~**functional component**~~

~~functional building block needed to engage in an activity, backed by an implementation~~

~~Note 1 to entry: See also "component", which is a superset containing all functional components and other types of component that are deployable.~~

~~[SOURCE: ISO/IEC 17789:2014, 3.2.3, modified — Note 1 to entry has been added.]~~

3.1.18

human user

natural person who uses a system

**3.1.19
identifier**

information (3.1.21) that unambiguously distinguishes one *entity* (3.1.17) from other entities in a given *identity context* (3.1.20)

**3.1.20
identity context**

environment where an *entity* (3.1.17) can be sufficiently identified by a certain set of its attributes and values

**3.1.21
information**

data (3.1.11) that within a certain context has a particular meaning

**3.1.22
interface**

shared boundary between two functional *components* (3.1.8), defined by various characteristics pertaining to the functions, physical interconnections, signal exchanges, and other characteristics

[SOURCE: ISO/IEC 13066-1:2011, 2.15, modified – In the definition, "units" has been replaced by "components"; ", as appropriate" has been deleted from the end of the definition.]

**3.1.23
interoperability**

ability of two or more systems or *applications* (3.1.1) to exchange *information* (3.1.21) and to mutually use the information that has been exchanged

[SOURCE: ~~ISO/IEC 17788:2014, 3.1.5~~ ISO/IEC 22123-1:2023, 3.6.1]

**3.1.24
network**

data network

digital network

infrastructure that connects a set of *endpoints* (3.1.15), enabling communication of *data* (3.1.11) between the digital entities reachable through them

**3.1.25
physical entity**

entity (3.1.17) in the physical world that can be the subject of sensing and/or actuating

Note 1 to entry: In the Internet of Things reference architecture, the physical entity is a thing that can be sensed and/or actuated by IoT devices or IoT systems.

**3.1.26
reference architecture**

~~framework used as a template when developing or validating an architecture description for a particular solution~~

architecture description for a specific subject area that guides and constrains the structure and behaviour of a related set of systems of interest

**3.1.27
safety**

state in which the risk of harm (to persons) or damage is limited to an acceptable level

[SOURCE: ISO 21101:2014, 3.34]

**3.1.28
service**

distinct functionality that is provided by an *entity* (3.1.17) through *interfaces* (3.1.22)

[SOURCE: ISO/IEC TR 14252:1996, 2.2.2.46, modified – In the definition, "part of the functionality" has been replaced by "functionality" and "on one side of an interface to an entity on the other side of the interface" has been replaced by "through *interfaces* (3.1.22)".]

**3.1.29
service provider**

organization that manages and delivers a service or services to customers

[SOURCE: ISO/IEC 20000-10:2018, 3.2.24]

**3.1.30
socialized**

having organized and constructive behaviour of functions in a system or among systems built with the attributes of the division of labour and the collaboration of tasks

[SOURCE: ISO/IEC TR 30174:2021, 3.4]

**3.1.31
stakeholder**

individual, ~~team~~, organization, or classes thereof, having an interest, right, share, or claim, in ~~a system~~ an entity of interest

[SOURCE: ISO/IEC/IEEE 42010:2011/2022, 3.10, 3.17, modified – "role, position" has been deleted from the beginning of the definition; the EXAMPLE has been deleted.]

**3.1.32
tag**

human- or machine-readable mark, or digital identity used to communicate *information* (3.1.21) about an *entity* (3.1.17)

Note 1 to entry: A tag can contain information that can be read by sensors to aid in identification of the *physical entity* (3.1.25).

**3.1.33
trustworthiness**

ability to meet stakeholder expectations in a demonstrable, verifiable and measurable way

~~Note 1 to entry: Depending on the context or sector, and also on the specific product or service, data, and technology used, different characteristics apply and need verification to ensure stakeholders' expectations are met.~~

~~Note 2 to entry: Characteristics of trustworthiness include, for instance, reliability, availability, resilience, security, privacy, safety, accountability, transparency, integrity, authenticity, quality, usability and accuracy.~~

~~Note 3 to entry: Trustworthiness is an attribute that can be applied to services, products, technology, data and information as well as, in the context of governance, to organizations.~~

**3.1.34
virtual entity**

digital entity that represents a *physical entity* (3.1.25)

**3.1.35
wearable device**

~~electronic device intended to be located near to, on or in a body~~

IoT device designed for operation near to, on, or inside of a body

Note 1 to entry: Wearable devices often have a variety of sensing abilities, but limited power capacity constraining communication and data processing abilities. As critical devices of the IoT, it is considered that the communication between wearable devices and a network might not require any human intervention. Wearable devices include electronic devices usable by humans, animals, and other organisms.

3.2 Internet of Things specific terms

3.2.1

actuating

changing one or more properties of a physical entity in response to an input

[SOURCE: IIC vocabulary v3,0]

3.2.2

actuator

~~<Internet of Things>~~ IoT device (3.2.11) that changes one or more properties of a physical entity (3.1.25) in response to an input

Note 1 to entry: The change can be nonmechanical in nature.

3.2.3

data acquisition functional system

~~<Internet of Things>~~ system for gathering required data (3.1.11) from a group of sensors, and assembling them into messages for delivery to another component (3.1.8)

[SOURCE: ISO/IEC 30144:2020, 3.3]

3.2.4

digital user

digital entity that uses an IoT system

Note 1 to entry: Digital user includes automation services that act on behalf of human users (3.1.18).

3.2.5

electronic label

EL

IoT device which attaches to a physical item having a display for the information (3.1.21) about the item and its perceived environment and also having information transmission via a data link

Note 1 to entry: Examples of the information about the item and its perceived environment include, but are not limited to, prices, stock status, promotional advertisement, barcode, two-dimensional code, temperature, humidity, ambient light conditions.

[SOURCE: ISO/IEC 30169:2022, 3.1, modified – The domain tag "<in retail industry>" has been deleted. In the definition, "an RF data link" has been replaced by "a data link".]

3.2.6

electronic label system

ELS

system with a few to a large number of electronic labels designed for IoT applications

[SOURCE: ISO/IEC 30169:2022, 3.2, modified – The domain tag "<in retail industry>" has been removed.]

3.2.7

ELS backend system

subsystem intended to realize the business service functions and the equipment control functions of ELS

Note 1 to entry: The ELS backend system provides unified planning and management services for business activities that utilize the ELS, and it also provides a centralized equipment monitoring service.

[SOURCE: ISO/IEC 30169:2022, 3.3]

3.2.8

Internet of Things

IoT

infrastructure of interconnected entities, people, systems and *information* (3.1.21) resources together with *services* (3.1.28) which processes and reacts to information from the physical world and virtual world

3.2.9

IoT component

basic building block of *IoT systems* (3.2.15) that interacts with other IoT components to achieve a set of goals

3.2.10

IoT conceptual model

~~common structure and definitions for describing the concepts, relationships, and behaviour within an IoT system~~

set of common concepts, structure and behaviours of *IoT systems* (3.2.15)

3.2.11

IoT device

~~entity of an IoT system that interacts and communicates with the physical world through sensing or actuating~~

endpoint (3.1.15) that interacts with the physical world through sensing or actuating

Note 1 to entry: An IoT device can be a sensor or an actuator.

3.2.12

IoT domain

major functional group of an *IoT system* (3.2.15)

Note 1 to entry: Every *entity* (3.1.17) in an IoT system participates ~~in one or more IoT domains~~ by those domain(s) and is said to be included or contained by that domain.

Note 2 to entry: The IoT domain consists of six domains: user domain, operation and management domain, *application* (3.1.1) and *service* (3.1.28) domain, resource access and interchange domain, sensing and controlling domain, *physical entity* (3.1.25) domain.

3.2.13

IoT environment

boundary containing the *IoT components* (3.2.9), *IoT systems* (3.2.15), and related infrastructure

3.2.14

IoT gateway

entity (3.1.17) of an *IoT system* (3.2.15) that connects one or more proximity *networks* (3.1.24) and the *IoT devices* (3.2.11) on those networks to each other and to one or more access networks with different protocols

3.2.15

IoT system

system providing functionalities of IoT

Note 1 to entry: An IoT system can include, but not be limited to, *IoT devices* (3.2.11), *IoT gateways* (3.2.14), *sensors* (3.2.20), and *actuators* (3.2.2).

3.2.16

IoT trustworthiness

trustworthiness (3.1.32) of an *IoT system* (3.2.15) with characteristics including security, privacy, safety, reliability, and resilience

3.2.17

IoT user

user of an *IoT system* (3.2.15)

3.2.18

network interface

interface enabling an *endpoint* (3.1.15) to access one or more *networks* (3.1.24)

3.2.19

sensing

observing one or more properties of a *physical entity* (3.1.25) and converting those properties into *information* (3.1.21)

[SOURCE: IIC vocabulary v3,0]

3.2.20

sensor

~~<Internet of Things> IoT device that measures one or more properties of one or more physical entities and outputs data that can be transmitted over a network~~

IoT device (3.2.11) with the capability of *sensing* (3.2.19)

[SOURCE: IIC vocabulary v3,0]

3.2.21

socialized IoT system

system providing functionalities of IoT built on *socialized* (3.1.30) capability

Note 1 to entry: A socialized IoT system can include, but not be limited to, *IoT devices* (3.2.11), *IoT gateways* (3.2.14), *sensors* (3.2.20), and *actuators* (3.2.2).

[SOURCE: ISO/IEC TR 30174:2021, 3.5]

3.2.22

transport interoperability

interoperability (3.1.23) where *information* (3.1.21) exchange uses an established communication infrastructure between the participating systems including between *components* (3.1.8) of an *IoT system* (3.2.15)

Note 1 to entry: The term "transport" does not refer to the transport layer of the OSI standard model.

[SOURCE: ISO/IEC 19941:2017, 3.1.3, modified – In the definition, "including between components of an IoT system" has been added. Note 1 to entry has been added.]

3.3 Digital twin specific terms

3.3.1

augmented reality

AR

virtual objects superimposed upon or composited with the real world

Note 1 to entry: Virtual and real-world objects co-exist in augmented reality systems.

[SOURCE: ISO/IEC 30173:–, 3.5.6]

3.3.2

control loop

<digital twin> feedback link between *digital entities* (3.1.13) and *target entities* (3.3.8) whereby the digital entity receives data from the target entity and issues back to the target entity data that are used to modify the behaviour of the target entity

Note 1 to entry: Control loops use engineering control methods for the purpose of automation, e.g. to keep the temperature on an engine under control of a certain limit.

[SOURCE: ISO/IEC 30173:–, 3.1.14]

3.3.3

digital representation

digital entity (3.1.13) representing either a set of properties or behaviours or both of one or more observable elements

[SOURCE: ISO/IEC 30173:–, 3.1.8]

3.3.4

digital twin

DTw

digital representation (3.3.3) of a *target entity* (3.3.8) with data connections that enable convergence between the physical and digital states at an appropriate rate of synchronization

Note 1 to entry: Digital twin has some or all of the capabilities of connection, integration, analysis, simulation, visualization, optimization, collaboration, etc.

Note 2 to entry: Digital twin can provide an integrated view throughout the life cycle of the target entity.

[SOURCE: ISO/IEC 30173:–, 3.1.1]

3.3.5

digital twin system

system providing functionalities for the *digital twin* (3.3.4) composed of inter-operating *target entities* (3.3.8), *digital entities* (3.1.13), data connections, and models, *data* (3.1.11) and *interfaces* (3.1.22) involved in the data connection process

[SOURCE: ISO/IEC 30173:–, 3.1.21]

3.3.6

simulation

use of a similar or equivalent system to imitate a real system, so that it behaves like or appears to be the real system

Note 1 to entry: Simulation serves the purpose of analysing the future behaviour of a system, i.e., making predictions, or the purpose of reasoning on the past behaviour in order to analyse failures. For performing simulations, a model is needed together with actualized sets of data and a platform able to execute the simulation.

[SOURCE: ISO/IEC 30173:–, 3.5.4]

3.3.7

synchronization

<digital twin> action of making the states of *target entity* (3.3.8) and its *digital representation* (3.3.3) synchronized, using *network* (3.1.24) for real time system

[SOURCE: ISO/IEC 30173:–, 3.1.20, modified – In the definition, "target and digital entity" has been replaced by "target entity and its digital representation".]

3.3.8

target entity

entity (3.1.17) providing a functional purpose in reality which is the subject of *digital representation* (3.3.3)

Note 1 to entry: The target entity, which provides some functional purpose in reality, can be either physical or digital under consideration.

[SOURCE: ISO/IEC 30173:–, 3.1.3]

3.3.9

virtual reality

VR

artificial environment presented in the computer

[SOURCE: ISO/IEC 30173:–, 3.5.7]

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV

Bibliography

ISO/IEC 13066-1:2011, *Information technology – Interoperability with assistive technology (AT) – Part 1: Requirements and recommendations for interoperability*

~~ISO/IEC TR 14252:1996, *Information technology – Guide to the POSIX Open System Environment (OSE)*¹~~

ISO/IEC 15459-3:2014, *Information technology – Automatic identification and data capture techniques – Unique identification – Part 3: Common rules*

~~ISO/IEC 17788:2014, *Information technology – Cloud computing – Overview and vocabulary*~~

~~ISO/IEC 17789:2014, *Information technology – Cloud computing – Reference architecture*~~

ISO/IEC 19941:2017, *Information technology – Cloud computing – Interoperability and portability*

ISO/IEC 20000-10:2018, *Information technology – Service management – Part 10: Concepts and vocabulary*

ISO/IEC 22123-1:2023, *Information technology – Cloud computing – Part 1: Vocabulary*

ISO/IEC 24713-2:2008, *Information technology – Biometric profiles for interoperability and data interchange – Part 2: Physical access control for employees at airports*

ISO/IEC 27000:2018, *Information technology – Security techniques – Information security management systems – Overview and vocabulary*

~~ISO/IEC 27032:2012, *Information technology – Security techniques – Guidelines for cybersecurity*~~

ISO/IEC 30141:2018, *Internet of Things (IoT) – Reference Architecture*

ISO/IEC 30173:—², *Digital twin – Concepts and terminology*

ISO/IEC/IEEE 42010:2011/2022, *Systems and software engineering – Architecture description*

ISO 14813-5:2010/2020, *Intelligent transport systems – Reference model architecture(s) for the ITS sector – Part 5: Requirements for architecture description in ITS standards*³

~~ISO 18104:2014, *Health informatics – Categorial structures for representation of nursing diagnoses and nursing actions in terminological systems*~~

ISO 21101:2014, *Adventure tourism – Safety management systems – Requirements*

¹ ~~Withdrawn.~~

² Under preparation. Stage at the time of publication: ISO/IEC FDIS 30173:2023.

³ ~~Withdrawn. Revised by ISO 14813-5:2020.~~

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV



ISO/IEC 20924

Edition 3.0 2024-02

INTERNATIONAL STANDARD

Internet of things (IoT) and digital twin – Vocabulary

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
3.1 General terms	5
3.2 Internet of Things specific terms	9
3.3 Digital twin specific terms	11
Bibliography.....	14

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV

INTERNET OF THINGS (IoT) AND DIGITAL TWIN – VOCABULARY

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.
- 2) The formal decisions or agreements of IEC and ISO 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 and ISO National bodies.
- 3) IEC and ISO documents have the form of recommendations for international use and are accepted by IEC and ISO National bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC and ISO documents is accurate, IEC and ISO 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 and ISO National bodies undertake to apply IEC and ISO documents transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC and ISO document and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC and ISO do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC and ISO marks of conformity. IEC and ISO are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this document.
- 7) No liability shall attach to IEC and ISO or their directors, employees, servants or agents including individual experts and members of its technical committees and IEC and ISO National bodies 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 ISO/IEC document or any other IEC and ISO documents.
- 8) Attention is drawn to the Normative references cited in this document. Use of the referenced publications is indispensable for the correct application of this document.
- 9) IEC and ISO draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC and ISO take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC and ISO had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch> and www.iso.org/patents. IEC and ISO shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 20924 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC joint technical committee 1: Information technology. It is an International Standard.

This third edition cancels and replaces the second edition published in 2021. This edition constitutes a technical revision.

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

- a) addition of new terms which are used in other ISO/IEC IoT related standards;
- b) update of some definitions to align with current usage in IoT standards;
- c) extension of digital twin related vocabularies with title and scope changes.

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

Draft	Report on voting
JTC1-SC41/386/FDIS	JTC1-SC41/404/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 the ISO/IEC Directives, JTC 1 Supplement available at www.iec.ch/members_experts/refdocs and www.iso.org/directives.

IECNORM.COM : Click to view the full PDF of ISO/IEC 20924:2024 RLV

INTERNET OF THINGS (IoT) AND DIGITAL TWIN – VOCABULARY

1 Scope

This document provides a definition of Internet of Things and digital twin along with a set of terms and definitions. This document is a terminology foundation for the Internet of Things and digital twin.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 General terms

3.1.1

application

software designed to fulfil a particular purpose

[SOURCE: ISO/IEC 24713-2:2008, 4.1, modified – "program or piece of" has been deleted from the beginning of the definition.]

3.1.2

architecture

set of fundamental concepts or properties of an entity in its environment

Note 1 to entry: Governing principles are covered in the architecture description and are not part of the architecture.

[SOURCE: ISO/IEC/IEEE 42010:2022, 3.2, modified – "set of" has been added to the beginning of the definition, "and governing principles for the realization and evolution of this entity and its related life cycle processes" has been deleted from the end of the definition, and Note 1 to entry has been added.]

3.1.3

asset

entity (3.1.17) that has potential or actual value to an individual, an organization, a government, or other groups

3.1.4

availability

property of being accessible and usable upon demand by an authorized *entity* (3.1.17)

Note 1 to entry: *IoT systems* (3.2.15) can include both *human users* (3.1.18) and service components as "authorized entities".

[SOURCE: ISO/IEC 27000:2018, 3.7]

3.1.5**cloud computing**

paradigm for enabling *network* (3.1.24) access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on demand

[SOURCE: ISO/IEC 22123-1:2023, 3.1.1, modified – Notes 1 and 2 to entry have been deleted.]

3.1.6**cloud service**

one or more capabilities offered via *cloud computing* (3.1.5) invoked using a defined *interface* (3.1.22)

[SOURCE: ISO/IEC 22123-1:2023, 3.1.2]

3.1.7**cloud service provider**

party that is acting in a cloud service provider role

[SOURCE: ISO/IEC 22123-1:2023, 3.3.3]

3.1.8**cloud service provider role****CSP role**

set of activities that make cloud services available

[SOURCE: ISO/IEC 22123-1:2023, 3.3.15]

3.1.9**component**

modular, deployable, and replaceable part of a system

[SOURCE: ISO 14813-5:2010, B.1.31, modified – "that encapsulates implementation and exposes a set of interfaces" has been deleted from the end of the definition.]

3.1.10**confidentiality**

property that *information* (3.1.21) is not made available or disclosed to unauthorized individuals, entities, or processes

[SOURCE: ISO/IEC 27000:2018, 3.10]

3.1.11**data**

symbol or symbols represented in a digital and formalized manner suitable for communication, storage, interpretation or processing

3.1.12**data store**

persistent repository for *data* (3.1.11)

Note 1 to entry: A data store can be accessed by a single *entity* (3.1.17) or shared by multiple entities via a *network* (3.1.24) or other connection.

3.1.13**digital entity**

entity (3.1.17) that exists in the digital realm

Note 1 to entry: A digital entity can exist in several forms, including a *cloud service* (3.1.6) or as a *service* (3.1.28) in a data centre, or as a *network* (3.1.24) element or as an *IoT gateway* (3.2.14).

3.1.14

discovery service

service (3.1.28) to find resources, entities or services based on a specification, keywords, search terms, or tags of the desired target

Note 1 to entry: A discovery service can be used by a *human user* (3.1.18) or a *digital user* (3.2.4).

3.1.15

endpoint

component (3.1.8) that exposes and uses one or more *network* (3.1.24) *interfaces* (3.1.22)

3.1.16

endpoint address

<endpoint> character or group of characters that can be used to identify an *endpoint* (3.1.15), which can designate the originating source or destination of *data* (3.1.11) being transmitted

3.1.17

entity

anything (physical or non-physical) having a distinct existence

[SOURCE: ISO/IEC 15459-3:2014, 3.1]

3.1.18

human user

natural person who uses a system

3.1.19

identifier

information (3.1.21) that unambiguously distinguishes one *entity* (3.1.17) from other entities in a given *identity context* (3.1.20)

3.1.20

identity context

environment where an *entity* (3.1.17) can be sufficiently identified by a certain set of its attributes and values

3.1.21

information

data (3.1.11) that within a certain context has a particular meaning

3.1.22

interface

shared boundary between two functional *components* (3.1.8), defined by various characteristics pertaining to the functions, physical interconnections, signal exchanges, and other characteristics

[SOURCE: ISO/IEC 13066-1:2011, 2.15, modified – In the definition, "units" has been replaced by "components"; ", as appropriate" has been deleted from the end of the definition.]

3.1.23

interoperability

ability of two or more systems or *applications* (3.1.1) to exchange *information* (3.1.21) and to mutually use the information that has been exchanged

[SOURCE: ISO/IEC 22123-1:2023, 3.6.1]

3.1.24**network**

data network

digital network

infrastructure that connects a set of *endpoints* (3.1.15), enabling communication of *data* (3.1.11) between the digital entities reachable through them

3.1.25**physical entity**

entity (3.1.17) in the physical world that can be the subject of sensing and/or actuating

Note 1 to entry: In the Internet of Things reference architecture, the physical entity is a thing that can be sensed and/or actuated by IoT devices or IoT systems.

3.1.26**reference architecture**

architecture description for a specific subject area that guides and constrains the structure and behaviour of a related set of systems of interest

3.1.27**safety**

state in which the risk of harm (to persons) or damage is limited to an acceptable level

[SOURCE: ISO 21101:2014, 3.34]

3.1.28**service**

distinct functionality that is provided by an *entity* (3.1.17) through *interfaces* (3.1.22)

[SOURCE: ISO/IEC TR 14252:1996, 2.2.2.46, modified – In the definition, "part of the functionality" has been replaced by "functionality" and "on one side of an interface to an entity on the other side of the interface" has been replaced by "through *interfaces* (3.1.22)".]

3.1.29**service provider**

organization that manages and delivers a service or services to customers

[SOURCE: ISO/IEC 20000-10:2018, 3.2.24]

3.1.30**socialized**

having organized and constructive behaviour of functions in a system or among systems built with the attributes of the division of labour and the collaboration of tasks

[SOURCE: ISO/IEC TR 30174:2021, 3.4]

3.1.31**stakeholder**

individual, organization, or classes thereof, having an interest, right, share, or claim, in an entity of interest

[SOURCE: ISO/IEC/IEEE 42010:2022, 3.17, modified – "role, position" has been deleted from the beginning of the definition; the EXAMPLE has been deleted.]

3.1.32**tag**

human- or machine-readable mark, or digital identity used to communicate *information* (3.1.21) about an *entity* (3.1.17)

Note 1 to entry: A tag can contain information that can be read by sensors to aid in identification of the *physical entity* (3.1.25).

3.1.33

trustworthiness

ability to meet stakeholder expectations in a demonstrable, verifiable and measurable way

3.1.34

virtual entity

digital entity that represents a *physical entity* (3.1.25)

3.1.35

wearable device

IoT device designed for operation near to, on, or inside of a body

Note 1 to entry: Wearable devices often have a variety of sensing abilities, but limited power capacity constraining communication and data processing abilities. As critical devices of the IoT, it is considered that the communication between wearable devices and a network might not require any human intervention. Wearable devices include electronic devices usable by humans, animals, and other organisms.

3.2 Internet of Things specific terms

3.2.1

actuating

changing one or more properties of a physical entity in response to an input

[SOURCE: IIC vocabulary v3,0]

3.2.2

actuator

IoT device (3.2.11) that changes one or more properties of a *physical entity* (3.1.25) in response to an input

Note 1 to entry: The change can be nonmechanical in nature.

3.2.3

data acquisition functional system

system for gathering required *data* (3.1.11) from a group of sensors, and assembling them into messages for delivery to another *component* (3.1.8)

[SOURCE: ISO/IEC 30144:2020, 3.3]

3.2.4

digital user

digital entity that uses an IoT system

Note 1 to entry: Digital user includes automation services that act on behalf of *human users* (3.1.18).

3.2.5

electronic label

EL

IoT device which attaches to a physical item having a display for the *information* (3.1.21) about the item and its perceived environment and also having information transmission via a data link

Note 1 to entry: Examples of the information about the item and its perceived environment include, but are not limited to, prices, stock status, promotional advertisement, barcode, two-dimensional code, temperature, humidity, ambient light conditions.

[SOURCE: ISO/IEC 30169:2022, 3.1, modified – The domain tag "<in retail industry>" has been deleted. In the definition, "an RF data link" has been replaced by "a data link".]