



# EUOS

EU Observatory for  
ICT Standardisation

Report of TWG IIoT  
& Edge:

# Landscape of Edge Computing Standards

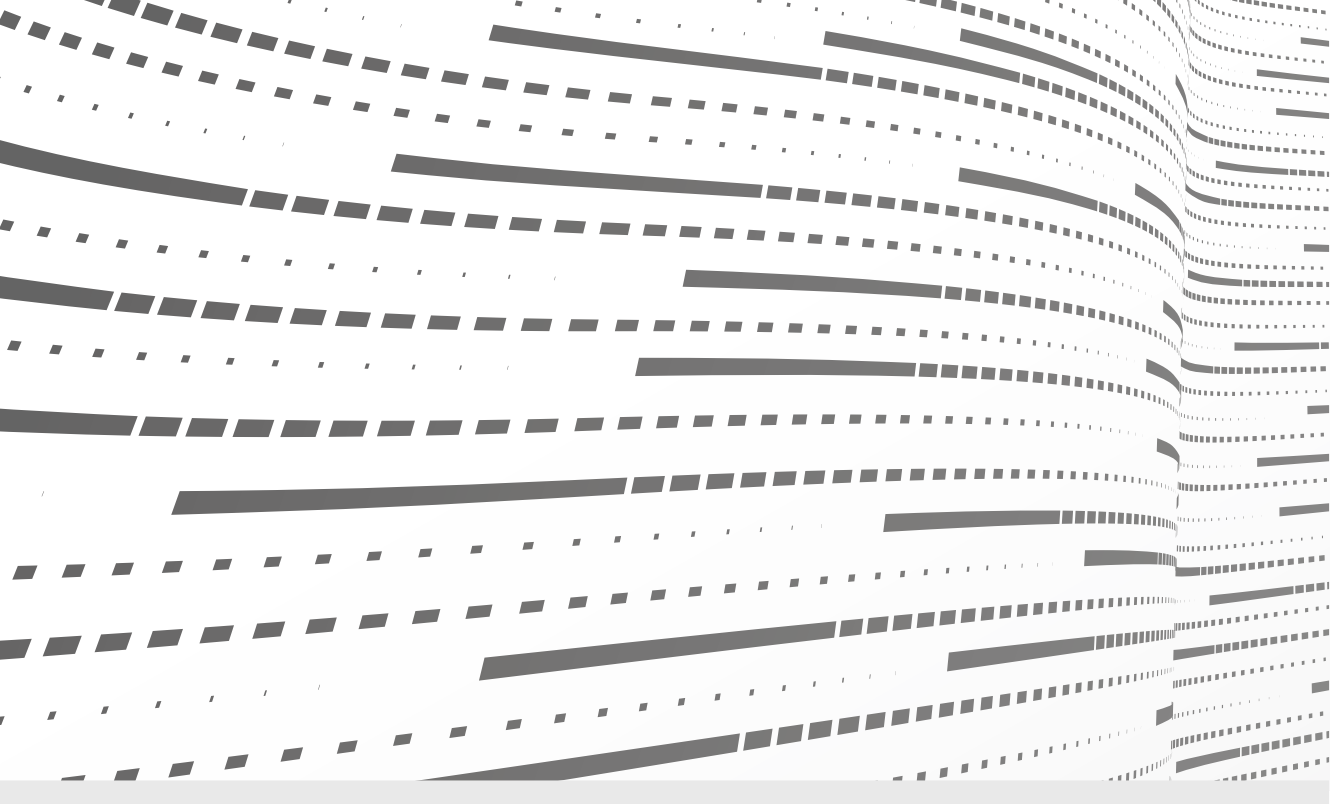
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ICT STANDARDISATION OBSERVATORY AND SUPPORT FACILITY IN EUROPE



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## About StandICT.eu

The StandICT.eu 2023 Coordination and Support Action project has received funding from the European Union's Horizon 2020 - Research and Innovation programme - under grant agreement no. 951972. The project is coordinated by [Trust-IT Srl](#) (IT), supported by its partners from the [Dublin City University](#) (IE) and [AUSTRALO](#) (ES). The content of the present report does not represent the opinion of the European Union, and the European Union is not responsible for any use that might be made of such content.

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# ■ 1. Introduction

Several definitions of edge computing are provided by Standards Development Organizations (SDOs) and industry associations. In this report, similar to the definition provided by the Alliance for Internet of Things Innovation (AIOTI), edge computing is the concept that encompasses the paradigm shift from centralised solutions to decentralised and distributed computing architectures, in which information processing is located close to the edge, where “things” (e.g. sensors/actuators, devices, machines and humans) produce and utilise that information, knowledge, intelligence and related experience.



Currently, several SDO, Alliance and OSS (Open Source Software) initiatives are active and competing in the area of edge computing technologies. This is a normal development considering that edge computing technology is still in the early phase of deployment. In this context, the edge computing landscape can be considered to be complex, dynamic and challenging to grasp and visualize.

Similar to IoT systems, there are several edge computing systems and edge computing applications being implemented and deployed in almost all vertical industry domains, such as Health, Industry & Manufacturing, Agriculture, Finance, Mobility, Energy, Public safety, Buildings and Cities.

The goal of this report is to capture the landscape of edge computing activities and documents/specifications published and/or under publication by SDOs, Alliances and OSS.

In order to realize this goal, this report has used the methodology and process defined by EUOS StandICT.eu in the “Landscape of AI Standards”, report of TWG AI (Technical Working Group of Artificial Intelligence). In particular, representatives from several SDOs, Alliances, OSS Initiatives and academic institutions have created an open-access database of edge computing related specifications and documents, such as architectures, requirements, technical reports, reviews, white papers, guidelines, in a way that encourages future extensions, re-use, cross-comparisons and re-classification according to various needs. Applying the EUOS StandICT.eu aforementioned methodology and process, the TWG IoT and Edge team members who have collated this report, have made the collection of disparate outcomes from across the global community, readable and accessible and at the same time have provided the possibility to make dynamic extensions of these collected outcomes, in the future.

StandICT.eu and the team of TWG IoT and Edge thanks the European Commission for supporting this work and invites experts to join us in expanding the coverage of the edge computing related database behind this report, and use it to compare standards, improve them, and make their work more effective.

**By the editor, Georgios Karagiannis**

## ■ 2. Acknowledgements

StandICT.eu 2023 gratefully acknowledges the following individuals, who have contributed the present report: **Ray Walshe**, Director EUOS, **Georgios Karagiannis** (editor), AIOTI WG Standardisation Chair & Huawei, **Noleen Campbell**, NSAI Standards, **Maria Ines Robles**, Tampere University, **Michelle Wetterwald**, Netellany, **Orfeas Voutyras**, Institute of Communication and Computer Systems, **Antonio Kung**, Trialog, **Lindsay Frost**, NEC, **George Suciu**, BEIA Consult, **Amelié Gyrard**, Trialog, **Jens Gayko**, VDE Association for Electrical, Electronic & Information Technologies, **Axel Rennoch**, Fraunhofer FOKUS, **Edward C. Zimmermann**, NONMONOTONIC Networks, **Marco Carugi**, Consultant, **Amanda Suo**, UNE - Spanish Standardisation Body, **Carlos Valderrama**, Huawei, **Richard Pitwon**, Resolute Photonics, **Christine Perey**, Spime Wrangler, **Kong Lingbo**, Huawei, **Shen Bin**, CAICT, **Samir Medjiah**, Laas-CNRS Toulouse

Thanks to the European Commission for their continued guidance and support: **Thomas Reibe**, **Emilio Davila-Gonzales**, **Eddy Hartog**, **Rolf Riemenschneider** and **Max Lemke**.

## ■ 3. Foreword

In the emerging smart Internet of Things, the trend is that the need for computing power at the edge is growing much faster than the demand at centralized cloud data centres. It is expected that in 5 years, 80% of the data processing will take place at the edge – reversing today's balance. With Europe's strength in industrial and business applications, industrial IoT systems, and 5G, Europe has its one time opportunity to bring its actors back to playing a significant role in the data economy by 2025, thereby improving its strategic autonomy. With computing power moving fast to the edge, data legislation influences the rules across the computing continuum.



In line with Europe's data legislation, green and industrial strategies, for capitalising on the emerging edge paradigm shift and next wave of innovation around the computing continuum, Europe needs to pool major investments. Focus must be on the development and deployment of the next generation edge computing components, systems and platforms that enable a speedy transition to a compute continuum with strong capacities at the edge and IoT- edge in an energy efficient and trustworthy manner.

As a key element of a platform strategy, it is crucial that all stakeholders involved interact in a coordinated way to set the route on interoperability and data standards, underpinning the legislative basis to achieve a thriving data economy, e.g. through the *Data Act*<sup>1</sup> (March 2022).

We acknowledge the work of initiatives like StandICT to interact with the open source and standardisation communities to define complementarities around **interoperability, data protection, portability of cloud services and security**, fostering collaboration and coordination around inputs to new activities based on the gap analysis and spotlighting European strengths and leadership in international developments.

In this context, the new StandICT.eu 2023 *Landscape Report on Edge Computing*, is highly welcome. A report which provides an exhaustive mapping of corresponding international standards with a timely classification of relevant documents, work being carried out within the different Standard Developing Organisations, and industrial (verticals and horizontal) domains.

In a new post-Covid era, IoT and Edge technologies are speeding up the transition paths for key sectors and helping industries that face overarching challenges, particularly linked to the side-effects of the Ukraine crisis. Leveraging emerging digital technologies like edge computing and decentralized intelligence help to tackle urgent societal needs such as addressing energy savings and resilience, and reducing the carbon footprint in key sectors like mobility and housing as well as of major industrial sectors.

Europe's leadership in this area is essential to enable artificial intelligence, Internet of Things and 5G/6G. Europe should aim to set global standards on data storage, processing and innovative data services while maintaining market openness and international cooperation. As a key element, the Commission works in partnership with member states and industry through the proposed **IPCEI - Important Project of Common European Interest (IPCEI) on Next Generation Cloud Infrastructure and Services** which will aim at enabling European data leadership and digital sovereignty, or other relevant initiatives like the Alliance for Internet of Things and Edge Computing Innovation (<https://AIOTI.eu>)

Harnessing the power of IoT and Edge Computing technologies will unquestionably create positive spins to all industrial sectors of activity; it is tightly interlinked with the Digital Decade and upcoming digital policies, such as the Data Act and the *Data Governance Act*<sup>2</sup>, and will benefit from Europe's ambition to secure supply next-generation chips through the Chips Act, due to the arising demand side that the IoT and Edge represents.

This *Landscape Report on Edge Computing* report lends itself on the valuable activities carried out by the Technical Working Group on IIoT & Edge, it represents a crucial step to stimulate industrial platforms at the edge and strive for leadership around global standards in this emerging area.

**Rolf Riemenschneider**

Head of Sector IoT, DG Connect, Unit E4, European Commission

1 <https://digital-strategy.ec.europa.eu/en/library/data-act-proposal-regulation-harmonised-rules-fair-access-and-use-data>

2 <https://www.consilium.europa.eu/en/press/press-releases/2022/05/16/le-conseil-approuve-l-acte-sur-la-gouvernance-des-donnees/>



# ■ 4. Landscape of standards



## ■ 4.1 Connectivity

### 4.1.1 Horizontals & Verticals

#### 3GPP TR 23.748 V17.0.0 (2020-12) Study on enhancement of support for Edge Computing in 5G Core network (5GC)

🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3622>

**ABSTRACT:** The Technical Report studies and performs evaluations of potential architecture enhancements to support Edge Computing (EC) in the 5G Core network (5GC). Specifically, two objectives are included: a) to study the potential system enhancements for enhanced Edge Computing support, and b) to provide deployment guidelines for typical Edge Computing use cases, e.g. URLLC, V2X, AR/VR/XR, UAS, 5GSAT, CDN, etc.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-12

#### AIOTI IoT and Edge Computing impact on Beyond 5G: enabling technologies and challenges

🔗 URL: <https://aioti.eu/wp-content/uploads/2021/10/AIOTI-Beyond-5G-R1-Report-Published.pdf>

**ABSTRACT:** This report highlights several IoT vertical domain use cases collected by AIOTI and determines the specific requirements they impose on the underlying (Beyond) 5G network infrastructure. These use cases and requirements can be used by Standards Developing Organizations (SDOs), such as 3GPP, ITU-T, ISO, and IEEE as requirements for automation in vertical domains focusing on critical communications. In addition to these use cases also emerging topics in the area of (Beyond) 5G technology are as well introduced.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2021-09

#### Contiki-NG, the OS for Next Generation IoT Devices

🔗 URL <https://www.contiki-ng.org/>

**ABSTRACT:** Contiki-NG is an operating system for resource-constrained devices in the Internet of Things. Contiki-NG contains an RFC-compliant, low-power IPv6 communication stack, enabling Internet connectivity. The system runs on a variety of platforms based on energy-efficient architectures such as the ARM Cortex-M3/M4 and the Texas Instruments MSP430. The code footprint is on the order of a 100 kB, and the memory usage can be configured to be as low as 10 kB. The source code is available as open source with a 3-clause BSD license.

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: 2017/01

#### ECC - Carrier Edge Computing Network Technical White Paper

🔗 URL: <http://www.econsortium.org/Lists/show/id/376.html>

**ABSTRACT:** This white paper focuses on identifying, interpreting, and locating network technology systems related to edge computing. Firstly, the relationship between edge computing and network infrastructure is analyzed in detail from three typical scenarios of edge computing to network



requirements, and seven key requirements are obtained. Secondly, the network infrastructure is re-divided and defined from the perspective of edge computing, and the network infrastructure related to edge computing is divided into three parts: edge computing access network (ECA), edge computing internal network (ECN), and edge computing interconnection network (ECI). The corresponding solution and key technology are given for each part. Finally, the development trend of edge computing network technology and the possible technologies involved in the future are described in detail.

To clarify the relationship between edge computing and network infrastructure, the Edge Computing Consortium (ECC) and Network 5.0 Industry and Technology Innovation Alliance, (N5A) worked together to develop the Technical White Paper on Carrier Edge Computing Network.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2019-11

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## ECC - Collaboration Between Edge Computing and Cloud Computing 2018

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🔗 URL: <http://www.eccconsortium.org/Lists/show/id/335.html>

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**ABSTRACT:** This white paper focuses on: (1) the main scenarios, value, and key technologies of edge-cloud synergy, (2) to promote industry consensus on edge-cloud synergy and (3) provide references for building and using related capabilities in the industry ecosystem.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2018-11

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## ECC - Edge Computing and Cloud Computing Collaboration White Paper 2.0

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🔗 URL: <http://www.eccconsortium.org/Lists/show/id/522.html>

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**ABSTRACT:** The Edge Computing and Cloud Computing Collaboration White Paper 2.0 is a continuation of the Edge Computing and Cloud Computing Collaboration White Paper (2018) jointly released by ECC and All in 2018. It will further deepen the relationship between edge computing and cloud computing. In addition, the research on value scenarios, value connotations, and key technologies of edge-cloud synergy is expected to effectively promote the technology development and industry practice of edge-cloud synergy in the industry.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2020-12

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## ETSI GR MEC 018 V1.1.1 (2017-10) Mobile Edge Computing (MEC); End to End Mobility Aspects

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/018/01.01.01\\_60/gr\\_mec018v010101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/018/01.01.01_60/gr_mec018v010101p.pdf)

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**ABSTRACT:** This document focuses on mobility support provided by Mobile Edge Computing. It documents mobility use cases and end to end information flows to support UE (User Equipment) and Application mobility for Mobile Edge Computing. When necessary, the document describes new mobile edge services or interfaces, as well as changes to existing mobile edge services or interfaces, data models, application rules and requirements. The document identifies gaps to support mobility that are not covered by existing WIs (Work Items), documents these gaps and recommends the necessary normative work to close these gaps.

📄 DOCUMENT TYPE: Gap analysis

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📅 PUBLICATION DATE: 2017-10

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## ETSI GR MEC 022 V2.1.1 (2018-09) Multi-access Edge Computing (MEC); Study on MEC Support for V2X Use Cases

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/022/02.01.01\\_60/gr\\_mec022v020101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/022/02.01.01_60/gr_mec022v020101p.pdf)

**ABSTRACT:** The document focuses on identifying the MEC features to support V2X (Vehicle-to-everything) applications. It collects and analyses the relevant V2X use cases (including the findings from external organizations), evaluates the gaps from the defined MEC features and functions, and identifies the new requirements including new features and functions. When necessary, this may include identifying new multi-access edge services or interfaces, as well as changes to existing MEC services or interfaces, data models, application rules and requirements. It will also recommend the necessary normative work to close these gaps if identified.

📄 DOCUMENT TYPE: Gap analysis

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📅 PUBLICATION DATE: 2018-09

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## ETSI GR MEC 024 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); Support for network slicing

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/024/02.01.01\\_60/gr\\_mec024v020101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/024/02.01.01_60/gr_mec024v020101p.pdf)

**ABSTRACT:** The document focuses on identifying the MEC functionalities to support network slicing. It first analyses the relevant network slicing concepts as defined by external organizations. Next, it collects relevant use cases based on the identified network slicing concepts when applied in the context of MEC and it evaluates the gaps from the defined MEC functional elements. When necessary, the document identifies new MEC functionalities or interfaces as well as changes to existing MEC functional elements, interfaces and requirements. It will also recommend the necessary normative work to close these gaps if identified.

📄 DOCUMENT TYPE: Gap analysis

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📅 PUBLICATION DATE: 2019-11

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## ETSI GR MEC 027 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); Study on MEC support for alternative virtualization technologies

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/027/02.01.01\\_60/gr\\_mec027v020101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/027/02.01.01_60/gr_mec027v020101p.pdf)

**ABSTRACT:** This document focuses on identifying the additional support that needs to be provided by MEC when MEC applications run on alternative virtualization technologies, such as containers. This document collects and analyses the use cases relating to the deployment of such alternative virtualization technologies, evaluates the gaps from the currently defined MEC functionalities, and identifies new recommendations. As ETSI NFV is also working on alternative virtualization technologies, the MEC work should be aligned with NFV where applicable. Furthermore, this document also recommends the necessary normative work to close any identified gaps.

📄 DOCUMENT TYPE: Gap analysis

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📅 PUBLICATION DATE: 2019-11

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## ETSI GR MEC 035 V3.1.1 (2021-06) Multi-access Edge Computing (MEC); Study on Inter-MEC systems and MEC-Cloud systems coordination

📄 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/035/03.01.01\\_60/gr\\_mec035v030101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/035/03.01.01_60/gr_mec035v030101p.pdf)

**ABSTRACT:** This document studies the applicability of MEC specifications to inter-MEC systems and MEC-Cloud systems coordination that supports e.g. application instance relocation, synchronization and similar functionalities. Another subject of this study is the enablement and/or enhancement of functionalities for application lifecycle management by third parties (e.g. application developers).

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2021-06

## ETSI GS MEC 002 V2.2.1 (2022-01) Multi-access Edge Computing (MEC); Phase 2: Use Cases and Requirements

📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/002/02.02.01\\_60/gsmec002v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/002/02.02.01_60/gsmec002v020201p.pdf)

**ABSTRACT:** This document specifies the requirements for Multi-access Edge Computing with the aim of promoting interoperability and deployments. It contains normative and informative parts. The document also contains an annex describing example use cases and their technical benefits, for the purpose of deriving requirements.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2022-01

## ETSI GS MEC-IEG 004 V1.1.1 (2015-11) Mobile-Edge Computing (MEC); Service Scenarios

📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC-IEG/001\\_099/004/01.01.01\\_60/gsmec-ieg004v010101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/004/01.01.01_60/gsmec-ieg004v010101p.pdf)

**ABSTRACT:** This document introduces a number of service scenarios that would benefit from the introduction of Mobile-Edge Computing (MEC) technology. The focus of the document is to introduce or provide a non-exhaustive set of service scenarios. It is not the intent nor does the present document provide any requirements.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2015-11

## ETSI GS MEC 010-1 V1.1.1 (2017-10) Mobile Edge Computing (MEC); Mobile Edge Management; Part 1: System, host and platform management

📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/01001/01.01.01\\_60/gsmec01001v010101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01001/01.01.01_60/gsmec01001v010101p.pdf)

**ABSTRACT:** This document defines the management of the mobile edge system, mobile edge hosts and mobile edge platforms. It includes platform configuration, performance and fault management, application monitoring, remote service configuration and service control, information gathering regarding the platform features, available services, and available virtualised resources.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2017-10

## ETSI GS MEC 010-2 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); MEC Management; Part 2: Application lifecycle, rules and requirements management

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/01002/02.01.01\\_60/gs\\_mec01002v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01002/02.01.01_60/gs_mec01002v020101p.pdf)

**ABSTRACT:** This document provides information flows for lifecycle management of applications running on a MEC host, and describes interfaces over the reference points to support application lifecycle management. It also describes application rules and requirements, application-related events, mobility handling and MEC service availability tracking. Furthermore, this document specifies the necessary data model, data format and operation format when applicable.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2019-11

## ETSI GS MEC 011 V2.2.1 (2020-12) Multi-access Edge Computing (MEC); Edge Platform Application Enablement

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/011/02.02.01\\_60/gs\\_mec011v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/011/02.02.01_60/gs_mec011v020201p.pdf)

**ABSTRACT:** This document focuses on the functionalities enabled via the Mp1 reference point between MEC applications and MEC platform, which allows these applications to interact with the MEC system. Service related functionality includes registration/deregistration, discovery and event notifications. Other functionality includes application availability, traffic rules, DNS and time of day. It describes the information flows, required information, and specifies the necessary operations, data models and API definitions.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-12

## ETSI GS MEC 012 V2.1.1 (2019-12) Multi-access Edge Computing (MEC); Radio Network Information API

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/012/02.01.01\\_60/gs\\_mec012v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/012/02.01.01_60/gs_mec012v020101p.pdf)

**ABSTRACT:** This document focuses on the Radio Network Information MEC service. It describes the message flows and the required information. Furthermore, this document also specifies the RESTful API with the data model.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2019-12

## ETSI GS MEC 013 V2.1.1 (2019-09) Multi-access Edge Computing (MEC); Location API

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/013/02.01.01\\_60/gs\\_mec013v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/013/02.01.01_60/gs_mec013v020101p.pdf)

**ABSTRACT:** This document focuses on the MEC Location Service. It describes the related application policy information including authorization and access control, information flows, required information and service aggregation patterns. Furthermore, this document specifies the necessary API with the data model and data format. It is to be noted that the actual data model and data format which is functional for the present API re-uses the definitions in “RESTful Network API for Zonal Presence” and “RESTful Network API for Terminal Location” published by the Open Mobile Alliance.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2019-09

## ETSI GS MEC 014 V2.1.1 (2021-03) Multi-access Edge Computing (MEC); UE Identity API

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📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/014/02.01.01\\_60/gs\\_mec014v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/014/02.01.01_60/gs_mec014v020101p.pdf)

**ABSTRACT:** This document focuses on the UE Identity functionality. It describes the related application policy information (including authorization, access control and traffic rule pattern format), information flows, required information and service aggregation patterns. Furthermore, this document specifies the necessary API, data model and data format, considering existing API(s) if applicable.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2021-03

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## ETSI GS MEC 015 V2.1.1 (2020-06) Multi-Access Edge Computing (MEC); Traffic Management APIs

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📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/015/02.01.01\\_60/gs\\_mec015v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/015/02.01.01_60/gs_mec015v020101p.pdf)

**ABSTRACT:** This document focuses on the Traffic Management multi-access edge service. It describes the related application policy information including authorization and access control, information flows, required information and service aggregation patterns. Furthermore, this document specifies the necessary API with the data model and data format.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06

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## ETSI GS MEC 016 V2.2.1 (2020-04) Multi-access Edge Computing (MEC); Device application interface

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📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/016/02.02.01\\_60/gs\\_mec016v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/016/02.02.01_60/gs_mec016v020201p.pdf)

**ABSTRACT:** This document contains the API definition for the lifecycle management of user applications over the Mx2 reference point between the device application and the User Application LifeCycle Management Proxy (UALCMP) in the MEC system. Furthermore, this document covers the following lifecycle management operations: user application look-up, instantiation and termination. In addition, a mechanism is specified for the exchange of lifecycle management related information between the MEC system and the device application. The intended key audience of the present document are the application developers for the MEC system, since this API provides them with a method to manage their applications.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-04

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## ETSI GS MEC 021 V2.1.1 (2020-01) Multi-access Edge Computing (MEC); Application Mobility Service API

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📄 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/021/02.01.01\\_60/gs\\_mec021v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/021/02.01.01_60/gs_mec021v020101p.pdf)

**ABSTRACT:** This document provides a specification for end-to-end MEC application mobility support in a multi-access edge system. Furthermore, this document describes information flows, required information and operations. Moreover, this document also specifies the necessary API with the data model and data format.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-01

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## ETSI GS MEC 028 V2.2.1 (2021-07) Multi-access Edge Computing (MEC); WLAN Access Information API

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/028/02.02.01\\_60/gsmec028v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/028/02.02.01_60/gsmec028v020201p.pdf)

**ABSTRACT:** This document focuses on the WLAN Access Information MEC service. It describes the message flows and the required information. Furthermore, this document also specifies the RESTful API with the data model.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-07

## ETSI GS MEC 029 V2.2.1 (2022-01) Multi-access Edge Computing (MEC); Fixed Access Information API

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/029/02.02.01\\_60/gsmec029v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/029/02.02.01_60/gsmec029v020201p.pdf)

**ABSTRACT:** This document describes a MEC service on Fixed Access Information for Fibre (e.g. G-PON, XG-PON, NG-PON2, XGS-PON), Cable (DOCSIS 3.1), xDSL, and Point-to-Point Fibre Ethernet access networks. It describes the information flows, required information, and as applicable, specifies the necessary operations, data model and data format. Furthermore, this document also specifies the RESTful API.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2022-01

## ETSI GS MEC 030 V2.1.1 (2020-04) Multi-access Edge Computing (MEC); V2X Information Service API

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/030/02.01.01\\_60/gsmec030v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/030/02.01.01_60/gsmec030v020101p.pdf)

**ABSTRACT:** This document focuses on a MEC Vehicular-to-Everything (V2X) Information Service (VIS), in order to facilitate V2X interoperability in a multi-vendor, multi-network and multi-access environment. It describes the V2X-related information flows, required information and operations. Furthermore, this document also specifies the necessary API with the data model and data format.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-04

## ETSI GS MEC-DEC 032-1 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 1: Test Requirements and Implementation Conformance Statement (ICS)

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC-DEC/001\\_099/03201/02.01.01\\_60/gsmec-dec03201v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03201/02.01.01_60/gsmec-dec03201v020101p.pdf)

**ABSTRACT:** Based on the testing methodology guidelines and framework specified in ETSI GR MEC-DEC 025, the document specifies part 1 of a multi-part deliverable test specification. Part 1 (the present document) provides the Test requirements and Implementation Conformance Statement (ICS) for: (1) Application Package Management and Application Lifecycle Management as specified in ETSI GS MEC 10-2, (2) MEC Application Enablement as specified in ETSI GS MEC 011, and (3) the MEC service APIs.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-12



## ETSI GS MEC-DEC 032-2 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 2: Test Purposes (TP)

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC-DEC/001\\_099/03202/02.01.01\\_60/gs\\_mec-dec03202v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03202/02.01.01_60/gs_mec-dec03202v020101p.pdf)

**ABSTRACT:** Based on the testing methodology guidelines and framework specified in ETSI GR MEC-DEC 025, the document specifies part 2 of a multi-part deliverable test specification for the MEC service APIs (currently ETSI GS MEC 012, ETSI GS MEC 013, ETSI GS MEC 014, ETSI GS MEC 015, ETSI GS MEC 016, ETSI GS MEC 021 and ETSI GS MEC 029) and the MEC Application Enablement API (ETSI GS MEC 011). Furthermore, this document includes the Test Suite Structure (TSS) and Test Purposes (TPs) using the standardized notation Test Description Language - Test Objectives extension (TDL\_TO).

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-12

## ETSI GS MEC-DEC 032-3 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 3: Abstract Test Suite (ATS)

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC-DEC/001\\_099/03203/02.01.01\\_60/gs\\_mec-dec03203v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03203/02.01.01_60/gs_mec-dec03203v020101p.pdf)

**ABSTRACT:** Based on the testing methodology guidelines and framework specified in ETSI GR MEC-DEC 025, the document specifies part 3 of a multi-part deliverable on conformance test specification. Part 3 provides the Abstract Test Suites (ATS) in TTCN-3 and the Robot Framework for the MEC Application Enablement API specified in ETSI GS MEC 011 and the MEC service APIs.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-12

## ETSI GS MEC-IEG 006 V1.1.1 (2017-01) Mobile Edge Computing; Market Acceleration; MEC Metrics Best Practice and Guidelines

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC-IEG/001\\_099/006/01.01.01\\_60/gs\\_mec-ieg006v010101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/006/01.01.01_60/gs_mec-ieg006v010101p.pdf)

**ABSTRACT:** The document describes various metrics which can potentially be improved through deploying a service on a MEC platform. Example use cases are used to demonstrate where improvements to a number of key performance indicators can be identified in order to highlight the benefits of deploying MEC for various services and applications. Furthermore, the document describes best practices for measuring such performance metrics and these techniques are further exemplified with use cases. Metrics described in the present document can be taken from service requirements defined by various organizations (e.g. 5G service requirements defined by Next Generation Mobile Networks (NGMN) or 3rd Generation Partnership Project (3GPP)). An informative annex is used to document such desired and/or achieved ranges of performance which could be referenced from the main body of the present document.

📄 DOCUMENT TYPE: Recommended Practice

📅 PUBLICATION DATE: 2017-01

## ETSI GR MEC-DEC 025 V2.1.1 (2019-06) Multi-access Edge Computing (MEC); MEC Testing Framework

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC-DEC/001\\_099/025/02.01.01\\_60/gr\\_mec-dec025v020101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC-DEC/001_099/025/02.01.01_60/gr_mec-dec025v020101p.pdf)

**ABSTRACT:** The document lists the functionalities and capabilities required by a MEC compliant implementation. In addition, the document specifies a testing framework defining a methodology for development of interoperability and/or conformance test strategies, test systems and the resulting test specifications for MEC standards. In additional, the testable requirements are listed and prioritized.

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: 2019-06

## ETSI GS MEC 003 V2.2.1 (2020-12) Multi-access Edge Computing (MEC); Framework and Reference Architecture

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/003/02.02.01\\_60/gc\\_mec003v020201p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/003/02.02.01_60/gc_mec003v020201p.pdf)

**ABSTRACT:** The document provides a framework and reference architecture for Multi-access Edge Computing that describes a MEC system that enables MEC applications to run efficiently and seamlessly in a multi-access network. The document also describes the functional elements and the reference points between them, and a number of MEC services that comprise the solution. It finally presents a number of key concepts related to the multi-access edge architecture.

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: 2020-12

## ETSI GS MEC 005 V2.1.1 (2019-07) Multi-access Edge Computing (MEC); Proof of Concept Framework

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/005/02.01.01\\_60/gc\\_mec005v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/005/02.01.01_60/gc_mec005v020101p.pdf)

**ABSTRACT:** The document defines a framework to be used by ETSI ISC MEC to coordinate and promote multivendor Proofs of Concept (PoC) projects and MEC Deployment Trial (MDT) projects illustrating key aspects of MEC technology. Proofs of Concept are an important tool to demonstrate the viability of a new technology during its early days and or pre-standardization phase. MDTs are seen as the next step of PoC to demonstrate the viability of MEC in a commercial trial/deployment and to provide feedback to the standardization work.

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: 2019-07

## ETSI GR MEC 017 V1.1.1 (2018-02) Mobile Edge Computing (MEC); Deployment of Mobile Edge Computing in an NFV environment

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/017/01.01.01\\_60/gr\\_mec017v010101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/017/01.01.01_60/gr_mec017v010101p.pdf)

**ABSTRACT:** The document describes solutions that allow the deployment of MEC in an NFV environment. For each solution, it describes the motivation for the solution, its architectural impacts and the necessary work to enable it. The document provides recommendations as for where the specification work needs to be done.

📄 DOCUMENT TYPE: Guideline

📅 PUBLICATION DATE: 2018-02

## ETSI GR MEC 031 V2.1.1 (2020-10) Multi-access Edge Computing (MEC) MEC 5G Integration

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gr/MEC/001\\_099/031/02.01.01\\_60/gr\\_mec031v020101p.pdf](https://www.etsi.org/deliver/etsi_gr/MEC/001_099/031/02.01.01_60/gr_mec031v020101p.pdf)

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**ABSTRACT:** The document describes the key issues, solution proposals and recommendations for MEC integration into 3GPP 5G system. The following aspects are addressed: MEC System interactions with the 5G System, including the correspondence of the current MEC procedures to procedures available in 3GPP 5G system specification, options for the functional split between MEC and 5G Common API framework, realization of MEC as 5G Application Function(s). In addition the document addresses the scope and the preferred way of proceeding with the identified future technical work, as well as the identification of any missing 5G system functionality for MEC integration.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2020-10

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## ETSI GS MEC 009 V3.1.1 (2021-06) Multi-access Edge Computing (MEC); General principles, patterns and common aspects of MEC Service APIs

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/009/03.01.01\\_60/gsmec009v030101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/009/03.01.01_60/gsmec009v030101p.pdf)

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**ABSTRACT:** The document defines design principles for RESTful MEC service APIs, provides guidelines and templates for the documentation of these, and defines patterns of how MEC service APIs use RESTful principles.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2021-06

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## FIT IoT-LAB Testbed The Very Large Scale Internet of Things Testbed

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🔗 URL: <https://www.iot-lab.info/>

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**ABSTRACT:** IoT-LAB provides a facility suitable for testing networking with small wireless sensor devices and heterogeneous communicating objects.

📄 DOCUMENT TYPE: Framework

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📅 PUBLICATION DATE: 2014-06

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## FIWARE Foundation FIWARE Internet of Things Framework

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🔗 URL: <https://www.fiware.org/>

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**ABSTRACT:** FIWARE Foundation drives the definition - and the Open Source implementation - of key open standards that enable the development of portable and interoperable smart solutions in a faster, easier and affordable way, avoiding vendor lock-in scenarios, whilst also nurturing FIWARE as a sustainable and innovation-driven business ecosystem.

📄 DOCUMENT TYPE: Open\_Source

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📅 PUBLICATION DATE: 2018-01

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## IETF draft-ietf-mops-streaming-opcons-10 Operational Considerations for Streaming Media

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 URL: <https://datatracker.ietf.org/doc/draft-ietf-mops-streaming-opcons/>

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**ABSTRACT:** This document provides an overview of operational networking issues that pertain to quality of experience when streaming video and other high-bitrate media over the Internet.

 DOCUMENT TYPE: Technical Report

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 PUBLICATION DATE: 2022-04

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## IETF RFC 8992 Autonomic IPv6 Edge Prefix Management in Large-Scale Networks

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 URL: <https://datatracker.ietf.org/doc/rfc8992/>

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**ABSTRACT:** This document defines two autonomic technical objectives for IPv6 prefix management at the edge of large-scale ISP networks, with an extension to support IPv4 prefixes.

 DOCUMENT TYPE: Technical Report


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 PUBLICATION DATE: 2021-05

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## IEC 61406 ED1 Identification Link

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 URL: [https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1452,23,104621](https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104621)

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**ABSTRACT:** This document focuses on topics related to devices and their integration in enterprise systems. It is currently, under development.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## IEEE 802.1AB-2016 IEEE Standard for Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery

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 URL: [https://standards.ieee.org/standard/802\\_1AB-2016.html](https://standards.ieee.org/standard/802_1AB-2016.html)

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**ABSTRACT:** This document defines a protocol and a set of managed objects that can be used for discovering the physical topology from adjacent stations in IEEE 802(R) LANs.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2016-01

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## IEEE 802.1AC-2016 IEEE Standard for Local and metropolitan area networks-Media Access Control (MAC) Service Definition

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 URL: [https://standards.ieee.org/standard/802\\_1AC-2016.html](https://standards.ieee.org/standard/802_1AC-2016.html)

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**ABSTRACT:** The MAC Service and the Internal Sublayer Service (ISS) are defined in this standard. Furthermore, this standard specifies media-dependent convergence functions that map IEEE 802(R) MAC interfaces to the ISS. Note that the MAC Service is derived from the ISS.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2017-03

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## IEEE 802.1AS-2020 IEEE Standard for Local and Metropolitan Area Networks--Timing and Synchronization for Time-Sensitive Applications

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🔗 URL: [https://standards.ieee.org/standard/802\\_1AS-2020.html](https://standards.ieee.org/standard/802_1AS-2020.html)

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**ABSTRACT:** Protocols, procedures, and managed objects for the transport of timing over local area networks are defined in this standard. It includes the transport of synchronized time, the selection of the timing source (i.e., best master), and the indication of the occurrence and magnitude of timing impairments (i.e., phase and frequency discontinuities).

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06

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## IEEE 802.1AS-2020 Standard for Local and Metropolitan Area Networks - Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks

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🔗 URL: <https://standards.ieee.org/ieee/802.1AS/7121/>

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**ABSTRACT:** This standard defines a protocol and procedures for the transport of timing over bridged and virtual bridged local area networks. It includes the transport of synchronized time, the selection of the timing source (i.e., best master), and the indication of the occurrence and magnitude of timing impairments (i.e., phase and frequency discontinuities).

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06

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## IEEE 802.1AX-2020 IEEE Standard for Local and metropolitan area networks -- Link Aggregation

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🔗 URL: [https://standards.ieee.org/standard/802\\_1AX-2020.html](https://standards.ieee.org/standard/802_1AX-2020.html)

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**ABSTRACT:** Link Aggregation allows parallel point-to-point links to be used as if they were a single link and also supports the use of multiple links as a resilient load-sharing interconnect between multiple nodes in two separately administered networks. This standard defines a MAC-independent Link Aggregation capability and provides general information relevant to specific MAC types.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-05

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## IEEE 802.1BR-2012 IEEE Standard for Local and metropolitan area networks--Virtual Bridged Local Area Networks--Bridge Port Extension

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🔗 URL: [https://standards.ieee.org/standard/802\\_1BR-2012.html](https://standards.ieee.org/standard/802_1BR-2012.html)

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**ABSTRACT:** This standard specifies the operation of Bridge Port Extenders, including management, protocols, and algorithms. Bridge Port Extenders operate in support of the MAC Service by Extended Bridges.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2012-07

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## IEEE 802.1CB-2017 IEEE Standard for Local and metropolitan area networks--Frame Replication and Elimination for Reliability

🔗 URL: [https://standards.ieee.org/standard/802\\_1CB-2017.html](https://standards.ieee.org/standard/802_1CB-2017.html)

**ABSTRACT:** This standard specifies procedures, managed objects, and protocols for bridges and end systems that provide identification and replication of packets for redundant transmission, identification of duplicate packets, and elimination of duplicate packets. It is not concerned with the creation of the multiple paths over which the duplicates are transmitted.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2017-10

## IEEE 802.1CM-2018 IEEE Standard for Local and metropolitan area networks -- Time-Sensitive Networking for Fronthaul

🔗 URL: [https://standards.ieee.org/standard/802\\_1CM-2018.html](https://standards.ieee.org/standard/802_1CM-2018.html)

**ABSTRACT:** This standard defines profiles that select features, options, configurations, defaults, protocols, and procedures of bridges, stations, and LANs that are necessary to build networks that are capable of transporting fronthaul streams, which are time sensitive.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2018-06

## IEEE 802.1Q-2014 IEEE Standard for Local and metropolitan area networks--Bridges and Bridged Networks

🔗 URL: [https://standards.ieee.org/standard/802\\_1Q-2014.html](https://standards.ieee.org/standard/802_1Q-2014.html)

**ABSTRACT:** This standard specifies how the Media Access Control (MAC) Service is supported by Bridged Networks, the principles of operation of those networks, and the operation of MAC Bridges and VLAN Bridges, including management, protocols, and algorithms.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2014-12

## IEEE/ISO/IEC 8802-1Q-2020 IEEE/ISO/IEC International Standard - Telecommunications and exchange between information technology systems--Requirements for local and metropolitan area networks--Part 1Q: Bridges and bridged networks

🔗 URL: <https://standards.ieee.org/standard/8802-1Q-2020.html>

**ABSTRACT:** This standard specifies how the Media Access Control (MAC) Service is supported by Bridged Networks, the principles of operation of those networks, and the operation of MAC Bridges and VLAN Bridges, including management, protocols, and algorithms.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-08



## IEEE 802-2014 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture

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 URL: <https://standards.ieee.org/standard/802-2014.html>

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**ABSTRACT:** This standard provides an overview to the family of IEEE 802® standards. It describes the reference models for the IEEE 802 standards and explains the relationship of these standards to the higher layer protocols; it provides a standard for the structure of IEEE 802 MAC addresses; it provides a standard for identification of public, private, prototype, and standard protocols; it specifies an object identifier hierarchy used within IEEE 802 for uniform allocation of object identifiers used in IEEE 802 standards; and it specifies a method for higher layer protocol identification.

 DOCUMENT TYPE: Guideline

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 PUBLICATION DATE: 2014-06

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## ISO/IEC 20005:2013 Information technology - Sensor networks - Services and interfaces supporting collaborative information processing in intelligent sensor networks

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 URL: <https://www.iso.org/standard/50952.html?browse=tc>

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**ABSTRACT:** ISO/IEC 20005:2013 specifies services and interfaces supporting collaborative information processing (CIP) in intelligent sensor networks which includes: (1) CIP functionalities and CIP functional model, (2) common services supporting CIP, and (3) common service interfaces to CIP.

 DOCUMENT TYPE: Standard Specification


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 PUBLICATION DATE: 2013-07

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## ISO/IEC JTC1-SC41-262 ED1 Internet of Things (IoT) – Functional architecture for resource ID interoperability

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 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,108552](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108552)

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**ABSTRACT:** This document specifies functional requirements and architecture about the following items for resource interoperability among heterogeneous IoT platforms (e.g., oneM2M, GS1 OIiot, IBM Watson IoT, OCF IoTivity, and FIWARE, etc.) through the conversion of resource identifiers (IDs) and paths (e.g., uniform resource identifier (URI)): (1) Requirements for interoperability of resource IDs in the heterogeneous IoT platforms, (2) Functional architecture for converting IDs and paths of resources on heterogeneous platforms, and, (3) Functional architecture for mapping and managing resource IDs among heterogeneous platforms.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ISO/IEC/IEEE IEEE/ISO/IEC 8802-1BA-2016 ISO/IEC/IEEE International Standard - Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 1BA: Audio video bridging

🔗 URL: <https://standards.ieee.org/standard/8802-1BA-2016.html>

**ABSTRACT:** Profiles that select features, options, configurations, defaults, protocols and procedures of bridges, stations and LANs that are necessary to build networks that are capable of transporting time-sensitive audio and/or video data streams are defined in this standard.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2016-10

## ISO/IEC/IEEE IEEE/ISO/IEC 8802-1BR-2016 ISO/IEC/IEEE International Standard for Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 1BR: Virtual bridge

🔗 URL: <https://standards.ieee.org/standard/8802-1BR-2016.html>

**ABSTRACT:** This standard specifies the operation of Bridge Port Extenders, including management, protocols, and algorithms. Bridge Port Extenders operate in support of the MAC Service by Extended Bridges.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2016-10

## ITU-T - SG11 - Q.IEC-PRO Protocols for microservices based intelligent edge computing

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17839](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17839)

**ABSTRACT:** For development of the IEC architecture, there are couple of software-oriented architectural ways to build flexible protocol architecture achieved by deploying and operating the architecture, for instance, an unified software oriented architecture, which is composing logically modular functions to tightly coupled way as a monolithic architecture and microservice architecture which is loosely composing logically or physically separated own processing functions as microservices. Because IEC has developed protocols on different hardware specifications and various functionalities that each business requires, this specification focuses on standardized approaches based on microservices and can be used as a reference standard for implementation. Due to the derived microservices based IEC architecture, it can be continuously developed and operated by updating microservices. This Recommendation specifies the signalling architecture, protocol interfaces, protocol procedures and message format for microservices based intelligent edge computing.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ITU-T - SG13 - Y. FMSC-MEC Multi-access Edge Computing for fixed, mobile and satellite convergence in IMT-2020 networks and beyond

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18100](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18100)

**ABSTRACT:** This draft Recommendation aims to describe the framework of Multi-access Edge Computing for fixed, mobile and satellite convergence (FMSC) in IMT-2020 networks and beyond. This recommendation covers the following issues, but not limited to: (1) Requirements of Multi-access

Edge Computing for supporting fixed, mobile and satellite convergence in IMT-2020 networks, (2) The architecture of Multi-access Edge Computing for fixed, mobile and satellite convergence, and (3) Information flows of Multi-access Edge Computing for fixed, mobile and satellite convergence.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.FMC-EC Unified edge computing for supporting fixed mobile convergence in IMT-2020 networks

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18048](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18048)

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**ABSTRACT:** A unified and cloud-based edge computing platform allows operators to flexibly deploy network functions and support infrastructure for fixed-mobile network convergence, to provide a unified multi-access edge computing capability for all network access technologies in IMT-2020 networks. This draft Recommendation aims to describe the requirements, architecture and functions of unified multi-access edge computing for supporting fixed mobile convergence (FMC) network.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.IMT2020-CEFEC Framework of capability exposure function in edge computing for IMT-2020 networks and beyond

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18094](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18094)

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**ABSTRACT:** This draft Recommendation specifies the framework of capability exposure function (CEF) in edge computing for IMT-2020 networks and beyond. The scope of this document includes: (1) Requirements of capability exposure function in edge computing, (2) Framework of capability exposure function in edge computing, (3) Functionalities and reference points of capability exposure function in edge computing, and (4) Procedures of capability exposure function in edge computing.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.LSMEC Local shunting for multi-access edge computing in IMT- 2020 networks

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18058](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18058)

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**ABSTRACT:** This draft Recommendation describes the requirements, architecture, functional entities, reference points and information flows of local shunting for multi-access edge computing in IMT-2020 networks.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ITU-T - SG16 - F.743.13 Requirements for cooperation of multiple edge gateways

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14954&lang=en>

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**ABSTRACT:** This Recommendation describes the requirements for a function which enables the cooperation of multiple edge gateways (CEMG) to complete complex tasks. It also describes the required capabilities and requirements of key components. The CEMG function can support the information exchanging among multiple edge gateways and deal with gateway failure cooperatively. It can also specify the central gateway which is responsible for selecting a cooperative gateway for each gateway,

which in turn monitors the status of its partner gateway, and manages the cooperative data and devices.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2022-03

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## ITU-T F.743.10 (11/2019) Requirements for mobile edge computing enabled content delivery networks

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14103&lang=en>

**ABSTRACT:** Recommendation ITU-T F.743.10 specifies the general framework, scenarios and requirements for mobile edge computing- (MEC)-enabled content delivery networks (CDNs). Recommendation ITU-T F.743.10 also specifies the requirements for MEC functions on which a CDN edge node relies. The deployment of a CDN edge node with an MEC system is described in the general framework. Several use cases are introduced in Recommendation ITU-T F.743.10 to illustrate the usage of MEC-enabled CDN.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2019-11

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## ITU-T F.743.12 (06/2021) Requirements for edge computing in video surveillance

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14680&lang=en>

**ABSTRACT:** Recommendation ITU-T F.743.12 defines the requirements for edge computing in video surveillance. Edge computing is a distributed computing paradigm aimed at providing various computing services at the edge of the network, and it brings computation and data storage closer to the data source or the location where it is needed, to improve response time and save bandwidth. By using the edge computing technology, the video surveillance system can perform intelligent video analysis and store data near the network premises units. And the edge computing platform provides the management capabilities of the edge resources and functional components to the video surveillance system. It can improve the video processing efficiency and quality of services and reduce the infrastructure cost of the video surveillance system. This Recommendation describes the application scenarios and requirements for edge computing in the video surveillance system.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2021-06

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## ITU-T F.749.11 (11/2019) Requirements of civilian unmanned aerial vehicles enabled mobile edge computing

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14104&lang=en>

**ABSTRACT:** Civilian unmanned aerial vehicle (CUAV) enabled mobile edge computing (MEC) utilizes CUAV as an MEC platform to realize a flexible, efficient and on-demand computing service that can be rapidly deployed and move according to the practical service needs of devices. Recommendation ITU-T F.749.11 describes the framework and specifies requirements for a CUAV-MEC system, including functional, service and security requirements.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2019-11

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## ITU-T Y.3109 (04/2021) Quality of service assurance-related requirements and framework for virtual reality delivery using mobile edge computing supported by IMT-2020

🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14396&lang=en>

**ABSTRACT:** The Recommendation ITU-T Y.3109 specifies quality of service (QoS) assurance-related requirements and a framework for virtual reality (VR) delivery using mobile edge computing (MEC) in International Mobile Telecommunications-2020 (IMT-2020). Recommendation ITU-T Y.3109 first provides an introduction to VR delivery using MEC supported by IMT-2020. It then specifies QoS assurance-related function and mechanism requirements and a framework. The QoS planning for VR services, typical VR user cases and guidelines for deployments of VR services are described in appendices.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-04

## ITU-T Y.4122 (07/2021) Requirements and capability framework of the edge-computing-enabled gateway in the Internet of things

🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14735&lang=en>

**ABSTRACT:** The gateway is an important component of Internet of things (IoT) systems, enabling IoT devices to connect to communication networks. Edge computing technologies can benefit the IoT, providing computation, storage, networking and intelligence in proximity to IoT devices. Compared with the common gateway [ITU-T Y.4101], the edge-computing-enabled gateway in the IoT (EC-enabled IoT gateway) has additional capabilities supporting service layer interworking, and application layer interworking between IoT devices, IoT platforms and IoT application servers. In addition, the EC-enabled IoT gateway supports data transmission capabilities for IoT applications sensitive to time, latency, jitter and packet loss. Based on the common requirements and capabilities of a gateway for IoT applications [ITU-T Y.4101] and IoT requirements for support of edge computing [ITU-T Y.4208], additional capabilities and capability framework of the edge-computing-enabled gateway in the IoT are specified. Examples of applicability of the edge-computing-enabled gateway in the IoT are also given.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-07

## OASIS Advanced Message Queuing Protocol (AMQP) TC

🔗 URL: [https://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=amqp](https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=amqp)

**ABSTRACT:** The OASIS AMQP TC advances a vendor-neutral and platform-agnostic protocol that offers organizations an easier, more secure approach to passing real-time data streams and business transactions. The goal of AMQP is to ensure information is safely and efficiently transported between applications, among organizations, across distributed cloud computing environments, and within mobile infrastructures. AMQP avoids proprietary technologies, offering the potential to lower the cost of enterprise middleware software integrations through open interoperability. By enabling a commoditized, multi-vendor ecosystem, AMQP seeks to create opportunities for transforming the way business is done in the Cloud and over the Internet.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: N/A

## OASIS Message Queuing Telemetry Transport (MQTT) TC

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 URL: [https://www.oasis-open.org/committees/tc\\_home.php?wg\\_abbrev=mqtt](https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=mqtt)

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**ABSTRACT:** The OASIS MQTT TC is producing a standard for the Message Queuing Telemetry Transport Protocol compatible with MQTT V3.1, together with requirements for enhancements, documented usage examples, best practices, and guidance for use of MQTT topics with commonly available registry and discovery mechanisms. The standard supports bi-directional messaging to uniformly handle both signals and commands, deterministic message delivery, basic QoS levels, always/sometimes-connected scenarios, loose coupling, and scalability to support large numbers of devices. Candidates for enhancements include message priority and expiry, message payload typing, request/reply, and subscription expiry.

As an M2M/Internet of Things (IoT) connectivity protocol, MQTT is designed to support messaging transport from remote locations/devices involving small code footprints (e.g., 8-bit, 256KB ram controllers), low power, low bandwidth, high-cost connections, high latency, variable availability, and negotiated delivery guarantees. For example, MQTT is being used in sensors communicating to a broker via satellite links, SCADA, over occasional dial-up connections with healthcare providers (medical devices), and in a range of home automation and small device scenarios. MQTT is also ideal for mobile applications because of its small size, minimized data packets, and efficient distribution of information to one or many receivers (subscribers).

For more information on the MQTT TC, see the TC Charter.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: N/A

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## RIOT OS RIOT OS, the friendly Operating System for the Internet of Things

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 URL: <https://www.riot-os.org/>

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**ABSTRACT:** RIOT powers the Internet of Things like Linux powers the Internet. RIOT is a free, open source operating system developed by a grassroots community gathering companies, academia, and hobbyists, distributed all around the world.

 DOCUMENT TYPE: Framework

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 PUBLICATION DATE: 2014/05

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## ■ 4.2 Data and Architecture

### 4.2.1 Energy

#### IEC TS 62872-1:2019 Industrial-process measurement, control and automation - Part 1: System interface between industrial facilities and the smart grid

 URL: <https://webstore.iec.ch/publication/62884>

**ABSTRACT:** IEC 62872-1:2019(E) defines the interface, in terms of information flow, between industrial facilities and the “smart grid”. It identifies, profiles and extends where required, the standards needed to allow the exchange of the information needed to support the planning, management and control of electric energy flow between the industrial facility and the smart grid. The scope of this document specifically excludes the protocols needed for the direct control of energy resources within a facility where the control and ultimate liability for such control is delegated by the industrial facility to the external entity (e.g. distributed energy resource (DER) control by the electrical grid operator).

 DOCUMENT TYPE: Technical Report

 PUBLICATION DATE: 2019-06

#### ISO/IEC TR 30148:2019 Internet of things (IoT) - Application of sensor network for wireless gas meters

 URL: <https://webstore.iec.ch/publication/63562>


**ABSTRACT:** ISO/IEC TR 30148:2019 describes: (1) the structure of wireless gas meter networks, and (2) the application protocol of wireless gas meter networks.

 DOCUMENT TYPE: Technical Report

 PUBLICATION DATE: 2019-10

### 4.2.2 Horizontals & Verticals

#### 3GPP TR 23.758 V17.0.0 (2019-12) Study on application architecture for enabling Edge Applications

 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3614>

**ABSTRACT:** This document is a technical report capturing the study on application architecture for enabling edge applications over 3GPP networks. The aspects of the study include identifying architecture requirements (e.g. discovery of edge services, authentication of the clients), supporting application layer functional model and corresponding solutions to enable the deployment of applications on the edge of 3GPP networks, with no impact to edge-unaware applications on the UE (User Equipment) and minimal impact to edge-aware applications on the UE.

 DOCUMENT TYPE: Technical Report

 PUBLICATION DATE: 2019-12

## 3GPP TR 23.803 V7.0.0 (2005-09) Evolution of policy control and charging

🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=883>

**ABSTRACT:** The document studies: (1) the complete harmonization and merger of the policy control and flow based charging architecture and procedures, (2) possible architectures and solutions for adding end-user subscription differentiation and general policy control aspects to the policy- and charging control, and (3) alternative solutions for binding bearers to services (provided today by the authorization token). This includes studying solutions for the network to control bearer usage by service flows.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2005-10

## 3GPP TS 23.558 V17.2.0 (2021-12) Architecture for enabling Edge Applications

🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3723>

**ABSTRACT:** This document specifies the application layer architecture, procedures and information flows necessary for enabling edge applications over 3GPP networks. It includes architectural requirements for enabling edge applications, application layer architecture fulfilling the architecture requirements and procedures to enable the deployment of edge applications.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2022-05

## AIOTI Edge Computing Standard Framework Concepts

🔗 URL: [https://aioti.eu/wp-content/uploads/2021/09/AIOTI-SDOs\\_alliance\\_landscape\\_edge\\_computing\\_standard\\_framework\\_R1-Published.pdf](https://aioti.eu/wp-content/uploads/2021/09/AIOTI-SDOs_alliance_landscape_edge_computing_standard_framework_R1-Published.pdf)

**ABSTRACT:** This document introduces the landscapes of Standards Developing Organisation (SDO), Alliance and Open Source Software (OSS) initiatives that are currently focusing on edge computing. The main objective of this deliverable is to briefly present the global dynamics and landscapes of edge computing SDO, Alliance and OSS initiatives, which can be used: 1) to leverage on existing edge computing standardization, industry promotion and implementation of standards and protocols, and 2) to provide input to edge computing standardisation gap analysis activities.

📄 DOCUMENT TYPE: Landscape

📅 PUBLICATION DATE: 2021-09

## AIOTI High Priority Edge Computing Standardisation Gaps and Relevant SDOs

🔗 URL: <https://aioti.eu/wp-content/uploads/2022/04/AIOTI-High-Priority-Edge-Computing-Gaps-Final.pdf>

**ABSTRACT:** This report introduces an approach for the definition and identification of key edge computing and/or combination of IoT/IIoT, edge computing and cloud computing gaps in several initiatives. Based on the prioritisation of these gaps, the deliverable starts to address the work done within the relevant SDOs that need to cooperate in order to solve these gaps.

📄 DOCUMENT TYPE: Gap analysis

📅 PUBLICATION DATE: 2022-04

## CEN Wireless mesh networking - Communication systems for meter data exchange

🔗 URL: <https://standards.iteh.ai/catalog/tc/cen/a0640f96-2f0c-4456-af8e-20887cd8b203/cen-tc-294-wg-6>

**ABSTRACT:** Produce and maintain standards for meter data exchange protocols, for use over short range wireless networks with meshing functionality. Note: Work will be based on existing ZigBee specifications.

📄 DOCUMENT TYPE: Database

📅 PUBLICATION DATE: N/A

## EECC - Reference Architecture Model Edge Computing (RAMEC)

🔗 URL: [https://www.fokus.fraunhofer.de/en/ngni/news/ecf-eecc\\_2019\\_12](https://www.fokus.fraunhofer.de/en/ngni/news/ecf-eecc_2019_12)

**ABSTRACT:** This document presents the Reference Architecture Model for Edge Computing (RAMEC) to accelerate the adoption of software-based, interoperable, programmable, secure and easy to use industrial ICT infrastructures. RAMEC is not a technical system architecture, but an orientation guide for a multi-dimensional problem space instead.

The mission of RAMEC also for its host organization EECC (European Edge Computing Consortium) is to build an international end-to-end Edge Computing ecosystem by streamlining preferred standards and thereby minimizing the number of potential technology combinations. The approach includes: (1) building an international Edge Computing network (industry, initiatives, and research), (2) getting insights about, prepare for and influence future markets and technologies (gaps and standardization), (3) show readiness of reference stacks (hardware and software) and (4) gain recognition in specific domains (white papers, presentations, forums).

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: 2019-10

## ECC - Edge Computing Reference Architecture 3.0 2018

🔗 URL: <http://www.econsortium.org/Lists/show/id/334.html>

**ABSTRACT:** This document provides an extension to Reference Architecture 2.0, where the business view, usage view, function view, and deployment view are provided.

📄 DOCUMENT TYPE: Whitepaper

📅 PUBLICATION DATE: 2018-11

## ECC - Edge Native Technical Architecture White Paper 1.0

🔗 URL: <http://www.econsortium.org/Lists/show/id/552.html>

**ABSTRACT:** The Edge Native Technical Architecture White Paper 1.0 summarizes the connotation and extension of the Edge Native concept, its technical system, and industry practices to promote the development of Edge Native technologies and maximize the value of "edge computing + industry".

This white paper points out that Edge Native is a major innovation in the industry. It is centered on connectivity and computing and mainly deployed on lightweight edge nodes. Cloud Native, which is computing-centric and focuses on large-scale data center deployment, is two-in-one. As the focus of the ICT industry shifts to the edge, Edge Native addresses some challenges faced by Cloud Native technologies at the edge, such as resource consumption, network security, and edge node customization and O&M.

Edge Native includes ten edge native technologies. (1) Edge infrastructure, (2) edge network, (3) edge orchestrator, (4) edge collaboration, (5) edge intelligence, (6) edge security, (7) edge grid, (8) edge storage, (9) edge framework, and (10) agile development of edge security. These technologies are demonstrating the important role and enablement path of Edge Native in industry digital transformation and new

infrastructure construction. It provides a reference for the industry to promote the development of Edge Native and is of great significance for the convergence of edge computing solutions and industries.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2021-02

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## ECC- Edge Computing Reference Architecture 2.0 2017

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🔗 URL: <http://en.econsortium.org/Lists/show/id/82.html>; <http://www.econsortium.org/Lists/show/id/163.html>

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**ABSTRACT:** This document provides challenges to Industry Intelligence/Digitalization and Relationship with Edge Computing. Moreover, it provides (1) the current progress of Edge Computing Industry, (2) edge computing concept, (3) basic features and attributes, (4) edge computing cross value, (5) model-driven reference architecture, and (6) ECC (Edge Computing Consortium) Industry Development and Business Practice.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2017-11

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## IEC TR 63283-5 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 5: Market and innovation trends analysis

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🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,107051](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,107051)

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**ABSTRACT:** Industrial IoT, (I)IoT devices, Edge, Cloud, 6G and AI are the key topics and sections, including edge management, edge providers etc. Standardization needs are addressed.

📄 DOCUMENT TYPE: Gap analysis

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📅 PUBLICATION DATE: Under development

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## IEEE 1934-2018: IEEE Standard for Adoption of OpenFog Reference Architecture for Fog Computing

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🔗 URL: <https://standards.ieee.org/standard/1934-2018.html>

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**ABSTRACT:** OpenFog Consortium--OpenFog Reference Architecture for Fog Computing is adopted by this standard. OpenFog Reference Architecture [OPFRA001.020817] is a structural and functional prescription of an open, interoperable, horizontal system architecture for distributing computing, storage, control and networking functions closer to the users along a cloud-to-thing continuum of communicating, computing, sensing and actuating entities. It encompasses various approaches to disperse Information Technology (IT), Communication Technology (CT) and Operational Technology (OT) Services through information messaging infrastructure as well as legacy and emerging multi-access networking technologies

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2018-08

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## IEEE 2413-2019 IEEE Standard for an Architectural Framework for the Internet of Things (IoT)

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 URL: <https://standards.ieee.org/standard/2413-2019.html>

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**ABSTRACT:** An architecture framework description for the Internet of Things (IoT), which conforms to the international standard ISO/IEC/IEEE 42010:2011 is defined. The architecture framework description is motivated by concerns commonly shared by IoT system stakeholders across multiple domains (transportation, healthcare, Smart Grid, etc.). A conceptual basis for the notion of things in the IoT is provided and the shared concerns as a collection of architecture viewpoints is elaborated to form the body of the framework description.

 DOCUMENT TYPE: Standard Specification


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 PUBLICATION DATE: 2020-03

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## IEEE 754-2008 IEEE Standard for Floating-Point Arithmetic

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 URL: <https://ieeexplore.ieee.org/document/4610935>

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**ABSTRACT:** This standard specifies formats and methods for floating-point arithmetic in computer systems: standard and extended functions with single, double, extended, and extendable precision, and recommends formats for data interchange. Exception conditions are defined and standard handling of these conditions is specified.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2008-08

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## IEEE 802d-2017 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 1: Allocation of Uniform Resource Name (URN) Values in IEEE 802(R) Standards

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 URL: <https://standards.ieee.org/standard/802d-2017.html>

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**ABSTRACT:** How Uniform Resource Name (URN) values are allocated in IEEE 802(R) standards is described in this amendment to IEEE Std 802(R)-2014.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2017-03

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## IRTF draft-dwon-t2trg-multiedge-arch Multi-cluster Edge System Architecture and Network Function Requirements

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 URL: <https://datatracker.ietf.org/doc/draft-dwon-t2trg-multiedge-arch/>

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**ABSTRACT:** This internet draft presents the cluster-based edge system architecture and multi-cluster edge network topology that consists of multi-cluster edge system and core cloud. Moreover, it presents the network functions and network node to configure and operate multi-cluster edge network collaboratively.

 DOCUMENT TYPE: Technical Report

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 PUBLICATION DATE: 2021-11

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## IRTF draft-irtf-t2trg-iot-edge IoT Edge Challenges and Functions

🔗 URL: <https://datatracker.ietf.org/doc/draft-irtf-t2trg-iot-edge/>

**ABSTRACT:** This document outlines the requirements of the emerging IoT Edge and its challenges. It presents a general model, and major components of the IoT Edge, to provide a common base for future discussions in T2TRG and other IRTF and IETF groups.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2022-01

## ISO/IEC TR 30164:2020 Internet of Things (IoT) - Edge computing

🔗 URL: <https://webstore.iec.ch/publication/62522>

**ABSTRACT:** This document describes the common concepts, terminologies, characteristics, use cases and technologies (including data management, coordination, processing, network functionality, heterogeneous computing, security, hardware/software optimization) of edge computing for IoT systems applications. Furthermore, this document assists in the identification of potential areas for standardization in edge computing for IoT. The document describes several use cases from different industrial domains: Smart elevator, Smart video monitoring, Intelligent transport systems, Process control in smart factory, Virtual power plant, Automated crop monitoring and management system, and Smart lightning system.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-04

## ISO/IEC TR 30164:2020 - Internet of things (IoT) - Edge computing

🔗 URL: <https://webstore.iec.ch/publication/62522>

**ABSTRACT:** ISO/IEC TR 30164:2020 describes the common concepts, terminologies, characteristics, use cases and technologies (including data management, coordination, processing, network functionality, heterogeneous computing, security, hardware/software optimization) of edge computing for IoT systems applications. This document is also meant to assist in the identification of potential areas for standardization in edge computing for IoT.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-04

## ISO/IEC TR 30164:2020 Internet of Things (IoT) - Edge computing

🔗 URL: <https://webstore.iec.ch/publication/62522>

**ABSTRACT:** ISO/IEC TR 30164:2020 describes the common concepts, terminologies, characteristics, use cases and technologies (including data management, coordination, processing, network functionality, heterogeneous computing, security, hardware/software optimization) of edge computing for IoT systems applications. This document is also meant to assist in the identification of potential areas for standardization in edge computing for IoT.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-04



## ISO ISO/PAS 19450:2015 Automation systems and integration - Object-Process Methodology

🔗 URL: <https://www.iso.org/standard/84612.html?browse=tc>

**ABSTRACT:** ISO/PAS 19450:2015 specifies Object-Process Methodology (OPM) with detail sufficient for enabling practitioners to utilise the concepts, semantics, and syntax of Object-Process Methodology as a modelling paradigm and language for producing conceptual models at various extents of detail, and for enabling tool vendors to provide application modelling products to aid those practitioners.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2015-12

## ISO/IEC 21823-3:2021 Internet of Things (IoT) - Interoperability for IoT systems - Part 3: Semantic interoperability

🔗 URL: <https://webstore.iec.ch/publication/61088>

**ABSTRACT:** ISO/IEC 21823-3:2021 provides the basic concepts for IoT systems semantic interoperability, as described in the facet model of ISO/IEC 21823-1, including: (1) requirements of the core ontologies for semantic interoperability, (2) best practices and guidance on how to use ontologies and to develop domain-specific applications, including the need to allow for extensibility and connection to external ontologies, (3) cross-domain specification and formalization of ontologies to provide harmonized utilization of existing ontologies, (4) relevant IoT ontologies along with comparative study of the characteristics and approaches in terms of modularity, extensibility, reusability, scalability, interoperability with upper ontologies, and so on, and (5) use cases and service scenarios that exhibit necessities and requirements of semantic interoperability.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-09

## ISO/IEC 30141:2018 Internet of things and related technologies

🔗 URL: <https://webstore.iec.ch/publication/60606>

**ABSTRACT:** This document provides a standardized IoT Reference Architecture using a common vocabulary, reusable designs and industry best practices. It uses a top down approach, beginning with collecting the most important characteristics of IoT, abstracting those into a generic IoT Conceptual Model, deriving a high level system based reference with subsequent dissection of that model into five architecture views from different perspectives.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-08

## ISO/IEC 30141:2018 Internet of Things (IoT) - Reference Architecture

🔗 URL: <https://webstore.iec.ch/publication/60606>

**ABSTRACT:** ISO/IEC 30141:2018 This document provides a standardized IoT Reference Architecture using a common vocabulary, reusable designs and industry best practices. It uses a top down approach, beginning with collecting the most important characteristics of IoT, abstracting those into a generic IoT Conceptual Model, deriving a high level system based reference with subsequent dissection of that model into the four architecture views (functional view, system view, networking view and usage view) from different perspectives.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2018-08

## ISO/IEC AWI 5392 Information technology — Artificial intelligence — Reference architecture of knowledge engineering

🔗 URL: <https://www.iso.org/standard/81228.html>

**ABSTRACT:** This document defines a reference architecture of Knowledge Engineering (KE) in Artificial Intelligence (AI). The reference architecture describes KE roles, activities, constructional layers, components and their relationships among themselves and other systems from systemic user and functional views. This document also provides a common KE vocabulary by defining KE terms

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC JTC1-SC41-257 ED1 Internet of Things (IoT) – Device model for IoT device interoperability

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,108033](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108033)

**ABSTRACT:** This document defines a structured description method, which describes the functionalities of IoT devices, including what functionalities an IoT device can provide, and how to use the functionalities of IoT device. In details, the contents: (1) Define concept of IoT Device Model: what is IoT Device Model, and how it works with underlying IoT communication protocols, (2) Specify structure of IoT Device Model: define the elements of Status, Profile, and Resource; Furthermore, specify the structure of Resource element, to describe the functionalities of IoT devices through Property, Service, and Event, (3) Specify construction method of IoT Device Model: how to build IoT device functionalities based on IoT Device Model, and (4) Describe the device interoperability based on the IoT Device Model: IoT Device Model discovery, remote query, remote controlling, subscription and data uploading.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC PWI JTC1-SC41-5 Digital Twin - Reference Architecture

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,20,104896](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104896)

**ABSTRACT:** This document provides an overview of Digital Twin, describes the capabilities, range, characteristics and requirements, and establishes a well-defined conceptual model, reference model and reference architectural views including usage view, functional view, and network view. Furthermore, this document is applicable to all types of organizations (e.g., commercial enterprises, government agencies, not-for-profit organizations).

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ITU-T Y.IoT-DES-fr Framework of decentralized service by using DLT and edge computing technologies for IoT devices

🔗 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16855](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16855)

**ABSTRACT:** This draft Recommendation introduces a decentralized service by using DLT (Distributed Ledger Technology) and edge computing technologies for IoT devices, and analyses its characteristics and high-level requirements, and provides its functional framework and relevant common capabilities, functionalities and general procedures.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: Under development

## ITU-T Y.IoT-DSE-arc Reference architecture of service exposure for decentralized services for IoT applications

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🔗 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16862](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16862)

**ABSTRACT:** This draft Recommendation introduces a concept of service exposure for decentralized services (DSE) for IoT applications, analyses its common characteristics and high-level requirements, and provides a reference architecture of DSE and relevant common capabilities.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: Under development

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## ITU-T Y.scdt-reqts Requirements and capabilities of a digital twin system for smart cities

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🔗 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16396](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16396)

**ABSTRACT:** This Recommendation provides a concept of digital twin federation and defines requirements for digital twin federation in smart cities and communities.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: Under development

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## ITU-H.644.4 (06/21) Architecture for mobile/multi-access edge computing enabled content delivery networks

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🔗 URL: <https://www.itu.int/rec/T-REC-H.644.4-202106-l/en>

**ABSTRACT:** Recommendation ITU-T H.644.4 specifies a functional architecture for mobile/multi-access edge computing (MEC) enabled content delivery network (MEC-CDN). The functions and functional blocks within this functional architecture and the related reference points are specified in this Recommendation for matching the requirements in Recommendation ITU-T F.743.10. Particularly, this Recommendation also provides the deployment of virtualized content delivery network (CDN) service and the interworking between virtualized CDN functionalities and MEC management system, within a MEC-CDN ecosystem. In addition, a containerized solution of MEC-CDN is given in this Recommendation, followed by the basic information flows.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-06

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## ITU-T - SG11 - Q.5001 Signalling requirements and architecture of intelligent edge computing

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?rec=13701&lang=en>

**ABSTRACT:** A huge volume of data has been generated from the various smart things. Lots of smart services have been working based on cloud systems. However, the network bottleneck between terminals and a cloud system has incurred various issues (e.g., data loss, network delay, etc.). An edge computing technology between user equipment and cloud server system is attracted to solve these problems. In addition, applying the intelligent data processing functions by providing AI technologies will provide enhanced networking capabilities for new emerging services and applications.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2018-10

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## ITU-T - SG11 - Q.5003 Signalling requirements and architecture for federated multiaccess edge computing

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🔗 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?id=14925&lang=en>

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**ABSTRACT:** Recommendation ITU-T Q.5003 describes signalling requirements and architecture for federated multiaccess edge computing (MEC). This Recommendation specifies signalling requirements, signalling architecture with reference points and security considerations for federated MEC.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2022-02

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## ITU-T - SG13 - Y.3076 Architecture of ICN-enabled Edge Network in IMT-2020

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🔗 URL: <https://www.itu.int/rec/T-REC-Y.3076-202009-I>

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**ABSTRACT:** This Recommendation specifies the requirements and architecture about ICN-enabled edge network in IMT-2020. In particular, (1) From the service and network operation point of view, it discusses detailed requirements of ICN-enabled Edge network in IMT-2020, (2) It provides architecture of ICN-enabled edge network, and (3) It describes the key functions and interfaces to satisfy the requirements of ICN-enabled edge network.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-09

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## ITU-T - SG13 - Y.3526 Cloud computing - Functional requirements of edge cloud management

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🔗 URL: <https://www.itu.int/rec/T-REC-Y.3526-202111-I>

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**ABSTRACT:** This Recommendation provides requirements for edge cloud. It introduces the overview of edge cloud management including advantages of edge cloud management and relationship with global management in distributed cloud. It describes the edge cloud management local functions and mode. Additionally, this Recommendation provides edge cloud management functional requirements derived from use cases.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2021-11

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## ITU-T - SG13 - Y.ecloud-reqts Cloud computing - Functional requirements of edge cloud

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18104](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18104)

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**ABSTRACT:** This Recommendation provides functional requirements of edge cloud. Edge cloud is a cloud computing deployed to the edge of the network. It has small capacity resources enabling cloud service. It addresses the following subjects: (1) Overview of edge cloud, (2) Operation of edge cloud in distributed cloud, (3) Functional requirements of edge cloud, and (4) Use cases of edge cloud in distributed cloud.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.ec-reqts Overview and requirements of edge computing

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 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18101](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18101)

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**ABSTRACT:** This Recommendation provides an overview and requirements of edge computing. To provide requirements, this Recommendation defines terms and concept of edge computing, provides reference frameworks for edge computing based on fundamental characteristics and capabilities. Also, this Recommendation provides requirements through various use cases based on reference framework.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.FMC -AAEC-req Use cases and Technical requirements for supporting application addressing in edge computing for future networks including IMT-2020 network

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 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18079](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18079)

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**ABSTRACT:** This draft Recommendation presents the use cases and technical requirements of application addressing in edge computing for future networks, including IMT-2020. Application Addressing is the process to discover the IP address of the server which the application is running on when an UE (User Equipment) intends to access the application. This Recommendation specifies the following aspects of application addressing in edge computing in the context for future networks including IMT-2020: (1) Use cases and requirements of application addressing in edge computing for future networks including IMT-2020 and (2) FMC architecture enhancement requirements.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ITU-T - SG13 - Y.FMC-AAEC Application addressing in edge computing in IMT-2020 network and beyond

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 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18131](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18131)

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**ABSTRACT:** On the basis of Y.FMC-AAEC-req, which specifies use cases and requirement of application addressing in edge computing, this draft Recommendation presents the framework and technical solutions of application addressing in edge computing in IMT-2020 network and beyond. The following aspects of application addressing in edge computing are addressed in this Recommendation: (1) Framework of application addressing in edge computing, (2) Procedures of application addressing in edge computing, and (3) Security considerations on application addressing in edge computing.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ITU-T - SG16 - H.VSECArch Architecture for edge computing platform supporting a video surveillance system

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 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17519](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17519)

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**ABSTRACT:** This recommendation specifies the architecture for edge computing platform supporting a video surveillance system.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ITU-T - SG17 - X.sa-ec Security architecture of edge cloud

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18024](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18024)

**ABSTRACT:** The purpose of this Recommendation is to guide an operator to implement a uniformed security management for multi-vendor environment. This Recommendation analyses main security protection challenges, and proposes the collaborative cloud-edge computing security architecture. In addition, this Recommendation describes key technologies and work procedures of the security architecture.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

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## ITU-T - SG20 Framework of decentralized service by using DLT and edge computing technologies for IoT devices

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17928](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17928)

**ABSTRACT:** Decentralized services (e.g., enabled by distributed ledger technologies (DLT)) for IoT devices can be deployed in local area networks (e.g., in IoT devices or in local IoT gateways for constrained IoT devices) or in clouds (e.g., in remote IoT gateways or in cloud systems). When deployed in local area networks, the decentralized services will be affected by the local storage capability of peers and their computation capability and communication latency among peers. Furthermore, when deployed in clouds, the decentralized services will be affected by speed and efficiency of data access. With the popularization of the use of edge computing, part or whole of functionalities of DLT-based decentralized services can be deployed in edge nodes. This draft Recommendation introduces a decentralized service by using DLT and edge computing technologies, which is an intermediate supporting service between decentralized services in local area networks and that in clouds. The decentralized service by using DLT and edge computing technologies is deployed in edge nodes and can facilitate interaction among peers of decentralized services, no matter where the peers are deployed (e.g., in local areas or in clouds). This draft Recommendation analyses the characteristics and general requirements of the decentralized service by using DLT and edge computing technologies, and provides its functional framework and relevant common capabilities, functionalities and general procedures.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

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## ITU-T Study Group 20 (SG20) - Internet of things (IoT) and smart cities and communities (SC&C)

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🔗 URL: <https://www.itu.int/en/ITU-T/about/groups/Pages/sg20.aspx>

**ABSTRACT:** SG20 develops international standards to enable the coordinated development of IoT technologies, including machine-to-machine communications and ubiquitous sensor networks. A central part of this study is the standardization of end-to-end architectures for IoT, and mechanisms for the interoperability of IoT applications and datasets employed by various vertically oriented industry sectors.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: N/A

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## ITU-T Y.4208 Internet of things requirements for support of edge computing

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 URL: <https://www.itu.int/itu-t/recommendations/rec.aspx?rec=14162>

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**ABSTRACT:** Some of the capabilities offered by the Internet of thing (IoT), e.g., capabilities for computing, storage and analytics, are evolving in closer proximity to IoT data sources. Recommendation ITU-T Y.4208 provides an overview of related challenges faced by the IoT and describes how IoT-supporting edge computing (EC) may address these challenges. From the edge-computing deployment perspective, service requirements for support of EC capabilities in the IoT are identified, as well as related functional requirements. As an example, scenarios of EC deployment in different application domains, EC scenarios for vehicle-to-everything (V2X) and for smart manufacturing are provided in an appendix.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2020-01

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## ITU-T Y.AI-DECCS Functional architecture of AI enabled device-edge-cloud collaborative services for IoT and smart city

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 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16856](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16856)

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**ABSTRACT:** This Recommendation specifies the Functional architecture of AI enabled device-edge-cloud collaborative services for IoT and smart city.

 DOCUMENT TYPE: Framework

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 PUBLICATION DATE: Under development

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## ITU-T Y.CDML-arc Reference architecture of collaborative decentralized machine learning for intelligent IoT services

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 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16865](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16865)

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**ABSTRACT:** This recommendation aims to propose the reference architecture of collaborative decentralized machine learning for intelligent IoT services.

 DOCUMENT TYPE: Framework

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 PUBLICATION DATE: Under development

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## ITU-T Y.dec-IoT-arch Decentralized IoT communication architecture based on information centric networking and blockchain

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 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=14650](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14650)

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**ABSTRACT:** This Recommendation describes a decentralized, IoT communication reference architecture based on ICN (Information Centric Networking) and blockchain.

 DOCUMENT TYPE: Framework

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 PUBLICATION DATE: Under development

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## ITU-T Y.RA-FML Requirements and reference architecture of IoT and smart city and community service based on federated machine learning

🔗 URL: [https://www.itu.int/itu-t/workprog/wp\\_item.aspx?isn=16676](https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16676)

**ABSTRACT:** This Recommendation defines the reference architectural framework and requirements of IoT and Smart City and Community services based on federated machine learning.

📄 DOCUMENT TYPE: Framework

📅 PUBLICATION DATE: Under development

## NGI-0 Discovery NEUROPIL

🔗 URL: <https://gitlab.com/pi-lar/neuropil>

**ABSTRACT:** Neuropil is an open-source de-centralized messaging layer that focuses on security and privacy by design. Persons, machines, and applications first have to identify their respective partners and/or content before real information can be sent. The discovery is handled internally and is based on so called "intent messages" that are secured by cryptographic primitives. This project aims to create distributed search engine capabilities based on neuropil, that enable the discovery and sharing of information with significantly higher levels of trust and privacy and with more control over the search content for data owners than today's standard.

📄 DOCUMENT TYPE: EU & National funded Open Source projects

📅 PUBLICATION DATE: Under development

## NGI-Fed4Fire COMPUTATION OFFLOADING FOR IOT-ENABLED APPLICATIONS

🔗 URL: <https://www.fed4fire.eu/demo-stories/oc2/comfort-app/>

**ABSTRACT:** COMFORT APP aims to provide an offloading mechanism for IoT enabled applications. IoT devices have limited resources in terms of energy, computation and networking, thus the execution of computation intensive applications is still restrictive for them. MEC offers the processing power of cloud computing at the proximity of mobile users.

📄 DOCUMENT TYPE: EU & National funded Open Source projects

📅 PUBLICATION DATE: Under development

## NGI-Ontochain ADOS (AirTrace Decentralized Oracle System)

🔗 URL: <https://ontochain.ngi.eu/content/ados>

**ABSTRACT:** An advanced AI-based oracle system for securing off-chain IoT data integrity when injecting in the blockchain ADOS offers the chance to B-IoT (Blockchain of IoT) practitioners to track and quantify data integrity before and after injecting into the Blockchain. This new dimension greatly improves reliability in the IoT data auditing process.

📄 DOCUMENT TYPE: EU & National funded Open Source projects

📅 PUBLICATION DATE: Under development


## NGI-Trust D-SBOM (Distributed Software Bill of Materials)

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 URL: <https://www.trublo.eu/d-sbom/>

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**ABSTRACT:** D-SBOM (Distributed Software Bills of Material) will provide a solution in complex IoT software supply chains to document all the software used in IoT devices and distribute this information in a secure and trusted way towards all users and actors.

 DOCUMENT TYPE: EU & National funded Open Source projects


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 PUBLICATION DATE: Under development

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## NGI-Trust EDGE-TINC

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 URL: <https://edge-tinc.gitlab.io/fluentic/>

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**ABSTRACT:** Edge-TINC is developing the networking stack and all the required protocols to enable in-network nodes that possess CPU capacity to accommodate requests for computation.

 DOCUMENT TYPE: EU & National funded Open Source projects


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 PUBLICATION DATE: Under development

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## NGI-Trust IZI

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 URL: <https://github.com/mizolotu/izi>

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**ABSTRACT:** NGI-Trust IZI implements a prototype of a defense framework relying on advanced technologies that have recently emerged in the area of software-defined networking (SDN) and network function virtualization (NFV) for IoT devices.

 DOCUMENT TYPE: EU & National funded Open Source projects

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 PUBLICATION DATE: Under development

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## NGI-Trust PY

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 URL: <https://www.panga.fr/>

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**ABSTRACT:** NGI-Trust PY focuses on the network architecture of connected buildings and cities Local networks to transform buildings and cities into a service platform for their users and managers.

 DOCUMENT TYPE: EU & National funded Open Source projects

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 PUBLICATION DATE: Under development

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## NGI-Trust PY 2.0

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 URL: <https://www.pyguard.fr/>

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**ABSTRACT:** NGI-Trust PY 2.0 aims to address issues by combining two emerging technologies known as edge AI and fog computing. This solution will aggregate the data collected by the IoT devices into fog nodes and apply edge AI for data analysis at the edge of the infrastructure.

 DOCUMENT TYPE: EU & National funded Open Source projects

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 PUBLICATION DATE: Under development

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## NGI-Trust Totem

🔗 URL: <https://insigh.io/>

**ABSTRACT:** NGI-Trust Totem provides a set of innovations along with open hardware devices and software applications/tools that will enable the holistic monitoring of the connected home network activities, identify and prevent potential security/trust breaches.

📄 DOCUMENT TYPE: EU & National funded Open Source projects

📅 PUBLICATION DATE: Under development

## OMA IPSO Smart Object Guidelines

🔗 URL: <https://omaspecworks.org/develop-with-oma-specworks/ipso-smart-objects/guidelines/>

**ABSTRACT:** IPSO Smart Object Guidelines provide a common design pattern, an object model, that can effectively use the IETF CoAP (Constrained Application Protocol) protocol to provide high level interoperability between Smart Object devices and connected software applications on other devices and services.

📄 DOCUMENT TYPE: Guideline

📅 PUBLICATION DATE: 2018-03

## OMA IPSO Repo Public IPSO Repository

🔗 URL: <https://technical.openmobilealliance.org/OMNA/LwM2M/LwM2MRegistry.html>

**ABSTRACT:** The IPSO Smart Object Registry registry is intended for developers that are building products based on IPSO Objects, it is not intended to be used at runtime by applications.

📄 DOCUMENT TYPE: Guideline

📅 PUBLICATION DATE: 2018-03

## oneM2M TR-0017-V2.0.0 Home Domain Abstract Information Model

🔗 URL: [https://onem2m.org/images/files/deliverables/Release2/TR-0017-Home\\_Domain\\_Abstract\\_Information\\_Model-V2\\_0\\_0.pdf](https://onem2m.org/images/files/deliverables/Release2/TR-0017-Home_Domain_Abstract_Information_Model-V2_0_0.pdf)

**ABSTRACT:** This document allows application developers to describe the status of devices as resources on oneM2M-based platform in various ways. Thus different application developers can create different resource trees, even when they build the same kinds of applications. Moreover, when handling the same kinds of devices from different vendors on M2M platforms, application developers may create disunited resource trees without common information model.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2016-8

## W3C TR/2020/REC-wot-architecture-20200409 Web of Things (WoT) Architecture

🔗 URL: <https://www.w3.org/TR/2020/REC-wot-architecture-20200409/>

**ABSTRACT:** The document describes the abstract architecture for the W3C Web of Things. This architecture is based on a set of requirements that were derived from use cases for multiple application domains, both given in this document. A set of modular building blocks are also identified whose detailed specifications are given in other documents. This document describes how these building blocks are related and work together. The WoT abstract architecture defines a basic conceptual framework that can be mapped onto a variety of concrete deployment scenarios, several examples of

which are given. However, the abstract architecture described in this specification does not itself define concrete mechanisms or prescribe any concrete implementation.

📄 DOCUMENT TYPE: Framework

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📅 PUBLICATION DATE: 2020-04

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## 4.2.3 Manufacturing

### IEC TR 62541-1:2020 OPC Unified Architecture - Part 1: Overview and concepts

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🔗 URL: <https://webstore.iec.ch/publication/61109>

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**ABSTRACT:** IEC TR 62541-1:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-1:2020 presents the concepts and overview of the OPC Unified Architecture (OPC UA). Reading this document is helpful to understand the remaining parts of this multi-part document set. Each of the other parts of IEC 62451 is briefly explained along with a suggested reading order.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2020-11

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### IEC TR 62541-2:2020 OPC Unified Architecture - Part 2: Security Model

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🔗 URL: <https://webstore.iec.ch/publication/61110>

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**ABSTRACT:** IEC TR 62541-2:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-2:2020 describes the OPC Unified Architecture (OPC UA) security model. It describes the security threats of the physical, hardware, and software environments in which OPC UA is expected to run. It describes how OPC UA relies upon other standards for security. It provides definition of common security terms that are used in this and other parts of the OPC UA specification. It gives an overview of the security features that are specified in other parts of the OPC UA specification. It references services, mappings, and Profiles that are specified normatively in other parts of the OPC UA Specification. It provides suggestions or best practice guidelines on implementing security. Any seeming ambiguity between this part and one of the other normative parts does not remove or reduce the requirement specified in the other normative part.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2020-11

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### IEC TR 63283-2 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 2: Use cases

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🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,103914](https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103914)

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**ABSTRACT:** The document presents Use cases that describe IIoT platform and edge device usage with the “roles” around them e.g., in the use case cluster “IT-infrastructure and software”, use case “Device configuration”.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: Under development

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## IEC TR 63283-4 WD Industrial-process measurement, control and automation – Smart Manufacturing – Part 4: New technologies

🔗 URL: [https://www.iec.ch/ords/f?p=103:23:523507370720228:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:1250,25](https://www.iec.ch/ords/f?p=103:23:523507370720228:::FSP_ORG_ID,FSP_LANG_ID:1250,25)

**ABSTRACT:** This document is a “Smart manufacturing trend analysis”. Some of the new technologies are related to AI, Edge computing, Cloud technology, Digital twin, New communication protocols, 5G, TSN, Big data and data analytics, IoT and IIoT, Privacy technology, etc. Each chapter has a subchapter on “Technology description”, “Use case analysis” and “Standardization needs”.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: Under development

## IEC 62541-10:2020 OPC Unified Architecture - Part 10: Programs

🔗 URL: <https://webstore.iec.ch/publication/61119>

**ABSTRACT:** IEC 62541-10:2020 RLV contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62541-10:2020 defines the information model associated with Programs in the OPC Unified Architecture. This includes the description of the NodeClasses, standard Properties, Methods and Events and associated behaviour and information for Programs. The complete Address Space model including all NodeClasses and Attributes is specified in IEC 62541-3. The Services such as those used to invoke the Methods used to manage Programs are specified in IEC 62541 4. This third edition cancels and replaces the second edition published in 2015. This edition includes several clarifications and in addition the following significant technical changes with respect to the previous edition: a) Changed ProgramType to ProgramStateMachineType. This is in line with the NodeSet (and thus implementations). In ProgramDiagnosticDataType: changed the definition of lastInputArguments and lastOutputArguments and added two additional fields for the argument values. Also changed StatusResult into StatusCode. Created new version of the type to ProgramDiagnostic2DataType. b) Changed Optional modelling rule to OptionalPlaceholder for Program control Methods. Following the clarification in IEC 62541-3, this now allows subtypes (or instances) to add arguments.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-07-07

## IEC 62541-100:2015 OPC Unified Architecture - Part 100: Device Interface

🔗 URL: <https://webstore.iec.ch/publication/21987>

**ABSTRACT:** IEC 62541-100:2015 is an extension of the overall OPC Unified Architecture standard series and defines the information model associated with Devices. This part of IEC 62541 describes three models which build upon each other:

- (1) the (base) Device Model intended to provide a unified view of devices,
- (2) the Device Communication Model which adds Network and Connection information elements so that communication topologies can be created, and
- (3) the Device Integration Host Model finally which adds additional elements and rules required for host systems to manage integration for a complete system. It allows reflecting the topology of the automation system with the devices as well as the connecting communication networks.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2015-03-25


## IEC 62541-11:2020 OPC Unified Architecture - Part 11: Historical Access

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 URL: <https://webstore.iec.ch/publication/61129>

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**ABSTRACT:** IEC 62541-11:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-11:2020 is part of the OPC Unified Architecture standard series and defines the information model associated with Historical Access (HA). It particularly includes additional and complementary descriptions of the NodeClasses and Attributes needed for Historical Access, additional standard Properties, and other information and behaviour. The complete AddressSpace Model including all NodeClasses and Attributes is specified in IEC 62541-3. The predefined Information Model is defined in IEC 62541-5. The Services to detect and access historical data and events, and description of the ExtensibleParameter types are specified in IEC 62541-4. This document includes functionality to compute and return Aggregates like minimum, maximum, average etc. The Information Model and the concrete working of Aggregates are defined in IEC 62541-13. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition: (1) a new method for determining the first historical point has been added, (2) added clarifications on how to add, insert, modify, and delete annotations.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2020-06-23

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## IEC 62541-13:2020 OPC Unified Architecture - Part 13: Aggregates

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 URL: <https://webstore.iec.ch/publication/61131>

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**ABSTRACT:** IEC 62541-13:2020 contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62541-13:2020 is part of the overall OPC Unified Architecture specification series and defines the information model associated with Aggregates. This second edition cancels and replaces the first edition of IEC 62541-13, published in 2015. No technical changes but numerous clarifications. Also some corrections to the examples.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2020-06-11

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## IEC 62541-14:2020 OPC Unified Architecture - Part 14: PubSub

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 URL: <https://webstore.iec.ch/publication/61108>

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**ABSTRACT:** IEC 62541-14:2020 defines the OPC Unified Architecture (OPC UA) PubSub communication model. It defines an OPC UA publish subscribe pattern which complements the client server pattern defined by the Services in IEC 62541-4. IEC TR 62541-1 gives an overview of the two models and their distinct uses. PubSub allows the distribution of data and events from an OPC UA information source to interested observers inside a device network as well as in IT and analytics cloud systems. This document consists of

- a) a general introduction of the PubSub concepts,
- b) a definition of the PubSub configuration parameters,
- c) mapping of PubSub concepts and configuration parameters to messages and transport protocols, and
- d) a PubSub configuration model.

Not all OPC UA Applications will need to implement all defined message and transport protocol mappings. IEC 62541-7 defines the Profile that dictates which mappings need to be implemented in order to be compliant with a particular Profile.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2020-07-08


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## IEC 62541-3:2020 OPC Unified Architecture - Part 3: Address Space Model

 URL: <https://webstore.iec.ch/publication/61112>

**ABSTRACT:** IEC 62541-3:2020 RLV contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62541-3:2020 defines the OPC Unified Architecture (OPC UA) AddressSpace and its Objects. This document is the OPC UA meta model on which OPC UA information models are based. This third edition cancels and replaces the second edition published in 2015. This edition includes the following significant technical changes with respect to the previous edition:

- a) Added new improved approach for exposing structure definitions. An Attribute on the DataType Node now simply contains a binary description.
- b) Added new flags for Variables to indicate atomicity when reading or writing.
- c) Added Roles and Permissions to allow configuration of a role-based authorization.
- d) Added new data types: "Union", "Decimal", "OptionSet", "DateString", "TimeString", "DurationString", "NormalizedString", "DecimalString", and "AudioDataType".
- e) Added definition on how to use the ModellingRules OptionalPlaceholder and MandatoryPlaceholder for Methods.
- f) Added optional Properties "MaxCharacters" and "MaxByteStringLength" to Variable Nodes.

 DOCUMENT TYPE: Standard Specification

 PUBLICATION DATE: 2020-07-08

## IEC 62541-4:2020 OPC Unified Architecture - Part 4: Services

 URL: <https://webstore.iec.ch/publication/61113>

**ABSTRACT:** IEC 62541-4:2020 RLV contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62541-4:2020 defines the OPC Unified Architecture (OPC UA) Services. The Services defined are the collection of abstract Remote Procedure Calls (RPC) that are implemented by OPC UA Servers and called by OPC UA Clients. All interactions between OPC UA Clients and Servers occur via these Services. The defined Services are considered abstract because no particular RPC mechanism for implementation is defined in this document. IEC 62541-6 specifies one or more concrete mappings supported for implementation. For example, one mapping in IEC 62541-6 is to XML Web Services. In that case the Services described in this document appear as the Web service methods in the WSDL contract. Not all OPC UA Servers will need to implement all of the defined Services. IEC 62541-7 defines the Profiles that dictate which Services need to be implemented in order to be compliant with a particular Profile This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) Added ability to resend all data of monitored items in a Subscription using the ResendData Method.
- b) Added support for durable Subscriptions (lifetime of hours or days).
- c) Added Register2 and FindServersOnNetwork Services to support network-wide discovery using capability filters.
- d) Removed definition of software certificates. Will be defined in a future edition.
- e) Extended and partially revised the redundancy definition. Added sub-range definitions for ServiceLevel and added more terms for redundancy.
- f) Added a section on how to use Authorization Services to request user access tokens.
- g) Added JSON Web Tokens (JWTs) as a new user token.
- h) Added the concept of session-less service invocation.
- i) Added a generic structure that allows passing any number of attributes to the AddNodes Service.
- j) Added requirement to protect against user identity token attacks.
- k) Added new EncryptedSecret format for user identity tokens.



DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 2020-07-13

## IEC 62541-5:2020 OPC Unified Architecture - Part 5: Information Model

URL: <https://webstore.iec.ch/publication/61114>

**ABSTRACT:** IEC 62541-5:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-5:2020 defines the Information Model of the OPC Unified Architecture. The Information Model describes standardized Nodes of a Server's AddressSpace. These Nodes are standardized types as well as standardized instances used for diagnostics or as entry points to server-specific Nodes. Thus, the Information Model defines the AddressSpace of an empty OPC UA Server. However, it is not expected that all Servers will provide all of these Nodes. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) Added Annex F on User Authentication. Describes the Role Information Model that also allows configuration of Roles.
- b) Added new data types: "Union", "Decimal", "OptionSet", "DateString", "TimeString", "DurationString", "NormalizedString", "DecimalString", and "AudioDataType".
- c) Added Method to request a state change in a Server.
- d) Added Method to set Subscription to persistent mode.
- e) Added Method to request resending of data from a Subscription.
- f) Added concept allowing to temporarily create a file to write to or read from a server in C.4.
- g) Added new Variable type to support Selection Lists.
- h) Added optional properties to FiniteStateMachineType to expose currently available states and transitions.
- i) Added UrisVersion Property to ServerType. This version information can be used for session-less service invocation.

DOCUMENT TYPE: Standard Specification

PUBLICATION DATE: 2020-07-10

## IEC 62541-6:2020 OPC Unified Architecture - Part 6: Mappings

URL: <https://webstore.iec.ch/publication/61115>

**ABSTRACT:** IEC 62541-6:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-6:2020 specifies the OPC Unified Architecture (OPC UA) mapping between the security model described in IEC TR 62541-2, the abstract service definitions specified in IEC 62541-4, the data structures defined in IEC 62541-5 and the physical network protocols that can be used to implement the OPC UA specification. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) Encodings: (1) added JSON encoding for PubSub (non-reversible), (2) added JSON encoding for Client/Server (reversible), (3) added support for optional fields in structures, (4) added support for Unions.
- b) Transport mappings: (1) added WebSocket secure connection - WSS, (2) added support for reverse connectivity; (3) added support for session-less service invocation in HTTPS.
- c) Deprecated Transport (missing support on most platforms): SOAP/HTTP with WS-SecureConversation (all encodings).
- d) Added mapping for JSON Web Token.
- e) Added support for Unions to NodeSet Schema.
- f) Added batch operations to add/delete nodes to/from NodeSet Schema.

g) Added support for multi-dimensional arrays outside of Variants.

h) Added binary representation for Decimal data types.

i) Added mapping for an OAuth2 Authorization Framework.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-07-13

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## IEC 62541-7:2020 OPC Unified Architecture - Part 7: Profiles

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🔗 URL: <https://webstore.iec.ch/publication/61116>

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**ABSTRACT:** IEC 62541-7:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-7:2020 defines the OPC Unified Architecture (OPC UA) Profiles. The Profiles in this document are used to segregate features with regard to testing of OPC UA products and the nature of the testing (tool based or lab based). This includes the testing performed by the OPC Foundation provided OPC UA CTT (a self-test tool) and by the OPC Foundation provided Independent certification test labs. This could equally as well refer to test tools provided by another organization or a test lab provided by another organization. What is important is the concept of automated tool-based testing versus lab-based testing. The scope of this standard includes defining functionality that can only be tested in a lab and defining the grouping of functionality that is to be used when testing OPC UA products either in a lab or using automated tools. The definition of actual TestCases is not within the scope of this document, but the general categories of TestCases are within the scope of this document. Most OPC UA applications will conform to several, but not all, of the Profiles. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

a) new functional Profiles: (1) profiles for global discovery and global certificate management, (2) profiles for global KeyCredential management and global access token management, (3) facet for durable subscriptions, (4) standard UA Client Profile, (5) profiles for administration of user roles and permissions.

b) new transport Profiles: (1) HTTPS with JSON encoding, (2) secure WebSockets (WSS) with binary or JSON encoding, (3) reverse connectivity.

c) new security Profiles: (1) transportSecurity - TLS 1.2 with PFS (with perfect forward secrecy), (2) securityPolicy [A] - Aes128-Sha256-RsaOaep (replaces Base128Rsa15), (3) securityPolicy - Aes256-Sha256-RsaPss adds perfect forward secrecy for UA TCP), (4) user Token JWT (Jason Web Token).

d) deprecated Security Profiles (due to broken algorithms): (1) securityPolicy - Basic128Rsa15 (broken algorithm Sha1), (2) securityPolicy - Basic256 (broken algorithm Sha1), (3) transportSecurity - TLS 1.0 (broken algorithm RC4), (4) transportSecurity - TLS 1.1 (broken algorithm RC4).

e) deprecated Transport (missing support on most platforms): SOAP/HTTP with WS-SecureConversation (all encodings).

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06-22

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## IEC 62541-8:2020 OPC Unified Architecture - Part 8: Data Access

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🔗 URL: <https://webstore.iec.ch/publication/61117>

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**ABSTRACT:** IEC 62541-8:2020 which contains the International Standard and its Redline version, showing all changes of the technical content compared to the previous edition. IEC 62541-8:2020 is part of the overall OPC Unified Architecture (OPC UA) standard series and defines the information model associated with Data Access (DA). It particularly includes additional VariableTypes and complementary descriptions of the NodeClasses and Attributes needed for Data Access, additional Properties, and other information and behaviour. The complete address space model, including all NodeClasses and Attributes is specified in IEC 62541-3. The services to detect and access data are specified in IEC 62541-4. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) added new VariableTypes for AnalogItems;
- b) added an Annex that specifies a recommended mapping of OPC UA DataAccess to OPC COM DataAccess;
- c) changed the ambiguous description of “Bad\_NotConnected”;
- d) updated description for EUInformation to refer to latest revision of UNCEFACT units.

🔗 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-06-22

## IEC 62541-9:2020 OPC Unified Architecture - Part 9: Alarms and Conditions

🔗 URL: <https://webstore.iec.ch/publication/61118>

**ABSTRACT:** IEC 62541-9:2020 contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62541-9:2020 specifies the representation of Alarms and Conditions in the OPC Unified Architecture. Included is the Information Model representation of Alarms and Conditions in the OPC UA address space. Other aspects of alarm systems such as alarm philosophy, life cycle, alarm response times, alarm types and many other details are captured in documents such as IEC 62682 and ISA 18.2. The Alarms and Conditions Information Model in this specification is designed in accordance with IEC 62682 and ISA 18.2. This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) added optional engineering units to the definition of RateOfChange alarms;
- b) to fulfill the IEC 62682 model, the following elements have been added: - AlarmConditionType States: Suppression, Silence, OutOfService, Latched; - AlarmConditionType Properties: OnDelay, OffDelay, FirstInGroup, ReAlarmTime; - New alarm types: DiscrepancyAlarm, DeviationAlarm, InstrumentDiagnosticAlarm, SystemDiagnosticAlarm.
- c) added Annex that specifies how the concepts of this OPC UA part maps to IEC 62682 and ISA 18.2;
- d) added new ConditionClasses: Safety, HighlyManaged, Statistical, Testing, Training;
- e) added CertificateExpiration AlarmType; f) added Alarm Metrics model.

🔗 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2020-06-18

## IEC 62714-1:2018 Engineering data exchange format for use in industrial automation systems engineering - Automation Markup Language - Part 1: Architecture and general requirements

🔗 URL: <https://webstore.iec.ch/publication/32339>

**ABSTRACT:** IEC 62714-1:2018 RLV contains both the official IEC International Standard and its Redline version. The Redline version is available in English only and provides you with a quick and easy way to compare all the changes between the official IEC Standard and its previous edition. IEC 62714-1:2018 is a solution for data exchange focusing on the domain of automation engineering. The data exchange format defined in the IEC 62714 series (Automation Markup Language, AML) is an XML schema based data format and has been developed in order to support the data exchange in a heterogeneous engineering tools landscape. The goal of AML is to interconnect engineering tools in their different disciplines, e.g. mechanical plant engineering, electrical design, process engineering, process control engineering, HMI development, PLC programming, robot programming, etc. This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

- a) use of CAEX 3.0 according to IEC 62424:2016
- b) improved modelling of references to documents outside of the scope of the present standard,

- c) modelling of references between CAEX attributes and items in external documents,
- d) revised role libraries,
- e) modified Port concept,
- f) modelling of multilingual expressions,
- g) modelling of structured attribute lists or array,
- h) a new AML container format,
- i) a new standard AML attribute library

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2018-04-30

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## IEC 62714-2:2015 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 2: Role class libraries

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🔗 URL: <https://webstore.iec.ch/publication/22030>

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**ABSTRACT:** IEC 62714-2:2015 specifies normative as well as informative AML role class libraries for the modelling of engineering information for the exchange between engineering tools in the plant automation area by means of AML. Moreover, it presents additional user defined libraries as an example. Its provisions apply to the export/import applications of related tools.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2015-03-30

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## IEC 62714-3:2017 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 3: Geometry and kinematics

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🔗 URL: <https://webstore.iec.ch/publication/34158>

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**ABSTRACT:** IEC 62714-3:2017 specifies the integration of geometry and kinematics information for the exchange between engineering tools in the plant automation area by means of AML.

🔗 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2017-01-25

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## IEC 62714-4:2020 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 4: Logic

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🔗 URL: <https://webstore.iec.ch/publication/28979>

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**ABSTRACT:** IEC 62714-4:2020 specifies the integration of logic information as part of an AML model for the data exchange in a heterogenous engineering tool landscape of production systems. This document specifies three types of logic information: sequencing, behaviour, and interlocking information. This document deals with the six following sequencing and behaviour logic models (covering the different phases of the engineering process of production systems) and how they are integrated in AML: Gantt chart, activity-on-node network, timing diagram, Sequential Function Chart (SFC), Function Block Diagram (FBD), and mathematical expression. This document specifies how to model Gantt chart, activity-on-node network, and timing diagram and how they are stored in Intermediate Modelling Layer (IML). This document specifies how interlocking information is modelled (as interlocking source and target groups) in AML. The interlocking logic model is stored in Function Block Diagram (FBD). This document specifies the AML logic XML schema that stores the logic models by using IEC 61131-10. This document specifies how to reference PLC programs stored in PLCopen XML documents. This document

does not define details of the data exchange procedure or implementation requirements for the import/export tools. The contents of the corrigendum of November 2020 have been included in this copy.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06-16

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## IEC 62714-5:2022 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 5: Communication

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🔗 URL: <https://webstore.iec.ch/publication/65493>

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**ABSTRACT:** IEC 62714-5:2022 Engineering processes of technical systems and their embedded automation systems are executed with increasing efficiency and quality. Especially since the project duration tends to increase as the complexity of the engineered system increases. To solve this problem, the engineering process is more often being executed by exploiting software based engineering tools exchanging engineering information and artefacts along the engineering process related tool chain.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2022-03-11

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## IEC 63365 ED1 Digital Nameplate – Digital Product Marking

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🔗 URL: [https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1452,23,104515](https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104515)

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**ABSTRACT:** Under development

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## 4.2.4 Mobility

### 5GAA Cooperation Models enabling deployment and use of 5G infrastructures for CAM in Europe

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🔗 URL: <https://5gaa.org/news/cooperation-models-enabling-deployment-and-use-of-5g-infrastructures-for-cam-in-europe/>

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**ABSTRACT:** This White Paper outlines five non-mutually exclusive options for ecosystem cooperation models relevant to 5G CAM (Connected and Automated Mobility) infrastructure deployment and use. 5GAA believes these options may bring even more benefits when combined. Building upon this first assessment, 5GAA considers that in the context of the large-scale introduction of advanced safety and automated driving use cases supported by C-V2X (Cellular Vehicle-to-Everything), a more integrated model involving all parties (vehicle manufacturers, road operators, communication service providers i.e. mobile network operators and neutral host infrastructure providers) should be considered as well as other services providers who will play an increasing role in the ecosystem e.g., location-based data marketplace, Mobility as a Service (MaaS), etc.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2021-03

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## ITU-T - SG16 - F.DVMSF Edge - Distributed vehicular multimedia services framework for V2X based edge computing

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 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17612](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17612)

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**ABSTRACT:** Recommendation ITU-T F.749.3 describes the use-cases and requirements for vehicular multimedia networks (VMN), taking into account the autonomous levels defined by [SAE J3016], and defined the Vehicular multimedia service platform (VMSP) with the following functions: multimedia services, infotainment applications, intelligent voice interaction, high precision navigation (maps), security updates, software and certificates. This recommendation suggests to use Edge computing platform as the distributed computing system with the following advantages: - computing and network resource of VMSP allocation; - increase of services performance; - decentralization; - user demand services; - reduction of delays. This recommendation considers the framework of distributed VMS for V2X (Vehicle-to-everything) networks based on the Edge Computing possibilities.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: Under development

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## ■ 4.3 Industry and Business

### 4.3.1 Horizontals & Verticals

#### ECC - Industrial Internet Edge Computing Network White Paper in the 5G Era

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🔗 URL: <http://www.econsortium.org/Lists/show/id/523.html>

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**ABSTRACT:** This document describes the challenges faced by the industrial Internet and the advantages of edge computing, analyzes the requirements of the industrial Internet for 5G+ edge computing, and provides practical cases of the 5G+ edge computing network architecture and solution. This document provides reference for industry customers, equipment vendors, integrators, and carriers during deployment and application.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2021-11

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#### ECC- Industrial Internet Edge Computing Node White Paper 1.0

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🔗 URL: <http://www.econsortium.org/Lists/show/id/524.html>

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**ABSTRACT:** This document describes the functions and values of industrial edge nodes, and the new requirements of industrial edge nodes brought by the development of industrial Internet and edge-cloud synergy. Then, it describes the reference architecture of industrial edge nodes from two aspects: software and hardware. Finally, the implementation and maturation of industrial edge nodes in various industrial subdivisions are described in detail.

DOCUMENT TYPE: Whitepaper

PUBLICATION DATE: 2020-12

### 4.3.2 Manufacturing

#### IEC TR 63283-1:2022 Industrial-process measurement, control and automation - Smart manufacturing - Part 1: Terms and definitions

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🔗 URL: <https://webstore.iec.ch/publication/66314>

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**ABSTRACT:** IEC TR 63283-1:2022(E) is to compile a comprehensive collection of base terminology with compatible terms that can become relevant within the scope of Smart Manufacturing. Most of these terms refer to existing definitions in the domain of industrial-process measurement, control and automation and its various subdomains. When multiple similar definitions exist for the exact same term in different standards, this document contains only the preferred definition in the context of Smart Manufacturing. Whenever the existing definitions are not compatible with other terms in this document or when the definition does not fit into the broader scope of Smart Manufacturing, new or modified definitions are given.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2022-03

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## IEC 61987-1:2006 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 1: Measuring equipment with analogue and digital output

🔗 URL: <https://webstore.iec.ch/publication/6225>

**ABSTRACT:** IEC 61987-1:2006 defines a generic structure in which product features of industrial-process measurement and control equipment with analogue or digital output should be arranged, in order to facilitate the understanding of product descriptions when they are transferred from one party to another. It applies to the production of catalogues of process measuring equipment supplied by the manufacturer of the product and helps the user to formulate his requirements.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2006-12-14

## IEC 61987-10:2009 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 10: List of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange - Fundamentals

🔗 URL: <https://webstore.iec.ch/publication/6227>

**ABSTRACT:** IEC 61987-10:2009 provides a method of standardizing the descriptions of process control devices, instrumentation and auxiliary equipment as well as their operating environments and operating requirements (for example, measuring point specification data). The aims of this standard are: (1) to define a common language for customers and suppliers through the publication of Lists of Properties (LOPs), (2) to optimize workflows between customers and suppliers as well as in processes such as engineering, development and purchasing within their own organizations, (3) to reduce transaction costs. The standard describes industrial-process device types and devices using structured lists of properties and makes the associated properties available in a component data dictionary.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2009-07-23

## IEC 61987-11:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 11: List of properties (LOPs) of measuring equipment for electronic data exchange - Generic structures

🔗 URL: <https://webstore.iec.ch/publication/32275>

**ABSTRACT:** IEC 61987-11:2016 provides: (1) a characterisation of industrial process measuring equipment (device type dictionary) for integration in the Common Data Dictionary (CDD), and (2) generic structures for operating lists of properties (OLOP) and device lists of properties (DLOP) of measuring equipment in conformance with IEC 61987-10. This second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition: (1) The classification in Table A.1 has been amended to reflect the changes in the classification scheme of process measuring equipment in the CDD due to the development of IEC 61987-14, IEC 61987-15 and IEC 61987-16. (2) Annex A has become “informative”.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2016-12-15


## IEC 61987-12:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 12: Lists of properties (LOPs) for flow measuring equipment for electronic data exchange

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 URL: <https://webstore.iec.ch/publication/24401>

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**ABSTRACT:** IEC 61987-12:2016 provides an operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for a flow measuring equipment and device lists of properties (DLOP) for the description of a number of flow measuring equipment types.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2016-03-23

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## IEC 61987-13:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 13: Lists of properties (LOP) for pressure measuring equipment for electronic data exchange

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 URL: <https://webstore.iec.ch/publication/24400>

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**ABSTRACT:** IEC 61987-13:2016 provides an operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for a pressure measuring equipment, and device lists of properties (DLOP) for a range of pressure measuring equipment types describing them.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2016-03-23

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## IEC 61987-14:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 14: Lists of properties (LOP) for temperature measuring equipment for electronic data exchange

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 URL: <https://webstore.iec.ch/publication/24637>

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**ABSTRACT:** IEC 61987-14:2016 provides an operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for temperature measuring equipment and device lists of properties (DLOP) for the description of a range of contact and non-contact temperature measuring equipment types.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2016-04-26

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## IEC 61987-15:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 15: Lists of properties (LOPs) for level measuring equipment for electronic data exchange

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 URL: <https://webstore.iec.ch/publication/26177>

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**ABSTRACT:** IEC 61987-15:2016 provides operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for level measuring equipment, and device lists of properties (DLOPs) for the description of a range of level measuring equipment types.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2016-11-08

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## IEC 61987-16:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 16: List of properties (LOPs) for density measuring equipment for electronic data exchange

🔗 URL: <https://webstore.iec.ch/publication/34265>

**ABSTRACT:** IEC 61987-16:2016 provides an (1) operating list of properties (OLOP) for the description of the operating parameters and the collection of requirements for a density measuring equipment, and (2) device lists of properties (DLOP) for a range of density measuring equipment types describing them. The structures of the OLOP and the DLOP correspond with the general structures defined in IEC 61987-11 and agree with the fundamentals for the construction of LOPs defined in IEC 61987-10.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2016-12-15

## IEC 61987-32 ED1 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 32: Lists of properties (LOP) for I/O modules for electronic data exchange

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1452,23,102293](https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102293)

**ABSTRACT:** Under development

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IEC 61987-41 ED1 Generic structures of List of Properties (LOP) of Process Analyzer Technology (PAT) measuring devices for electronic data exchange

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1452,23,107355](https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,107355)

**ABSTRACT:** This document focuses on generic structures of List of Properties (LOP) of Process Analyzer Technology (PAT) measuring devices for electronic data exchange. This document is under development.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IEC 61987-92:2018 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 92: Lists of properties (LOP) of measuring equipment for electronic data exchange - Aspect LOPs

🔗 URL: <https://webstore.iec.ch/publication/33096>

**ABSTRACT:** IEC 61987-92:2018 provides the lists of properties (LOPs) describing aspects of equipment for industrial-process automation that is subject to IEC 61987 standard series. This standard series proposes a method for standardization which will help both suppliers and users of measuring equipment to optimize workflows both within their own companies and in their exchanges with other companies. IEC 61987-92 contains additional aspects that are common to all devices, for example, “Packaging and transportation”, “Calibration and test results” and “Device documents supplied”. The structures of the

LOPs correspond to the general structures defined in IEC 61987-11 and agree with the fundamentals for the construction of LOPs defined in IEC 61987-10. Libraries of properties and of blocks used in the aspect LOPs are listed in Annex B and Annex C.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2018-06-05

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## IEC 62443-2-1:2010 Industrial communication networks - Network and system security - Part 2-1: Establishing an industrial automation and control system security program

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🔗 URL: <https://webstore.iec.ch/publication/7030>

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**ABSTRACT:** IEC 62443-2-1:2010 defines the elements necessary to establish a cyber security management system (CSMS) for industrial automation and control systems (IACS) and provides guidance on how to develop those elements. This standard uses the broad definition and scope of what constitutes an IACS described in IEC/TS 62443-1-1. The elements of a CSMS described in this standard are mostly policy, procedure, practice and personnel related, describing what shall or should be included in the final CSMS for the organization. This bilingual version (2012-04) corresponds to the monolingual English version, published in 2010-11.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2010-11

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## IEC 62443-4-2:2019 Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components

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🔗 URL: <https://webstore.iec.ch/publication/34421>

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**ABSTRACT:** IEC 62443-4-2:2019 provides detailed technical control system component requirements (CRs) associated with the seven foundational requirements (FRs) described in IEC TS 62443-1-1 including defining the requirements for control system capability security levels and their components, SL-C (component). As defined in IEC TS 62443-1-1 there are a total of seven foundational requirements (FRs): a) identification and authentication control (IAC), b) use control (UC), c) system integrity (SI), d) data confidentiality (DC), e) restricted data flow (RDF), f) timely response to events (TRE), and g) resource availability (RA). These seven FRs are the foundation for defining control system security capability levels. Defining security capability levels for the control system component is the goal and objective of this document as opposed to SL-T or achieved SLs (SL-A), which are out of scope.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2019-02

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## IEC 62443-4-2:2019 Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components

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🔗 URL: <https://webstore.iec.ch/publication/34421>

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**ABSTRACT:** IEC 62443-4-2:2019 provides detailed technical control system component requirements (CRs) associated with the seven foundational requirements (FRs) described in IEC TS 62443-1-1 including defining the requirements for control system capability security levels and their components, SL-C (component). As defined in IEC TS 62443-1-1 there are a total of seven foundational requirements (FRs): a) identification and authentication control (IAC), b) use control (UC), c) system integrity (SI), d) data confidentiality (DC), e) restricted data flow (RDF), f) timely response to events (TRE), and g) resource availability (RA). These seven FRs are the foundation for defining control system security capability levels.

Defining security capability levels for the control system component is the goal and objective of this document as opposed to SL-T or achieved SLs (SL-A), which are out of scope.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2019-02

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## [IEC 62832-1:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles](#)

🔗 URL: <https://webstore.iec.ch/publication/65858>

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**ABSTRACT:** IEC 62832-1:2020 defines the general principles of the Digital Factory framework (DF framework), which is a set of model elements (DF reference model) and rules for modelling production systems. This DF framework defines: a) model of production system assets; b) a model of relationships between different production system assets; c) the flow of information about production system assets. d) The DF framework does not cover representation of building construction, input resources (such as raw production material, assembly parts), consumables, work pieces in process, nor end products. e) It applies to the three types of production processes (continuous control, batch control, and discrete control) in any industrial sector (for example aeronautic industries, automotive, chemicals, wood).

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-10

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## [IEC 62832-2:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 2: Model elements](#)

🔗 URL: <https://webstore.iec.ch/publication/60214>

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**ABSTRACT:** IEC 62832-2:2020 specifies detailed requirements for model elements of the Digital Factory framework. It defines the nature of the information provided by the model elements, but not the format of this information.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-10

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## [IEC 62832-3:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 3: Application of Digital Factory for life cycle management of production systems](#)

🔗 URL: <https://webstore.iec.ch/publication/60277>

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**ABSTRACT:** IEC 62832-3:2020 specifies rules of the Digital Factory framework for managing information of a production system throughout its life cycle. It also defines how the information will be added, deleted or changed in the Digital Factory by the various activities during the life cycle of the production system.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-10

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## IEC 62872-2:2022 Industrial-process measurement, control and automation - Part 2: Internet of Things (IoT) - Application framework for industrial facility demand response energy management

🔗 URL: <https://webstore.iec.ch/publication/63419>

**ABSTRACT:** IEC 62872-2:2022 presents an IoT application framework for industrial facility demand response energy management (FDREM) for the smart grid, enabling efficient information exchange between industrial facilities using IoT related communication technologies. This document specifies:

- (1) an overview of the price-based demand response program that serves as basic knowledge backbone of the IoT application framework;
- (2) a IoT-based energy management framework which describes involved functional components, as well as their relationships;
- (3) detailed information exchange flows that are indispensable between functional components;
- (4) existing IoT protocols that need to be identified for each protocol layer to support this kind of information exchange;
- (5) communication requirements that guarantee reliable data exchange services for the application framework.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2022-02

## IEC 63278-1 ED1 Asset Administration Shell for industrial applications – Part 1: Asset Administration Shell structure

🔗 URL: [https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,103536](https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103536)

**ABSTRACT:** Under development

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IEC 63278-3 ED1 Asset Administration Shell for Industrial Applications – Part 3: Security provisions for Asset Administration Shells

🔗 URL: [https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,109075](https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,109075)

**ABSTRACT:** This document focuses on the Asset Administration Shell for Industrial Applications – Part 3: Security provisions for Asset Administration Shells. This document is under development.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IEC 63339 ED1 Unified reference model for smart manufacturing

🔗 URL: [https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,104329](https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104329)

**ABSTRACT:** This document focuses on an unified reference model for smart manufacturing. This document is under development.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IEC 63376 ED1 INDUSTRIAL FACILITY ENERGY MANAGEMENT SYSTEM (FEMS) – Functions and Information Flows

🔗 URL: [https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,104647](https://www.iec.ch/dyn/www/f?p=103:38:731054763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104647)

**ABSTRACT:** This document focuses on INDUSTRIAL FACILITY ENERGY MANAGEMENT SYSTEM (FEMS)– Functions and Information Flows. This document is under development.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## IIC (Industrial Internet Consortium) Introduction to Edge Computing in IIoT

🔗 URL: [https://www.iiconsortium.org/pdf/Introduction\\_to\\_Edge\\_Computing\\_in\\_IIoT\\_2018-06-18.pdf](https://www.iiconsortium.org/pdf/Introduction_to_Edge_Computing_in_IIoT_2018-06-18.pdf)

**ABSTRACT:** Almost every use case and every connected device focused on by the Industrial Internet Consortium (IIC) requires some sort of compute capability at its source, at the edge. Multiple sources define edge computing as “cloud computing systems that perform data processing at the edge of the network, near the source of the data”. While this is certainly true, it only scratches the surface of the immense power and remarkable capabilities that edge computing applications and architectures can provide to solve industrial internet users’ toughest challenges. But, as is typical with any powerful technology, innovative architectures and new terminology are needed to facilitate implementation, bringing increased complexity with it.

📄 DOCUMENT TYPE: Whitepaper

📅 PUBLICATION DATE: 2018-06

## IIC (Industrial Internet Consortium) The Industrial Internet of Things Distributed Computing in the Edge

🔗 URL: <https://www.iiconsortium.org/pdf/IIoT-Distributed-Computing-in-the-Edge.pdf>

**ABSTRACT:** Distributed computing moves the capabilities of cloud computing in data centers closer to intelligent IoT devices, towards the edge. This can increase performance and efficiency, but it is essential in industrial settings for optimizing time-critical industrial processes because critical control processes that do not respond in time can become dangerously unstable.

This document describes a framework for distributed computing in the edge that brings computation, networking and storage closer to data producers and consumers for the Internet of Things (IoT). It is intended for IoT system architects and implementers who are working with edge systems comprising IoT devices, edge computing nodes, networking equipment and data center servers. It:

- (1) provides a structural and functional framework for distributing computing in the edge,
- (2) defines the key architectural concepts employed for distributed computing in the edge,
- (3) specifies the essential capabilities of this edge system’s elements,
- (4) pays special attention to essential security and management functions and
- (5) describes the essential interfaces among these elements.

System architects can use the framework as an architectural template that helps derive a concrete distributed computing architecture. Others, such as operations technologists, information technologists, network and business managers may also find it useful to understand the essential elements of distributed computing in the edge.

📄 DOCUMENT TYPE: Whitepaper

📅 PUBLICATION DATE: 2020-10



## ISO/IEC ISO 20140-5:2017 Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment - Part 5: Environmental performance evaluation data

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 URL: <https://webstore.iec.ch/publication/34147>

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**ABSTRACT:** ISO 20140-5:2017 specifies the types of environmental performance evaluation (EPE) data, including their attributes, which can be used for evaluating the environmental performance of manufacturing systems based on the general principles described in ISO 20140-1. It also provides recommendations for mapping the EPE data on to information models specified by IEC 62264. ISO 20140-5:2017 applies to

- (1) discrete, batch and continuous manufacturing and
- (2) entire manufacturing facilities and to parts of a manufacturing facility.

However, this document specifically excludes from its scope the syntax of the data and information models, the protocols to exchange data models, the functions that can be enabled by data models, and the activities in Level 1 and Level 2. The scope of this document also:

- (1) indicates the differences among various data and information models and the differences among various representations of environmental performance by actual data, and
- (2) refers to the semantics of the structured data and information models used by communication protocols.

The semantics explain the meaning of the attributes and of the context information. The following are outside the scope of this document: a) product life cycle assessment; b) EPE data that are specific to a particular industry sector, manufacturer or machinery; c) acquisition of data; d) the activity of data communication.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2017-04

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## ISO/IEC 30163:2021 System requirements of IoT/SN technology-based integrated platform for chattel asset monitoring supporting financial services

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 URL: <https://www.iso.org/standard/53283.html>

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**ABSTRACT:** ISO/IEC 30163:2021 specifies the system requirements of an Internet of Things (IoT)/Sensor Network (SN) technology-based platform for chattel asset monitoring supporting financial services, including:

- (1) System infrastructure that describes functional components;
- (2) System and functional requirements during the entire chattel asset management process, including chattel assets in transition, in/out of warehouse, storage, mortgage, etc.;
- (3) Performance requirements and performance specifications of each functional component;
- (4) Interface definition of the integrated platform system.

This document is applicable to the design and development of IoT/SN system for chattel asset monitoring supporting financial services.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2021-03

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## ITU-T - SG16 - F.CEC Requirements and reference framework of cloud-edge collaboration in industrial machine vision systems

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17635](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17635)

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**ABSTRACT:** With the development of industry, cloud computing and edge computing are widely used. Especially in the industrial machine vision system, with the increase of data-intensive applications and computing-intensive applications, it is necessary to use the powerful computing capabilities and communication resources of cloud computing, collaborate with the short-time response capabilities of edge computing to realize and complete corresponding application requests. Through collaborative work, the value of edge computing and cloud computing will be maximized, thereby effectively improving the performance of industrial machine vision systems.

Cloud-edge collaboration technology is a collaborative method of cloud computing and edge computing, including data collaboration, resource collaboration, intelligent collaboration, service collaboration and application collaboration. At the same time, cloud-edge collaboration in industrial machine vision system will meet the needs of intelligent analysis and real-time response business in different scenarios.

This Recommendation specifies requirements and reference framework of cloud-edge collaboration in industrial machine vision system.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ■ 4.4 Information Processing

### 4.4.1 Horizontals & Verticals

#### 3GPP TR 28.814 V17.0.0 (2021-09) Study on enhancements of edge computing management

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🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3744>

**ABSTRACT:** The document studies the potential use cases, requirements, and solutions for the management of edge computing architecture and requirement defined by TS 23.558 and TS 23.501. The document provides conclusions and recommendations on the next steps in the standardization.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2021-09

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#### 3GPP TR 28.815 V17.0.0 (2021-12) Study on charging aspects of edge computing

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🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3758>

**ABSTRACT:** This document studies the charging aspects of Edge Computing based on architecture, procedures and information flows for enabling Edge Applications over 3GPP network as well as capabilities for 5GS to support edge computing. The investigation includes different charging scenarios with potential business requirements, alternative solutions with potential impact on charging architecture, charging functions and charging procedures.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2021-12

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#### IEC Edge intelligence

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🔗 URL: <https://webstore.iec.ch/publication/60568>

**ABSTRACT:** To enable and realize the true value of the internet of things (IoT), edge intelligence pushes processing for data intensive applications away from the core of the cloud to the edge of the network. This radical transformation from the cloud to the edge, edge intelligence, will support trillions of sensors and billions of systems. It will treat data in motion differently from data at rest. This white paper synthesizes current trends in the areas of cloud computing, mobile networking, IoT and other domains that require low delay in communication and decision. Such domains include smart manufacturing, video analysis for security and safety, automotive, intelligent city furniture or virtual reality. The publication explores market potential and vertical use case requirements, analyzes gaps and produces recommendations for adopting vertical edge intelligence technologies. The white paper was developed by the IEC Market Strategy Board (MSB) edge intelligence project team with major contributions from Huawei and the Fraunhofer Institute for Open Communications Systems FOKUS.

📄 DOCUMENT TYPE: Whitepaper

📅 PUBLICATION DATE: 2017-10

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## ISO/IEC TR 22417:2017 Information technology - Internet of things (IoT) - IoT use cases

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🔗 URL: <https://www.iso.org/standard/73148.html?browse=tc>

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**ABSTRACT:** ISO/IEC TR 22417:2017(E) This technical report identifies IoT scenarios and use cases based on real-world applications and requirements. The use cases provide a practical context for considerations on interoperability and standards based on user experience. They also clarify where existing standards can be applied and highlight where standardization work is needed.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-11

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### 4.4.2 Manufacturing

## 3GPP TR 26.803 V17.0.0 (2021-06) Study on 5G Media Streaming Extensions for Edge Processing

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🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3742>

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**ABSTRACT:** The document is a study of use cases for multimedia processing in the edge and the potential 5G media streaming architecture extensions to enable them.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2021-06

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## ■ 4.5 Infrastructure

### 4.5.1 Horizontals & Verticals

#### IEC 61987-31 ED1 List of Properties (LOP) of infrastructure devices for electronic data exchange – Generic structures

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1452,23,102292](https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102292)

ABSTRACT: This document describes the List of Properties (LOP) of infrastructure devices for electronic data exchange – Generic structures. This document is under development.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

#### IETF draft-contreras-alto-service-edge Use of ALTO for Determining Service Edge

🔗 URL: <https://datatracker.ietf.org/doc/draft-contreras-alto-service-edge/>

ABSTRACT: This document proposes an initial approach towards the use of ALTO to provide such information and assist the selection of appropriate deployment locations for services and applications.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2022-03

#### IETF draft-ietf-mops-ar-use-case Media Operations Use Case for an Augmented Reality Application on Edge Computing Infrastructure

🔗 URL: <https://datatracker.ietf.org/doc/draft-ietf-mops-ar-use-case/03/>

ABSTRACT: A use case describing transmission of an application on the Internet that has several unique characteristics of Augmented Reality (AR) applications is presented for the consideration of the Media Operations (MOPS) Working Group

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2021-10

#### IRTF draft-irtf-coinrg-use-cases Use Cases for In-Network Computing

🔗 URL: <https://datatracker.ietf.org/doc/draft-irtf-coinrg-use-cases/>

ABSTRACT: This document discusses some use cases to demonstrate how real applications can benefit from COIN (Computing-in-the-Network) and to showcase essential requirements that have to be fulfilled by COIN applications.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2022-03

## IRTF draft-mcbride-edge-data-discovery-overview Edge Data Discovery for COIN

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🔗 URL: <https://www.ietf.org/archive/id/draft-mcbride-edge-data-discovery-overview-05.txt>

**ABSTRACT:** This document describes the problem of distributed data discovery in edge computing, and in particular for computing-in-the-network (COIN), which may require both the marshalling of data at the outset of a computation and the persistence of the resultant data after the computation.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-01

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## ITU-T - SG16 - F.DC-CGS-TREC Technical requirements of cloud gaming system for 5G mobile edge computing

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17582](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17582)

**ABSTRACT:** Cloud gaming requires high real-time performance, so it needs special hardwares to match the needs of real-time game rendering. This recommendation will describe the detailed infrastructure requirements of cloud gaming and provide reference for infrastructure selection of mobile edge computing in different scenarios. Among the factors that restrict the development of cloud gaming, the long end-to-end delay is the most important one. Mobile Edge computing is an effective way to reduce the end-to-end delay. This recommendation will describe the architecture and interaction process of cloud gaming system optimized for edge computing.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

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## ITU-T - SG5 - L.Spec\_Edge DC Specification of Edge Data Centre infrastructure

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17700](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17700)

**ABSTRACT:** In recent years, there are more extra-large data centres worldwide. Although these kind of data centres are in strong capability of data processing, it is a little bit difficult to meet the need of data centre application from users. The Edge data centre is established to perfectly solve this problem and let users get better experience of data access. With the huge quantity application and establishment of Edge data centres, the specific requirement of data centre infrastructure, especially in Edge data centre, will be stricter in the future. This Recommendation proposes to establish clear requirements on infrastructure including ICT system, powering system, cooling system, monitoring system etc. to get green, safe, reliable, smart, energy-saving Edge data centre.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

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## NGI-Trust B-Smart

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🔗 URL: <https://things.is/>

**ABSTRACT:** A human-centric interface, providing the best User Experience for managing privacy settings. One of the main issues related to the upcoming vision of the IoT is related to privacy: in particular, setting privacy controls. The B-Smart project addresses this from the user perspective.

📄 DOCUMENT TYPE: EU & National funded Open Source projects

📅 PUBLICATION DATE: Under development

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## OMA-AD-GwMO-V1\_1-20170725-A Gateway Management Object Architecture

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🔗 URL: [https://www.openmobilealliance.org/release/GwMO/V1\\_1-20170725-A/OMA-AD-GwMO-V1\\_1-20170725-A.pdf](https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-AD-GwMO-V1_1-20170725-A.pdf)

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**ABSTRACT:** The scope of the Gateway Management Object architecture document is to define the architecture for the DM Gateway Management Object v1.1 enabler. This document fulfills the functional capabilities and information flows needed to support this enabler as described in the Gateway Management Object requirements document [GwMO-RD].

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-07

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## OMA-ERELD-GwMO-V1\_1-20170725-A Enabler Release Definition for Gateway Management Object (GwMO)

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🔗 URL: [https://www.openmobilealliance.org/release/GwMO/V1\\_1-20170725-A/OMA-ERELD-GwMO-V1\\_1-20170725-A.pdf](https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-ERELD-GwMO-V1_1-20170725-A.pdf)

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**ABSTRACT:** The scope of this document is limited to the Enabler Release Definition of Gateway Management Object (GwMO v1.1) according to OMA Release process and the Enabler Release specification baseline listed in section 5.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-07

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## OMA-RD-GwMO-V1\_1-20170725-A GwMO Requirements

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🔗 URL: [https://www.openmobilealliance.org/release/GwMO/V1\\_1-20170725-A/OMA-RD-GwMO-V1\\_1-20170725-A.pdf](https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-RD-GwMO-V1_1-20170725-A.pdf)

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**ABSTRACT:** This document [GwMO-RD] lists the complete set of requirements for the OMA DM Gateway Management Object Enabler v1.1. It includes all the requirement of the OMA DM GatewayMO v1.0. It mainly focuses on requirements to enable a DM Server to manage devices that are not directly accessible to the OMADM Server (for example, because the devices are deployed behind a firewall or because the devices do not support the OMA DM protocol). This document also provides requirements for management of devices in a Machine to Machine (M2M) ecosystem (for example, fanning out DM commands from a DM Server to multiple End Devices and aggregating responses from multiple End Devices so that a consolidated response is sent back to the DM Server).

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-07

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## OMA-TS-DM-GwMO\_ZigBeeMO-V1\_0-20170725-A Management Objects for ZigBee Devices

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🔗 URL: [https://www.openmobilealliance.org/release/GwMO/V1\\_1-20170725-A/OMA-TS-GwMO\\_ZigBeeMO-V1\\_0-20170725-A.pdf](https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO_ZigBeeMO-V1_0-20170725-A.pdf)

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**ABSTRACT:** This document defines an OMA DM management object (data model) to represent ZigBee devices. This ZigBee MO models specific parameters used to represent a specific ZigBee device and should be used together with GwMO TS v1.1 [GwMOTS]. This ZigBee MO is optional for any OMA DM Gateway implementation.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-07

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## OMA-TS-GwMO-V1\_1-20170725-A Gateway Management Object Technical Specification

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📄 URL: [https://www.openmobilealliance.org/release/GwMO/V1\\_1-20170725-A/OMA-TS-GwMO-V1\\_1-20170725-A.pdf](https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO-V1_1-20170725-A.pdf)

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**ABSTRACT:** This technical specification describes Management Objects and Generic Alerts that are needed to provide the DM Gateway functionality, as defined in [DMDICT], i.e., OMA Device Management Dictionary.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2017-07

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## OneM2M oneM2M-TR-0052-V-0.13.1 Study on Edge and Fog Computing in oneM2M systems

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📄 URL: <https://member.onem2m.org/Application/documentapp/downloadLatestRevision/default.aspx?docID=32633>

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**ABSTRACT:** The document is a study of how to leverage Edge and Fog computing in oneM2M architecture. Based on the result of the study, it will identify possible advanced features and enhancements which the next oneM2M release(s) could support.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2020-09

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## ■ 4.6 Organization

### ISO/IEC 38505-1:2017 Information technology — Governance of IT — Governance of data — Part 1: Application of ISO/IEC 38500 to the governance of data

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🔗 URL: <https://www.iso.org/standard/56639.html>

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**ABSTRACT:** ISO/IEC 38505-1:2017 provides guiding principles for members of governing bodies of organizations on the effective, efficient, and acceptable use of data within their organizations by: (1) applying the governance principles and model of ISO/IEC 38500 to the governance of data, (2) assuring stakeholders that, if the principles and practices proposed by this document are followed, they can have confidence in the organization's governance of data, (3) informing and guiding governing bodies in the use and protection of data in their organization, and (4) establishing a vocabulary for the governance of data.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2017-04

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### ISO/IEC PWI JTC1-SC41-8 Internet of Things (IoT) - Behavioral and policy interoperability

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🔗 URL: [https://www.iec.ch/dyn/www/f?p=103:38:17567799116988:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,108353](https://www.iec.ch/dyn/www/f?p=103:38:17567799116988:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108353)

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**ABSTRACT:** Based on ISO/IEC 21823-1, this document provides the basic concepts for IoT systems and digital twin systems behavioral and policy interoperability. This includes: (1) requirements, (2) guidance on how to identify points of interoperability, (3) guidance on how to express behavioral and policy information on capabilities, (4) guidance on how to achieve trustworthiness interoperability, and (5) use cases and examples .

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: Under development

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## ■ 4.7 Privacy and Security

### 3GPP TR 33.839 V17.0.0 (2021-12) Study on security aspects of enhancement of support for edge computing in the 5G Core (5GC)

🔗 URL: <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3759>

**ABSTRACT:** This document studies the security enhancements on the support for Edge Computing in the 5G Core network defined in TR 23.748, and application architecture for enabling Edge Applications defined in TR 23.758 and TS 23.558. Potential security requirements are provided and possible security enhancements to 5GS and edge application architecture are proposed that meet these security requirements.

📅 DOCUMENT TYPE: Technical Report

PUBLICATION DATE: 2021-12

### Cloudwatch D3.6 Security and Interoperability Standards Status Report

🔗 URL: [https://www.cloudwatchhub.eu/sites/default/files/CloudWATCH2\\_Security-and-Interoperability-Standards-Status-Report.pdf](https://www.cloudwatchhub.eu/sites/default/files/CloudWATCH2_Security-and-Interoperability-Standards-Status-Report.pdf)

**ABSTRACT:** This document provides a monitoring of the standards landscape, identifying necessary extensions and profiles, and identifying relevant standards groups for future engagement of the EU projects. Through this deliverable CloudWATCH2 is able to:

- (1) Leverage input provided by finalized and on-going FP7 and H2020 projects to prepare and maintain a list of standards used by the different consortia. The list describes the level of adoption of each standard and the most common implementations.
- (2) Identify contributions to existing and developing standard from the FP7 and H2020 projects.
- (3) Provide evidence to the standardization community of identified gaps by analysing input from the above mentioned FP7 and H2020 projects.

📅 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2017-09

### ECC - Edge Computing Security White Paper

🔗 URL: <http://www.eccconsortium.org/Lists/show/id/374.html>

**ABSTRACT:** The Edge Computing Consortium (ECC) and Alliance of Industrial Internet (All) have jointly developed a white paper on edge computing security. As an extension of Edge Computing Reference Architecture 3.0, many important terms and concepts are consistent with the Edge Computing Reference Architecture 3.0. The architecture, design, and technology related to edge security are identified, explained, and positioned. Based on the importance and value of edge security, the challenges and requirements of edge security in typical value scenarios are analyzed. A reference framework for edge security and a combination of methods to ensure the handling of the corresponding security problems are proposed.

📅 DOCUMENT TYPE: Whitepaper

📅 PUBLICATION DATE: 2019-11

## ETSI TS 103 701 CYBER; Cyber Security for Consumer Internet of Things: Conformance Assessment of Baseline Requirements

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_ts/103700\\_103799/103701/01.01.01\\_60/ts\\_103701v010101p.pdf](https://www.etsi.org/deliver/etsi_ts/103700_103799/103701/01.01.01_60/ts_103701v010101p.pdf)

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**ABSTRACT:** The present document specifies a conformance assessment methodology for consumer IoT devices, their relation to associated services and corresponding relevant processes against ETSI TS 103 645 / ETSI EN 303 645, addressing the mandatory and recommended provisions as well as conditions and complements ETSI TS 103 645 / ETSI EN 303 645 by defining test cases and assessment criteria for each provision.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2021-08

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## ETSI GS MEC 026 V2.1.1 (2019-01) Multi-access Edge Computing (MEC); Support for regulatory requirements

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🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/026/02.01.01\\_60/gs\\_mec026v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/026/02.01.01_60/gs_mec026v020101p.pdf)

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**ABSTRACT:** The document focuses on the support of regulatory requirements for Lawful Interception (LI) and Retained Data (RD) when implementing MEC into the network. It describes the problems, constraints, interfaces and additional capabilities needed for the different deployment scenarios, to ensure full support of LI and RD regulatory requirements when implementing MEC.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2019-01

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## IEC TR 63283-3 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 3: Challenges for Cybersecurity

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🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:1250,23,103915](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103915)

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**ABSTRACT:** The document addresses roles of IIoT platforms and edge computing in the context of architecture-related transition from classical automation pyramid to automation networks, particularly related to security issues.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: Under development

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## IEEE 7005-2021 IEEE Standard for Transparent Employer Data Governance

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🔗 URL: <https://standards.ieee.org/standard/7005-2021.html>

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**ABSTRACT:** Specific methodologies to help employers in accessing, collecting, storing, utilizing, sharing, and destroying employee data are described in this standard. Specific metrics and conformance criteria regarding these types of uses from trusted global partners and how third parties and employers can meet them are provided in this standard. Certification processes, success criteria, and execution procedures are not within the scope of this standard.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2021-11

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## IEEE 802.1AE-2018 IEEE Standard for Local and metropolitan area networks-Media Access Control (MAC) Security

 URL: [https://standards.ieee.org/standard/802\\_1AE-2018.html](https://standards.ieee.org/standard/802_1AE-2018.html)

**ABSTRACT:** The document describes how all or part of a network can be secured transparently to peer protocol entities that use the MAC Service provided by IEEE 802® LANs to communicate is specified in this standard. MAC security (MACsec) provides connectionless user data confidentiality, frame data integrity, and data origin authenticity.


 DOCUMENT TYPE: Standard Specification

 PUBLICATION DATE: 2018-12

## IEEE 802.1AR-2018 IEEE Standard for Local and Metropolitan Area Networks - Secure Device Identity

 URL: [https://standards.ieee.org/standard/802\\_1AR-2018.html](https://standards.ieee.org/standard/802_1AR-2018.html)

**ABSTRACT:** This document presents a Secure Device Identifier (DevID), an ID cryptographically bound to a device and supports authentication of the device's identity. An Initial Device Identifier (IDeVID) provided by the supplier of a device can be supplemented by Local Device Identifiers (LDeVIDs) facilitating enrollment (provisioning of authentication and authorization credentials) by local network administrators.


 DOCUMENT TYPE: Standard Specification

 PUBLICATION DATE: 2018-08

## IEEE 802.1X-2020 IEEE Standard for Local and Metropolitan Area Networks--Port-Based Network Access Control

 URL: [https://standards.ieee.org/standard/802\\_1X-2020.html](https://standards.ieee.org/standard/802_1X-2020.html)

**ABSTRACT:** Port-based network access control allows a network administrator to restrict the use of IEEE 802(R) LAN service access points (ports) to secure communication between authenticated and authorized devices. This standard specifies a common architecture, functional elements, and protocols that support mutual authentication between the clients of ports attached to the same LAN and that secure communication between the ports, including the media access method independent protocols that are used to discover and establish the security associations used by IEEE 802.1AE(TM) MAC Security.


 DOCUMENT TYPE: Standard Specification

 PUBLICATION DATE: 2020-02

## ISO/IEC 30147:2021 Information technology — Internet of things — Methodology for trustworthiness of IoT system/service

 URL: <https://www.iso.org/standard/53267.html>

**ABSTRACT:** This document provides system life cycle processes to implement and maintain trustworthiness in an IoT system or service by applying and supplementing ISO/IEC/IEEE 15288:2015. The system life cycle processes are applicable to IoT systems and services common to a wide range of application areas.

 DOCUMENT TYPE: Standard Specification

 PUBLICATION DATE: 2021-05

## ISO/IEC CD 30149 (2022) IoT Trustworthiness principles

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,104432](https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104432)

**ABSTRACT:** This document provides principles for IoT trustworthiness based on ISO/IEC 30141 - IoT Reference Architecture. The current content and scope is based on the premise that Internet of Things is an application and can use a software development lifecycle as a means to address trust in IoT.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC/IEEE IEEE/ISO/IEC 8802-1AE-2020 ISO/IEC/IEEE International Standard - Information technology - Telecommunications and exchange between information technology systems -- Requirements for local and metropolitan area networks--Part 1AE: Media access

🔗 URL: <https://standards.ieee.org/standard/8802-1AE-2020.html>

**ABSTRACT:** How all or part of a network can be secured transparently to peer protocol entities that use the MAC Service provided by IEEE 802® LANs to communicate is specified in this standard. MAC security (MACsec) provides connectionless user data confidentiality, frame data integrity, and data origin authenticity.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2021-07

## ISO/IEC 27032:2012 Information technology — Security techniques — Guidelines for cybersecurity

🔗 URL: <https://www.iso.org/standard/44375.html>

**ABSTRACT:** ISO/IEC 27032:2012 provides guidance for improving the state of Cybersecurity, drawing out the unique aspects of that activity and its dependencies on other security domains, in particular: information security, network security, internet security, and critical information infrastructure protection (CIIP). It covers the baseline security practices for stakeholders in the Cyberspace. This International Standard provides: an overview of Cybersecurity, an explanation of the relationship between Cybersecurity and other types of security, a definition of stakeholders and a description of their roles in Cybersecurity, guidance for addressing common Cybersecurity issues, and a framework to enable stakeholders to collaborate on resolving Cybersecurity issues.

📄 DOCUMENT TYPE: Guideline

📅 PUBLICATION DATE: 2012-07

## ISO/IEC TR 27550:2019 Information technology — Security techniques — Privacy engineering for system life cycle processes

🔗 URL: <https://www.iso.org/standard/72024.html>

**ABSTRACT:** This document provides privacy engineering guidelines that are intended to help organizations integrate recent advances in privacy engineering into system life cycle processes. It describes:

(1) the relationship between privacy engineering and other engineering viewpoints (system engineering, security engineering, risk management);

(2) and privacy engineering activities in key engineering processes such as knowledge management, risk management, requirement analysis, and architecture design.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2019-09

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## ISO/IEC TS 27110:2021 Information technology, cybersecurity and privacy protection — Cybersecurity framework development guidelines

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🔗 URL: <https://www.iso.org/standard/72435.html>

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**ABSTRACT:** This document specifies guidelines for developing a cybersecurity framework. It is applicable to cybersecurity framework creators regardless of their organizations' type, size or nature.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2021-02

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## ISO/IEC TS 27570:2021 Privacy protection — Privacy guidelines for smart cities

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🔗 URL: <https://www.iso.org/standard/71678.html>

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**ABSTRACT:** The document takes a multiple agency as well as a citizen-centric viewpoint. It provides guidance on:

- (1) smart city ecosystem privacy protection;
- (2) how standards can be used at a global level and at an organizational level for the benefit of citizens; and
- (3) processes for smart city ecosystem privacy protection.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2021-01

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## 4.7.1 Manufacturing

### IEC TR 62443-2-3:2015 Security for industrial automation and control systems - Part 2-3: Patch management in the IACS environment

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🔗 URL: <https://webstore.iec.ch/publication/22811>

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**ABSTRACT:** IEC TR 62443-2-3:2015(E) describes requirements for asset owners and industrial automation and control system (IACS) product suppliers that have established and are now maintaining an IACS patch management program. This Technical Report recommends a defined format for the distribution of information about security patches from asset owners to IACS product suppliers, a definition of some of the activities associated with the development of the patch information by IACS product suppliers and deployment and installation of the patches by asset owners. The exchange format and activities are defined for use in security related patches; however, it may also be applicable for non-security related patches or updates.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2015-06

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## IEC TR 62443-3-1:2009 Industrial communication networks - Network and system security - Part 3-1: Security technologies for industrial automation and control systems

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🔗 URL: <https://webstore.iec.ch/publication/7031>

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**ABSTRACT:** IEC/TR 62443-3-1:2009(E) provides a current assessment of various cybersecurity tools, mitigation counter-measures, and technologies that may effectively apply to the modern electronically based IACSs regulating and monitoring numerous industries and critical infrastructures. It describes several categories of control system-centric cybersecurity technologies, the types of products available in those categories, the pros and cons of using those products in the automated IACS environments, relative to the expected threats and known cyber vulnerabilities, and, most important, the preliminary recommendations and guidance for using these cybersecurity technology products and/or countermeasures.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2009-07

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## IEC TS 62443-1-1:2009 Industrial communication networks - Network and system security - Part 1-1: Terminology, concepts and models

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🔗 URL: <https://webstore.iec.ch/publication/7029>

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**ABSTRACT:** IEC/TS 62443-1-1:2009(E) is a technical specification which defines the terminology, concepts and models for Industrial Automation and Control Systems (IACS) security. It establishes the basis for the remaining standards in the IEC 62443 series.

📄 DOCUMENT TYPE: Technical Report

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📅 PUBLICATION DATE: 2009-07

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## IEC 62443-2-4:2015 Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers

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🔗 URL: <https://webstore.iec.ch/publication/22810>

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**ABSTRACT:** IEC 62443-2-4:2015 specifies requirements for security capabilities for Industrial Automation and Control System (IACS) service providers that they can offer to the asset owner during integration and maintenance activities of an Automation Solution. The contents of the corrigendum of August 2015 have been included in this copy.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2015-06

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## IEC 62443-3-2:2020 Security for industrial automation and control systems - Part 3-2: Security risk assessment for system design

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🔗 URL: <https://webstore.iec.ch/publication/30727>

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**ABSTRACT:** IEC 62443-3-2:2020 establishes requirements for: a) defining a system under consideration (SUC) for an Industrial Automation and Control System (IACS); b) partitioning the SUC into zones and conduits; c) assessing risk for each zone and conduit; d) establishing the target security level (SL-T) for each zone and conduit; and e) documenting the security requirements.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-06

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## IEC 62443-3-3:2013 Industrial communication networks - Network and system security - Part 3-3: System security requirements and security levels

🔗 URL: <https://webstore.iec.ch/publication/7033>

**ABSTRACT:** IEC 62443-3-3:2013 provides detailed technical control system requirements (SRs) associated with the seven foundational requirements (FRs) described in IEC 62443-1-1 including defining the requirements for control system capability security levels, SL-C(control system). These requirements would be used by various members of the industrial automation and control system (IACS) community along with the defined zones and conduits for the system under consideration (SuC) while developing the appropriate control system target SL, SL-T(control system), for a specific asset. The contents of the corrigendum of April 2014 have been included in this copy.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2013-08-07

## ITU-T - SG17 - X.5Gsec-ecs Security framework for 5G edge computing services

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17977](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17977)

**ABSTRACT:** This draft Recommendation analyses the potential deployment scheme and typical application scenarios of edge computing services, specifies the security threats and requirements specific to the edge computing services and thus establishes the security framework for the operator to safeguard its applications.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ITU-T - SG17 - X.5Gsec-netec Security capabilities of network layer for 5G edge computing

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17985](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17985)

**ABSTRACT:** 5G Edge Computing will play a key role on low latency services and traffic off-load services in 5G era. When using 5G Edge Computing, several associated factors can increase the number of the security risks to the network layer, and even bring new security challenges to the network security operation. These factors are: (1) the flexible network architectures of 5G, (2) the variable deployment positions of Edge Computing, (3) the various application scenarios, (4) different types of users' private networks and access networks, etc. The boundaries among the telecommunication networks and the private networks would be more ambiguous, and the exposure surface would be expanded. Therefore, the security requirements and measures of the network layer including both of the telecommunication networks and the private networks would be recommended as telecommunication operators enjoying the benefit of Edge Computing.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ITU-T - SG17 - X.gecds Guideline on edge computing data security

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=18025](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18025)

**ABSTRACT:** Edge computing is strongly related to 5G and UPF is the data connection point between the MEC system and 5G Network architecture. The sinking of 5G network user plane brings threats such as illegal eavesdropping, which may seriously threaten the data security in edge computing. The edge node has unique features itself and whether in the physical environment or the network, the data security will

be an important problem that the edge nodes need to face. Therefore, the recommendation analyses the edge computing data security mainly from these two aspects and provides relative data security challenges and threats and data security guidelines for Edge Computing. This recommendation could help to address the data security issues in Edge Computing implementation.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

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## 4.7.2 Mobility

### 5GAA Privacy by Design Aspects of C-V2X

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🔗 URL: <https://5gaa.org/news/privacy-by-design-aspects-of-c-v2x/>

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**ABSTRACT:** Connected vehicles, as part of the emerging Cooperative Intelligent Transportation Systems (C-ITS) are positioned to transform the future of mobility – a change enabled by the exchange of messages between vehicles and between vehicles and transport infrastructure. As these messages are constantly broadcasting data, including vehicle speed and location, this raises potential concern about how to address privacy and data protection. In this document, we take a fresh look at the latest technological architectures that feature Privacy by Design. We focus specifically on Cooperative Awareness Messages (CAM) and Decentralised Environmental Notification Messages (DENM), where privacy protection is offered by using pseudonym certificates that do not contain any identifying information. A Public Key Infrastructure (PKI) system takes care of the provision and overall management of the corresponding cryptographic keys. In this document, we review how current PKI system design can help address the risk of tracking from outside and inside attackers, and we identify challenges and privacy risks that remain unresolved. We give some suggestions in terms of future research and conclude the document with general recommendations.

📄 DOCUMENT TYPE: Whitepaper

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📅 PUBLICATION DATE: 2020-11

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### ITU-T - SG17 - X.itssec-5 Security guidelines for vehicular edge computing

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🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17967](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17967)

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**ABSTRACT:** This draft Recommendation provides security guidelines for vehicular edge computing. Vehicular edge computing (VEC) is a model that supports the core cloud's capacity for decentralizing the concentration of computing resources in data centers. VEC also provides more localized storage and application services to road users, thereby making it possible to achieve lower latency delays, faster response times providing mobility support, location awareness, high availability, and Quality of Service for streaming real-time applications since the data processing is conducted closer to the vehicle. Vehicular edge computing faces many security challenges and issues since it requires providing faster service response time to end-users. This Recommendation provides security guidelines for vehicular edge computing based on an analysis of the threats and vulnerabilities identified within VEC. Further, it also provides use cases for a security system and relevant security requirements for use in for vehicular edge computing scenarios.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: Under development

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## ■ 4.8 Safety and Emergencies

### 4.8.1 Horizontals & Verticals

#### ASTM ASTM F3463-21 Standard Guide for Ensuring the Safety of Connected Consumer Products

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 URL: <https://www.astm.org/f3463-21.html>

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**ABSTRACT:** This guide provides guidance for connected consumer products, as it relates to physical product safety hazards created by virtue of their connectivity. It applies to connected products that need testing and evaluation to prevent cybersecurity vulnerabilities and weaknesses that could compromise the safety-related performance of the product, create a physical safety hazard in the product or its operation, or result in a noncompliance to the underlying end product safety standard.

 DOCUMENT TYPE: Guideline

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 PUBLICATION DATE: 2021-10

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### 4.8.2 Mobility

#### 5GAA Safety Treatment in V2X Applications

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 URL: <https://5gaa.org/news/safety-treatment-in-v2x-applications/>

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**ABSTRACT:** This White Paper describes the new challenges in the treatment of functional safety arising from the introduction of connected and distributed functions, which are typical for cellular vehicle-to-everything (C-V2X) applications. A dedicated 5GAA technical working group performed a detailed analysis to determine, propose, and evaluate possibilities for mobile network operators, vendors, and any further identified stakeholders to provide vehicle original equipment manufacturers (OEMs) what they need to treat safety in new use cases enabled by C-V2X technologies.

 DOCUMENT TYPE: Whitepaper

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 PUBLICATION DATE: 2021-07

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## ■ 4.9 Smart City

### 4.9.1 Smart City

#### IEEE - P1451-99 Standard for Harmonization of Internet of Things (IoT) Devices and Systems

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🔗 URL: <https://standards.ieee.org/ieee/1451.99/10355/>

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**ABSTRACT:** The standard utilizes the advanced capabilities of the Extensible Messaging and Presence Protocol (XMPP) protocol, such as providing globally authenticated identities, authorization, presence, life cycle management, interoperable communication, IoT discovery and provisioning. Descriptive meta-data about devices and operations will provide sufficient information for infrastructural components, services and end-users to dynamically adapt to a changing environment. Key components and needs of a successful Smart City infrastructure will be identified and addressed. This standard does not develop Application Programming Interfaces (APIs) for existing IoT or legacy protocols.

📄 DOCUMENT TYPE: Standard Specification

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📅 PUBLICATION DATE: 2020-09

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## ■ 4.10 Strategies\_Policies\_and\_Planning

### 4.10.1 Horizontals & Verticals

#### CEN/CENELEC CWA 17431 Principles and guidance for licensing Standard Essential Patents in 5G and the Internet of Things (IoT), including the Industrial Internet

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🔗 URL: <https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/ICT/cwa17431.pdf>

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**ABSTRACT:** This CWA (CEN Workshop Agreement) addresses a broad set of Principles and Guidance to form a solid foundation for future practice with regard to SEP (Standard Essential Patents) licensing for ICT standards such as mobile communication standards and other wireless communication standards. The CWA also includes information about licensing to those who are new to the implementation and use of standardised technology and the licensing of patents that cover those technologies.

📄 DOCUMENT TYPE: Guideline

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📅 PUBLICATION DATE: 2019-06

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## ■ 4.11 Sustainability\_and\_Resilience

### 4.11.1 Energy

#### ITU-T - SG5 - L.EEMDC Energy Efficiency in Micro Data Centre for Edge Computing

🔗 URL: [https://www.itu.int/ITU-T/workprog/wp\\_item.aspx?isn=17702](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17702)

**ABSTRACT:** The scope of the draft Recommendation is as follows: (1) considerations on micro data centre for edge computing: deployment, configuration including redundancy, components, (2) energy efficiency in micro data centre: management functions including energy efficiency and operation perspective, (3) energy efficiency in edge computing: management functions including energy efficiency and operation perspective.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ■ 4.12 Terms\_and\_Definitions

### 4.12.1 Horizontals & Verticals

#### ETSI GS MEC 001 V2.1.1 (2019-01) Multi-access Edge Computing (MEC); Terminology

🔗 URL: [https://www.etsi.org/deliver/etsi\\_gs/MEC/001\\_099/001/02.01.01\\_60/gs\\_mec001v020101p.pdf](https://www.etsi.org/deliver/etsi_gs/MEC/001_099/001/02.01.01_60/gs_mec001v020101p.pdf)

**ABSTRACT:** The document provides a glossary of terms relating to the conceptual, architectural and functional elements within the scope of work on Multi-access Edge Computing. The purpose of this glossary is to ensure that all terminology defined in the document is used in a consistent way by all ETSI MEC deliverables as well as in wider industry discussions on Multi-access Edge Computing.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: 2019-01

#### IIC (Industrial Internet Consortium) Augmented Reality and the Edge

🔗 URL: <https://www.iiconsortium.org/pdf/IIC-Edge-AR-Tech-Brief.pdf>

**ABSTRACT:** This Tech Brief examines the juxtaposition of the IoT edge with AR technology. Three main classes of AR technology are considered: AR headsets, AR on smart phones and spatial AR that projects light directly onto physical reality. Each can yield “intelligent realities”, a concept that was developed in IIC publications last year that spans the entire eXtended Reality (XR) space, including Virtual Reality (VR). This document shows as well how AR devices use edge computing and perform as edge computing devices themselves.

📄 DOCUMENT TYPE: Technical Report

📅 PUBLICATION DATE: 2020-09

## IIC (Industrial Internet Consortium) Decentralized Identity for Edge Computing

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 URL: <https://www.iiconsortium.org/pdf/IIC-Edge-DID-Tech-Brief.pdf>

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**ABSTRACT:** This Tech Brief provides an overview of emerging concepts such as decentralized identifiers (DIDs) and verifiable credentials (VCs), and it describes how to create a unified, interoperable and tamper-proof device identity registry on top of the blockchain by introducing DIDs and VCs into the lifecycle of IoT devices, thereby breaking IoT application silos and unlocking the potential of IoT on a global scale.

 DOCUMENT TYPE: Whitepaper

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 PUBLICATION DATE: 2020-09

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## IIC (Industrial Internet Consortium) The Edge Computing Advantage

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 URL: [https://www.iiconsortium.org/pdf/IIC\\_Edge\\_Computing\\_Advantages\\_White\\_Paper\\_2019-10-24.pdf](https://www.iiconsortium.org/pdf/IIC_Edge_Computing_Advantages_White_Paper_2019-10-24.pdf)

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**ABSTRACT:** Computing at the edge has grown steadily over the past decade, driven by the need to extend the technologies used in data centers to support cloud computing closer to things in the physical world. This is a key factor in accelerating the development of the internet of things (IoT). But, as is often the case with new technology, there is an abundance of overlapping terminology that obfuscates what the fundamentals are and how they relate to one another. We aim here to demystify edge computing, discuss its benefits, explain how it works, how it is realized and the future opportunities and challenges it presents.

 DOCUMENT TYPE: Whitepaper


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 PUBLICATION DATE: 2019-10

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## ISO/IEC TR 30172 ED1 Digital Twin - Use cases

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 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,104881](https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104881)

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**ABSTRACT:** This document provides a collection of representative use cases of Digital Twin applications in a variety of domains.

 DOCUMENT TYPE: Technical Report

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 PUBLICATION DATE: Under development

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## ISO/IEC 21823-1:2019 Interoperability for internet of things systems -- Part 1: Framework

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 URL: <https://webstore.iec.ch/publication/60604>

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**ABSTRACT:** ISO/IEC 21823-1:2019(E) provides an overview of interoperability as it applies to IoT systems and a framework for interoperability for IoT systems. This document enables IoT systems to be built in such a way that the entities of the IoT system are able to exchange information and mutually use the information in an efficient way. This document enables peer-to-peer interoperability between separate IoT systems. This document provides a common understanding of interoperability as it applies to IoT systems and the various entities within them.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2019-02

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## ISO/IEC 30173 ED1 Digital Twin - Concepts and terminology

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,104883](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104883)

**ABSTRACT:** This document establishes terminology for Digital Twin (DT) and describes concepts in the field of Digital Twin, including: (1) the terms and definitions of Digital Twin, (2) concepts of Digital Twin (e.g., Digital Twin ecosystem, lifecycle process for Digital Twin, and classifications of Digital Twin), (3) Functional view of Digital Twin and (4) Digital Twin stakeholders.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC PWI JTC1-SC41-6 Guidance for IoT and Digital Twin use cases

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,20,104897](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104897)

**ABSTRACT:** The document: (1) defines a conceptual model for the building of use cases; (2) specifies a use case template ontology, i.e. vocabulary as well as conventions for describing and representing use case contents; (3) provides guidance on building use case templates and on extending a use case ontology to cover the targeted standard; provides examples of use case templates and use cases; and (4) specifies an implementation scheme that will allow use cases to be stored and shared in a repository.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC PWI JTC1-SC41-7 Digital Twin – Maturity model

🔗 URL: [https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP\\_ORG\\_ID,FSP\\_APEX\\_PAGE,FSP\\_PROJECT\\_ID:20486,23,108352](https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108352)

**ABSTRACT:** This document provides (1) a standardized generic Digital Twin maturity model, (2) definition of assessment indicators, (3) guidance for a maturity assessment, and (4) other practical classifications of Digital Twin capabilities, etc.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development

## ISO/IEC/IEEE DIS 24641 Systems and Software engineering — Methods and tools for model-based systems and software engineering

🔗 URL: <https://www.iso.org/standard/79111.html>

**ABSTRACT:** This International Standard, within the context of methods and tools for Model-Based Systems and Software Engineering (MBSSE): (1) Provides terms and definitions related to MBSSE; (2) Defines MBSSE-specific processes for model-based systems and software engineering; the processes are described in terms of purpose, inputs, tasks, and outcomes; (3) Defines methods to support the defined tasks of each process; and (4) Defines tool capabilities to automate/semi-automate tasks or methods.

📄 DOCUMENT TYPE: Standard Specification

📅 PUBLICATION DATE: Under development


## W3C TR/2020/REC-wot-thing-description-20200409 Web of Things (WoT) Thing Description

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 URL: <https://www.w3.org/TR/2020/REC-wot-thing-description-20200409/>

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**ABSTRACT:** The document describes a formal model and a common representation for a Web of Things (WoT) Thing Description. A Thing Description describes the metadata and interfaces of Things, where a Thing is an abstraction of a physical or virtual entity that provides interactions to and participates in the Web of Things. Thing Descriptions provide a set of interactions based on a small vocabulary that makes it possible both to integrate diverse devices and to allow diverse applications to interoperate. Thing Descriptions, by default, are encoded in a JSON format that also allows JSON-LD processing. The latter provides a powerful foundation to represent knowledge about Things in a machine-understandable way. A Thing Description instance can be hosted by the Thing itself or hosted externally when a Thing has resource restrictions (e.g., limited memory space) or when a Web of Things-compatible legacy device is retrofitted with a Thing Description.

 DOCUMENT TYPE: Standard Specification

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 PUBLICATION DATE: 2020-04

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## W3C TR/2021/WD-wot-discovery-20210602 Web of Things (WoT) Discovery

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 URL: <https://www.w3.org/TR/wot-discovery/>

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**ABSTRACT:** The document presents a process for Web of Things (WoT) discovery with two phases: introduction and exploration. The Introduction phase leverages existing discovery mechanisms but does not directly expose metadata; they are simply used to discover Exploration services, which provide metadata but only after secure authentication and authorization. This document normatively defines two Exploration services, one for WoT Thing self-description with a single WoT Thing Description and a searchable WoT Thing Description Directory service for collections of Thing Descriptions. A variety of Introduction services are also described and where necessary normative definitions are given to support them.

 DOCUMENT TYPE: Technical Report

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 PUBLICATION DATE: 2021-06

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### 4.12.2 Mobility


## 5GAA C-V2X Use Cases Volume II: Examples and Service Level Requirements

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 URL: [https://5gaa.org/wp-content/uploads/2020/10/5GAA\\_White-Paper\\_C-V2X-Use-Cases-Volume-II.pdf](https://5gaa.org/wp-content/uploads/2020/10/5GAA_White-Paper_C-V2X-Use-Cases-Volume-II.pdf)

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**ABSTRACT:** 5G Automotive Association (5GAA) has defined a methodology to describe solution agnostic automotive use cases (UC) and application requirements referred to as Service Level Requirements (SLR). This White Paper applies the defined methodology to describe use cases, and includes advanced UCs that require complex interactions among vehicles as well as between vehicles and infrastructure in relation to self-driving (autonomous) vehicles. Different road scenarios, actors and service flows are considered in the defined use cases. Detailed analysis of the derived Service Level Requirements is also provided.

 DOCUMENT TYPE: Whitepaper

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 PUBLICATION DATE: 2020-08

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## 5. Annex

Title	Published	Webpage URL
3GPP TR 23.748 V17.0.0 (2020-12) Study on enhancement of support for Edge Computing in 5G Core network (5GC)	2020-12	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3622">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3622</a>
3GPP TR 23.758 V17.0.0 (2019-12) Study on application architecture for enabling Edge Applications	2019-12	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3614">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3614</a>
3GPP TR 23.803 V7.0.0 (2005-09) Evolution of policy control and charging	2005-10	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=883">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=883</a>
3GPP TR 26.803 V17.0.0 (2021-06) Study on 5G Media Streaming Extensions for Edge Processing	2021-06	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3742">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3742</a>
3GPP TR 28.814 V17.0.0 (2021-09) Study on enhancements of edge computing management	2021-09	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3744">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3744</a>
3GPP TR 28.815 V17.0.0 (2021-12) Study on charging aspects of edge computing	2021-12	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3758">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3758</a>
3GPP TR 33.839 V17.0.0 (2021-12) Study on security aspects of enhancement of support for edge computing in the 5G Core (5GC)	2021-12	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3759">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3759</a>
3GPP TS 23.558 V17.2.0 (2021-12) Architecture for enabling Edge Applications	2022-05	<a href="https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3723">https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3723</a>
5GAA Cooperation Models enabling deployment and use of 5G infrastructures for CAM in Europe	2021-03	<a href="https://5gaa.org/news/cooperation-models-enabling-deployment-and-use-of-5g-infrastructures-for-cam-in-europe/">https://5gaa.org/news/cooperation-models-enabling-deployment-and-use-of-5g-infrastructures-for-cam-in-europe/</a>
5GAA C-V2X Use Cases Volume II: Examples and Service Level Requirements	2020-08	<a href="https://5gaa.org/wp-content/uploads/2020/10/5GAA_White-Paper_C-V2X-Use-Cases-Volume-II.pdf">https://5gaa.org/wp-content/uploads/2020/10/5GAA_White-Paper_C-V2X-Use-Cases-Volume-II.pdf</a>
5GAA Privacy by Design Aspects of C-V2X	2020-11	<a href="https://5gaa.org/news/privacy-by-design-aspects-of-c-v2x/">https://5gaa.org/news/privacy-by-design-aspects-of-c-v2x/</a>
5GAA Safety Treatment in V2X Applications	2021-07	<a href="https://5gaa.org/news/safety-treatment-in-v2x-applications/">https://5gaa.org/news/safety-treatment-in-v2x-applications/</a>
AIOTI Edge Computing Standard Framework Concepts	2021-09	<a href="https://aioti.eu/wp-content/uploads/2021/09/AIOTI-SDOs_alliance_landscape_edge_computing_standard_framework_R1-Published.pdf">https://aioti.eu/wp-content/uploads/2021/09/AIOTI-SDOs_alliance_landscape_edge_computing_standard_framework_R1-Published.pdf</a>

Title	Published	Webpage URL
AIOTI High Priority Edge Computing Standardisation Gaps and Relevant SDOs	2022-04	<a href="https://aioti.eu/wp-content/uploads/2022/04/AIOTI-High-Priority-Edge-Computing-Gaps-Final.pdf">https://aioti.eu/wp-content/uploads/2022/04/AIOTI-High-Priority-Edge-Computing-Gaps-Final.pdf</a>
AIOTI IoT and Edge Computing impact on Beyond 5G: enabling technologies and challenges	2021-09	<a href="https://aioti.eu/wp-content/uploads/2021/10/AIOTI-Beyond-5G-R1-Report-Published.pdf">https://aioti.eu/wp-content/uploads/2021/10/AIOTI-Beyond-5G-R1-Report-Published.pdf</a>
ASTM ASTM F3463-21 Standard Guide for Ensuring the Safety of Connected Consumer Products	2021-10	<a href="https://www.astm.org/f3463-21.html">https://www.astm.org/f3463-21.html</a>
CEN Wireless mesh networking - Communication systems for meter data exchange	N/A	<a href="https://standards.iteh.ai/catalog/tc/cen/a0640f96-2f0c-4456-af8e-20887cd8b203/cen-tc-294-wg-6">https://standards.iteh.ai/catalog/tc/cen/a0640f96-2f0c-4456-af8e-20887cd8b203/cen-tc-294-wg-6</a>
CEN/CENELEC CWA 17431 Principles and guidance for licensing Standard Essential Patents in 5G and the Internet of Things (IoT), including the Industrial Internet	2019-06	<a href="https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/ICT/cwa17431.pdf">https://www.cencenelec.eu/media/CEN-CENELEC/CWAs/ICT/cwa17431.pdf</a>
Cloudwatch Cloudwatch D3.6 Security and Interoperability Standards Status Report	2017-09	<a href="https://www.cloudwatchhub.eu/sites/default/files/CloudWATCH2_Security-and-Interoperability-Standards-Status-Report.pdf">https://www.cloudwatchhub.eu/sites/default/files/CloudWATCH2_Security-and-Interoperability-Standards-Status-Report.pdf</a>
Contiki Contiki-NG Contiki-NG, the OS for Next Generation IoT Devices	2017/01	<a href="https://www.contiki-ng.org/">https://www.contiki-ng.org/</a>
ECC - Carrier Edge Computing Network Technical White Paper	2019-11	<a href="http://www.econsortium.org/Lists/show/id/376.html">http://www.econsortium.org/Lists/show/id/376.html</a>
ECC - Collaboration Between Edge Computing and Cloud Computing 2018	2018-11	<a href="http://www.econsortium.org/Lists/show/id/335.html">http://www.econsortium.org/Lists/show/id/335.html</a>
ECC - Edge Computing and Cloud Computing Collaboration White Paper 2.0	2020-12	<a href="http://www.econsortium.org/Lists/show/id/522.html">http://www.econsortium.org/Lists/show/id/522.html</a>
ECC - Edge Computing Reference Architecture 3.0 2018	2018-11	<a href="http://www.econsortium.org/Lists/show/id/334.html">http://www.econsortium.org/Lists/show/id/334.html</a>
ECC - Edge Computing Security White Paper	2019-11	<a href="http://www.econsortium.org/Lists/show/id/374.html">http://www.econsortium.org/Lists/show/id/374.html</a>
ECC - Edge Native Technical Architecture White Paper 1.0	2021-02	<a href="http://www.econsortium.org/Lists/show/id/552.html">http://www.econsortium.org/Lists/show/id/552.html</a>
ECC - Industrial Internet Edge Computing Network White Paper in the 5G Era	2021-11	<a href="http://www.econsortium.org/Lists/show/id/523.html">http://www.econsortium.org/Lists/show/id/523.html</a>
ECC- Edge Computing Reference Architecture 2.0 2017	2017-11	<a href="http://en.econsortium.org/Lists/show/id/82.html">http://en.econsortium.org/Lists/show/id/82.html</a> ; <a href="http://www.econsortium.org/Lists/show/id/163.html">http://www.econsortium.org/Lists/show/id/163.html</a>
ECC- Industrial Internet Edge Computing Node White Paper 1.0	2020-12	<a href="http://www.econsortium.org/Lists/show/id/524.html">http://www.econsortium.org/Lists/show/id/524.html</a>

Title	Published	Webpage URL
EECC EECC - Reference Architecture Model Edge Computing (RAMEC)	2019-10	<a href="https://www.fokus.fraunhofer.de/en/ngni/news/ecf-eecc_2019_12">https://www.fokus.fraunhofer.de/en/ngni/news/ecf-eecc_2019_12</a>
ETSI GR MEC 017 V1.1.1 (2018-02) Mobile Edge Computing (MEC); Deployment of Mobile Edge Computing in an NFV environment	2018-02	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/017/01.01.01_60/gr_mec017v010101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/017/01.01.01_60/gr_mec017v010101p.pdf</a>
ETSI GR MEC 018 V1.1.1 (2017-10) Mobile Edge Computing (MEC); End to End Mobility Aspects	2017-10	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/018/01.01.01_60/gr_mec018v010101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/018/01.01.01_60/gr_mec018v010101p.pdf</a>
ETSI GR MEC 022 V2.1.1 (2018-09) Multi-access Edge Computing (MEC); Study on MEC Support for V2X Use Cases	2018-09	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/022/02.01.01_60/gr_mec022v020101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/022/02.01.01_60/gr_mec022v020101p.pdf</a>
ETSI GR MEC 024 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); Support for network slicing	2019-11	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/024/02.01.01_60/gr_mec024v020101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/024/02.01.01_60/gr_mec024v020101p.pdf</a>
ETSI GR MEC 027 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); Study on MEC support for alternative virtualization technologies	2019-11	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/027/02.01.01_60/gr_mec027v020101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/027/02.01.01_60/gr_mec027v020101p.pdf</a>
ETSI GR MEC 031 V2.1.1 (2020-10) Multi-access Edge Computing (MEC) MEC 5G Integration	2020-10	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/031/02.01.01_60/gr_mec031v020101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/031/02.01.01_60/gr_mec031v020101p.pdf</a>
ETSI GR MEC 035 V3.1.1 (2021-06) Multi-access Edge Computing (MEC); Study on Inter-MEC systems and MEC-Cloud systems coordination	2021-06	<a href="https://www.etsi.org/deliver/etsi_gr/MEC/001_099/035/03.01.01_60/gr_mec035v030101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC/001_099/035/03.01.01_60/gr_mec035v030101p.pdf</a>
ETSI GR MEC-DEC 025 V2.1.1 (2019-06) Multi-access Edge Computing (MEC); MEC Testing Framework	2019-06	<a href="https://www.etsi.org/deliver/etsi_gr/MEC-DEC/001_099/025/02.01.01_60/gr_mec-dec025v020101p.pdf">https://www.etsi.org/deliver/etsi_gr/MEC-DEC/001_099/025/02.01.01_60/gr_mec-dec025v020101p.pdf</a>
ETSI GS MEC 001 V2.1.1 (2019-01) Multi-access Edge Computing (MEC); Terminology	2019-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/001/02.01.01_60/gs_mec001v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/001/02.01.01_60/gs_mec001v020101p.pdf</a>
ETSI GS MEC 002 V2.2.1 (2022-01) Multi-access Edge Computing (MEC); Phase 2: Use Cases and Requirements	2022-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/002/02.02.01_60/gs_mec002v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/002/02.02.01_60/gs_mec002v020201p.pdf</a>
ETSI GS MEC 003 V2.2.1 (2020-12) Multi-access Edge Computing (MEC); Framework and Reference Architecture	2020-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/003/02.02.01_60/gs_mec003v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/003/02.02.01_60/gs_mec003v020201p.pdf</a>

Title	Published	Webpage URL
ETSI GS MEC 005 V2.1.1 (2019-07) Multi-access Edge Computing (MEC); Proof of Concept Framework	2019-07	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/005/02.01.01_60/gsmec005v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/005/02.01.01_60/gsmec005v020101p.pdf</a>
ETSI GS MEC 009 V3.1.1 (2021-06) Multi-access Edge Computing (MEC); General principles, patterns and common aspects of MEC Service APIs	2021-06	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/009/03.01.01_60/gsmec009v030101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/009/03.01.01_60/gsmec009v030101p.pdf</a>
ETSI GS MEC 010-1 V1.1.1 (2017-10) Mobile Edge Computing (MEC); Mobile Edge Management; Part 1: System, host and platform management	2017-10	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01001/01.01.01_60/gsmec01001v010101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01001/01.01.01_60/gsmec01001v010101p.pdf</a>
ETSI GS MEC 010-2 V2.1.1 (2019-11) Multi-access Edge Computing (MEC); MEC Management; Part 2: Application lifecycle, rules and requirements management	2019-11	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01002/02.01.01_60/gsmec01002v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/01002/02.01.01_60/gsmec01002v020101p.pdf</a>
ETSI GS MEC 011 V2.2.1 (2020-12) Multi-access Edge Computing (MEC); Edge Platform Application Enablement	2020-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/011/02.02.01_60/gsmec011v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/011/02.02.01_60/gsmec011v020201p.pdf</a>
ETSI GS MEC 012 V2.1.1 (2019-12) Multi-access Edge Computing (MEC); Radio Network Information API	2019-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/012/02.01.01_60/gsmec012v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/012/02.01.01_60/gsmec012v020101p.pdf</a>
ETSI GS MEC 013 V2.1.1 (2019-09) Multi-access Edge Computing (MEC); Location API	2019-09	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/013/02.01.01_60/gsmec013v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/013/02.01.01_60/gsmec013v020101p.pdf</a>
ETSI GS MEC 014 V2.1.1 (2021-03) Multi-access Edge Computing (MEC); UE Identity API	2021-03	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/014/02.01.01_60/gsmec014v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/014/02.01.01_60/gsmec014v020101p.pdf</a>
ETSI GS MEC 015 V2.1.1 (2020-06) Multi-Access Edge Computing (MEC); Traffic Management APIs	2020-06	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/015/02.01.01_60/gsmec015v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/015/02.01.01_60/gsmec015v020101p.pdf</a>
ETSI GS MEC 016 V2.2.1 (2020-04) Multi-access Edge Computing (MEC); Device application interface	2020-04	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/016/02.02.01_60/gsmec016v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/016/02.02.01_60/gsmec016v020201p.pdf</a>
ETSI GS MEC 021 V2.1.1 (2020-01) Multi-access Edge Computing (MEC); Application Mobility Service API	2020-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/021/02.01.01_60/gsmec021v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/021/02.01.01_60/gsmec021v020101p.pdf</a>



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ETSI GS MEC 026 V2.1.1 (2019-01) Multi-access Edge Computing (MEC); Support for regulatory requirements	2019-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/026/02.01.01_60/gsmec026v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/026/02.01.01_60/gsmec026v020101p.pdf</a>
ETSI GS MEC 028 V2.2.1 (2021-07) Multi-access Edge Computing (MEC); WLAN Access Information API	2021-07	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/028/02.02.01_60/gsmec028v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/028/02.02.01_60/gsmec028v020201p.pdf</a>
ETSI GS MEC 029 V2.2.1 (2022-01) Multi-access Edge Computing (MEC); Fixed Access Information API	2022-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/029/02.02.01_60/gsmec029v020201p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/029/02.02.01_60/gsmec029v020201p.pdf</a>
ETSI GS MEC 030 V2.1.1 (2020-04) Multi-access Edge Computing (MEC); V2X Information Service API	2020-04	<a href="https://www.etsi.org/deliver/etsi_gs/MEC/001_099/030/02.01.01_60/gsmec030v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC/001_099/030/02.01.01_60/gsmec030v020101p.pdf</a>
ETSI GS MEC-DEC 032-1 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 1: Test Requirements and Implementation Conformance Statement (ICS)	2020-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03201/02.01.01_60/gsmec-dec03201v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03201/02.01.01_60/gsmec-dec03201v020101p.pdf</a>
ETSI GS MEC-DEC 032-2 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 2: Test Purposes (TP)	2020-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03202/02.01.01_60/gsmec-dec03202v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03202/02.01.01_60/gsmec-dec03202v020101p.pdf</a>
ETSI GS MEC-DEC 032-3 V2.1.1 (2020-12) Multi-access Edge Computing (MEC); API Conformance Test Specification; Part 3: Abstract Test Suite (ATS)	2020-12	<a href="https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03203/02.01.01_60/gsmec-dec03203v020101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC-DEC/001_099/03203/02.01.01_60/gsmec-dec03203v020101p.pdf</a>
ETSI GS MEC-IEG 004 V1.1.1 (2015-11) Mobile-Edge Computing (MEC); Service Scenarios	2015-11	<a href="https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/004/01.01.01_60/gsmec-ieg004v010101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/004/01.01.01_60/gsmec-ieg004v010101p.pdf</a>
ETSI GS MEC-IEG 006 V1.1.1 (2017-01) Mobile Edge Computing; Market Acceleration; MEC Metrics Best Practice and Guidelines	2017-01	<a href="https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/006/01.01.01_60/gsmec-ieg006v010101p.pdf">https://www.etsi.org/deliver/etsi_gs/MEC-IEG/001_099/006/01.01.01_60/gsmec-ieg006v010101p.pdf</a>
ETSI TS 103 701 CYBER; Cyber Security for Consumer Internet of Things: Conformance Assessment of Baseline Requirements	2021-08	<a href="https://www.etsi.org/deliver/etsi_ts/103700_103799/103701/01.01.01_60/ts_103701v010101p.pdf">https://www.etsi.org/deliver/etsi_ts/103700_103799/103701/01.01.01_60/ts_103701v010101p.pdf</a>
FIT IoT Lab FIT IoT-LAB Testbed The Very Large Scale Internet of Things Testbed	2014-06	<a href="https://www.ietf-lab.info/">https://www.ietf-lab.info/</a>
FIWARE Foundation FIWARE Internet of Things Framework	2018-01	<a href="https://www.fiware.org/">https://www.fiware.org/</a>



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IEC 61406 ED1 Identification Link	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104621">https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104621</a>
IEC 61987-1:2006 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 1: Measuring equipment with analogue and digital output	2006-12-14	<a href="https://webstore.iec.ch/publication/6225">https://webstore.iec.ch/publication/6225</a>
IEC 61987-10:2009 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 10: List of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange - Fundamentals	2009-07-23	<a href="https://webstore.iec.ch/publication/6227">https://webstore.iec.ch/publication/6227</a>
IEC 61987-11:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 11: List of properties (LOPs) of measuring equipment for electronic data exchange - Generic structures	2016-12-15	<a href="https://webstore.iec.ch/publication/32275">https://webstore.iec.ch/publication/32275</a>
IEC 61987-12:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 12: Lists of properties (LOPs) for flow measuring equipment for electronic data exchange	2016-03-23	<a href="https://webstore.iec.ch/publication/24401">https://webstore.iec.ch/publication/24401</a>
IEC 61987-13:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 13: Lists of properties (LOP) for pressure measuring equipment for electronic data exchange	2016-03-23	<a href="https://webstore.iec.ch/publication/24400">https://webstore.iec.ch/publication/24400</a>
IEC 61987-14:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 14: Lists of properties (LOP) for temperature measuring equipment for electronic data exchange	2016-04-26	<a href="https://webstore.iec.ch/publication/24637">https://webstore.iec.ch/publication/24637</a>

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IEC 61987-15:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 15: Lists of properties (LOPs) for level measuring equipment for electronic data exchange	2016-11-08	<a href="https://webstore.iec.ch/publication/26177">https://webstore.iec.ch/publication/26177</a>
IEC 61987-16:2016 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 16: List of properties (LOPs) for density measuring equipment for electronic data exchange	2016-12-15	<a href="https://webstore.iec.ch/publication/34265">https://webstore.iec.ch/publication/34265</a>
IEC 61987-31 ED1 List of Properties (LOP) of infrastructure devices for electronic data exchange - Generic structures	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102292">https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102292</a>
IEC 61987-32 ED1 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 32: Lists of properties (LOP) for I/O modules for electronic data exchange	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102293">https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,102293</a>
IEC 61987-41 ED1 Generic structures of List of Properties (LOP) of Process Analyzer Technology (PAT) measuring devices for electronic data exchange	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,107355">https://www.iec.ch/ords/f?p=103:38:401030832849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,107355</a>
IEC 61987-92:2018 Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 92: Lists of properties (LOP) of measuring equipment for electronic data exchange - Aspect LOPs	2018-06-05	<a href="https://webstore.iec.ch/publication/33096">https://webstore.iec.ch/publication/33096</a>
IEC 62443-2-1:2010 Industrial communication networks - Network and system security - Part 2-1: Establishing an industrial automation and control system security program	2010-11	<a href="https://webstore.iec.ch/publication/7030">https://webstore.iec.ch/publication/7030</a>
IEC 62443-2-4:2015 Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers	2015-06	<a href="https://webstore.iec.ch/publication/22810">https://webstore.iec.ch/publication/22810</a>

Title	Published	Webpage URL
IEC 62443-3-2:2020 Security for industrial automation and control systems - Part 3-2: Security risk assessment for system design	2020-06	<a href="https://webstore.iec.ch/publication/30727">https://webstore.iec.ch/publication/30727</a>
IEC 62443-3-3:2013 Industrial communication networks - Network and system security - Part 3-3: System security requirements and security levels	2013-08-07	<a href="https://webstore.iec.ch/publication/7033">https://webstore.iec.ch/publication/7033</a>
IEC 62443-4-2:2019 Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components	2019-02	<a href="https://webstore.iec.ch/publication/34421">https://webstore.iec.ch/publication/34421</a>
IEC 62443-4-2:2019 Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components	2019-02	<a href="https://webstore.iec.ch/publication/34421">https://webstore.iec.ch/publication/34421</a>
IEC 62541-10:2020 OPC Unified Architecture - Part 10: Programs	2020-07-07	<a href="https://webstore.iec.ch/publication/61119">https://webstore.iec.ch/publication/61119</a>
IEC 62541-100:2015 OPC Unified Architecture - Part 100: Device Interface	2015-03-25	<a href="https://webstore.iec.ch/publication/21987">https://webstore.iec.ch/publication/21987</a>
IEC 62541-11:2020 OPC Unified Architecture - Part 11: Historical Access	2020-06-23	<a href="https://webstore.iec.ch/publication/61129">https://webstore.iec.ch/publication/61129</a>
IEC 62541-13:2020 OPC Unified Architecture - Part 13: Aggregates	2020-06-11	<a href="https://webstore.iec.ch/publication/61131">https://webstore.iec.ch/publication/61131</a>
IEC 62541-14:2020 OPC Unified Architecture - Part 14: PubSub	2020-07-08	<a href="https://webstore.iec.ch/publication/61108">https://webstore.iec.ch/publication/61108</a>
IEC 62541-3:2020 OPC Unified Architecture - Part 3: Address Space Model	2020-07-08	<a href="https://webstore.iec.ch/publication/61112">https://webstore.iec.ch/publication/61112</a>
IEC 62541-4:2020 OPC Unified Architecture - Part 4: Services	2020-07-13	<a href="https://webstore.iec.ch/publication/61113">https://webstore.iec.ch/publication/61113</a>
IEC 62541-5:2020 OPC Unified Architecture - Part 5: Information Model	2020-07-10	<a href="https://webstore.iec.ch/publication/61114">https://webstore.iec.ch/publication/61114</a>
IEC 62541-6:2020 OPC Unified Architecture - Part 6: Mappings	2020-07-13	<a href="https://webstore.iec.ch/publication/61115">https://webstore.iec.ch/publication/61115</a>
IEC 62541-7:2020 OPC Unified Architecture - Part 7: Profiles	2020-06-22	<a href="https://webstore.iec.ch/publication/61116">https://webstore.iec.ch/publication/61116</a>
IEC 62541-8:2020 OPC Unified Architecture - Part 8: Data Access	2020-06-22	<a href="https://webstore.iec.ch/publication/61117">https://webstore.iec.ch/publication/61117</a>

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IEC 62541-9:2020 OPC Unified Architecture - Part 9: Alarms and Conditions	2020-06-18	<a href="https://webstore.iec.ch/publication/61118">https://webstore.iec.ch/publication/61118</a>
IEC 62714-1:2018 Engineering data exchange format for use in industrial automation systems engineering - Automation Markup Language - Part 1: Architecture and general requirements	2018-04-30	<a href="https://webstore.iec.ch/publication/32339">https://webstore.iec.ch/publication/32339</a>
IEC 62714-2:2015 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 2: Role class libraries	2015-03-30	<a href="https://webstore.iec.ch/publication/22030">https://webstore.iec.ch/publication/22030</a>
IEC 62714-3:2017 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 3: Geometry and kinematics	2017-01-25	<a href="https://webstore.iec.ch/publication/34158">https://webstore.iec.ch/publication/34158</a>
IEC 62714-4:2020 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 4: Logic	2020-06-16	<a href="https://webstore.iec.ch/publication/28979">https://webstore.iec.ch/publication/28979</a>
IEC 62714-5:2022 Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 5: Communication	2022-03-11	<a href="https://webstore.iec.ch/publication/65493">https://webstore.iec.ch/publication/65493</a>
IEC 62832-1:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles	2020-10	<a href="https://webstore.iec.ch/publication/65858">https://webstore.iec.ch/publication/65858</a>
IEC 62832-2:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 2: Model elements	2020-10	<a href="https://webstore.iec.ch/publication/60214">https://webstore.iec.ch/publication/60214</a>
IEC 62832-3:2020 Industrial-process measurement, control and automation - Digital factory framework - Part 3: Application of Digital Factory for life cycle management of production systems	2020-10	<a href="https://webstore.iec.ch/publication/60277">https://webstore.iec.ch/publication/60277</a>

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IEC 62872-2:2022 Industrial-process measurement, control and automation - Part 2: Internet of Things (IoT) - Application framework for industrial facility demand response energy management	2022-02	<a href="https://webstore.iec.ch/publication/63419">https://webstore.iec.ch/publication/63419</a>
IEC 63278-1 ED1 Asset Administration Shell for industrial applications - Part 1: Asset Administration Shell structure	Under development	<a href="https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103536">https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103536</a>
IEC 63278-3 ED1 Asset Administration Shell for Industrial Applications - Part 3: Security provisions for Asset Administration Shells	Under development	<a href="https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,109075">https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,109075</a>
IEC 63339 ED1 Unified reference model for smart manufacturing	Under development	<a href="https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104329">https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104329</a>
IEC 63365 ED1 Digital Nameplate - Digital Product Marking	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:40103083_2849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104515">https://www.iec.ch/ords/f?p=103:38:40103083_2849310:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1452,23,104515</a>
IEC 63376 ED1 INDUSTRIAL FACILITY ENERGY MANAGEMENT SYSTEM (FEMS) - Functions and Information Flows	Under development	<a href="https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104647">https://www.iec.ch/dyn/www/f?p=103:38:731054_763917753:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,104647</a>
IEC Edge intelligence	2017-10	<a href="https://webstore.iec.ch/publication/60568">https://webstore.iec.ch/publication/60568</a>
IEC TR 62443-2-3:2015 Security for industrial automation and control systems - Part 2-3: Patch management in the IACS environment	2015-06	<a href="https://webstore.iec.ch/publication/22811">https://webstore.iec.ch/publication/22811</a>
IEC TR 62443-3-1:2009 Industrial communication networks - Network and system security - Part 3-1: Security technologies for industrial automation and control systems	2009-07	<a href="https://webstore.iec.ch/publication/7031">https://webstore.iec.ch/publication/7031</a>
IEC TR 62541-1:2020 OPC Unified Architecture - Part 1: Overview and concepts	2020-11	<a href="https://webstore.iec.ch/publication/61109">https://webstore.iec.ch/publication/61109</a>
IEC TR 62541-2:2020 OPC Unified Architecture - Part 2: Security Model	2020-11	<a href="https://webstore.iec.ch/publication/61110">https://webstore.iec.ch/publication/61110</a>
IEC TR 63283-1:2022 Industrial-process measurement, control and automation - Smart manufacturing - Part 1: Terms and definitions	2022-03	<a href="https://webstore.iec.ch/publication/66314">https://webstore.iec.ch/publication/66314</a>

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IEC TR 63283-2 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 2: Use cases	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103914">https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103914</a>
IEC TR 63283-3 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 3: Challenges for Cybersecurity	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103915">https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,103915</a>
IEC TR 63283-4 WD Industrial-process measurement, control and automation – Smart Manufacturing – Part 4: New technologies	Under development	<a href="https://www.iec.ch/ords/f?p=103:23:523507370720228:::FSP_ORG_ID,FSP_LANG_ID:1250,25">https://www.iec.ch/ords/f?p=103:23:523507370720228:::FSP_ORG_ID,FSP_LANG_ID:1250,25</a>
IEC TR 63283-5 ED1 Industrial-process measurement, control and automation – Smart Manufacturing – Part 5: Market and innovation trends analysis	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,107051">https://www.iec.ch/ords/f?p=103:38:523507370720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:1250,23,107051</a>
IEC TS 62443-1-1:2009 Industrial communication networks - Network and system security - Part 1-1: Terminology, concepts and models	2009-07	<a href="https://webstore.iec.ch/publication/7029">https://webstore.iec.ch/publication/7029</a>
IEC TS 62872-1:2019 Industrial-process measurement, control and automation - Part 1: System interface between industrial facilities and the smart grid	2019-06	<a href="https://webstore.iec.ch/publication/62884">https://webstore.iec.ch/publication/62884</a>
IEEE - P1451-99 Standard for Harmonization of Internet of Things (IoT) Devices and Systems	2020-09	<a href="https://standards.ieee.org/ieee/1451.99/10355/">https://standards.ieee.org/ieee/1451.99/10355/</a>
IEEE 1934-2018 IEEE 1934-2018: IEEE Standard for Adoption of OpenFog Reference Architecture for Fog Computing	2018-08	<a href="https://standards.ieee.org/standard/1934-2018.html">https://standards.ieee.org/standard/1934-2018.html</a>
IEEE 2413-2019 IEEE Standard for an Architectural Framework for the Internet of Things (IoT)	2020-03	<a href="https://standards.ieee.org/standard/2413-2019.html">https://standards.ieee.org/standard/2413-2019.html</a>
IEEE 7005-2021 IEEE Standard for Transparent Employer Data Governance	2021-11	<a href="https://standards.ieee.org/standard/7005-2021.html">https://standards.ieee.org/standard/7005-2021.html</a>
IEEE 754-2008 IEEE Standard for Floating-Point Arithmetic	2008-08	<a href="https://ieeexplore.ieee.org/document/4610935">https://ieeexplore.ieee.org/document/4610935</a>
IEEE 802.1AB-2016 IEEE Standard for Local and metropolitan area networks - Station and Media Access Control Connectivity Discovery	2016-01	<a href="https://standards.ieee.org/standard/802_1AB-2016.html">https://standards.ieee.org/standard/802_1AB-2016.html</a>

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IEEE 802.1AC-2016 IEEE Standard for Local and metropolitan area networks-Media Access Control (MAC) Service Definition	2017-03	<a href="https://standards.ieee.org/standard/802_1AC-2016.html">https://standards.ieee.org/standard/802_1AC-2016.html</a>
IEEE 802.1AE-2018 IEEE Standard for Local and metropolitan area networks-Media Access Control (MAC) Security	2018-12	<a href="https://standards.ieee.org/standard/802_1AE-2018.html">https://standards.ieee.org/standard/802_1AE-2018.html</a>
IEEE 802.1AR-2018 IEEE Standard for Local and Metropolitan Area Networks - Secure Device Identity	2018-08	<a href="https://standards.ieee.org/standard/802_1AR-2018.html">https://standards.ieee.org/standard/802_1AR-2018.html</a>
IEEE 802.1AS-2020 IEEE Standard for Local and Metropolitan Area Networks--Timing and Synchronization for Time-Sensitive Applications	2020-06	<a href="https://standards.ieee.org/standard/802_1AS-2020.html">https://standards.ieee.org/standard/802_1AS-2020.html</a>
IEEE 802.1AS-2020 Standard for Local and Metropolitan Area Networks - Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks	2020-06	<a href="https://standards.ieee.org/ieee/802.1AS/7121/">https://standards.ieee.org/ieee/802.1AS/7121/</a>
IEEE 802.1AX-2020 IEEE Standard for Local and metropolitan area networks -- Link Aggregation	2020-05	<a href="https://standards.ieee.org/standard/802_1AX-2020.html">https://standards.ieee.org/standard/802_1AX-2020.html</a>
IEEE 802.1BR-2012 IEEE Standard for Local and metropolitan area networks--Virtual Bridged Local Area Networks--Bridge Port Extension	2012-07	<a href="https://standards.ieee.org/standard/802_1BR-2012.html">https://standards.ieee.org/standard/802_1BR-2012.html</a>
IEEE 802.1CB-2017 IEEE Standard for Local and metropolitan area networks--Frame Replication and Elimination for Reliability	2017-10	<a href="https://standards.ieee.org/standard/802_1CB-2017.html">https://standards.ieee.org/standard/802_1CB-2017.html</a>
IEEE 802.1CM-2018 IEEE Standard for Local and metropolitan area networks -- Time-Sensitive Networking for Fronthaul	2018-06	<a href="https://standards.ieee.org/standard/802_1CM-2018.html">https://standards.ieee.org/standard/802_1CM-2018.html</a>
IEEE 802.1Q-2014 IEEE Standard for Local and metropolitan area networks--Bridges and Bridged Networks	2014-12	<a href="https://standards.ieee.org/standard/802_1Q-2014.html">https://standards.ieee.org/standard/802_1Q-2014.html</a>



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IEEE 802.1X-2020 IEEE Standard for Local and Metropolitan Area Networks--Port-Based Network Access Control	2020-02	<a href="https://standards.ieee.org/standard/802_1X-2020.html">https://standards.ieee.org/standard/802_1X-2020.html</a>
IEEE 802-2014 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture	2014-06	<a href="https://standards.ieee.org/standard/802-2014.html">https://standards.ieee.org/standard/802-2014.html</a>
IEEE 802d-2017 IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture Amendment 1: Allocation of Uniform Resource Name (URN) Values in IEEE 802(R) Standards	2017-03	<a href="https://standards.ieee.org/standard/802d-2017.html">https://standards.ieee.org/standard/802d-2017.html</a>
IEEE/ISO/IEC IEEE/ISO/IEC 8802-1Q-2020 IEEE/ISO/IEC International Standard - Telecommunications and exchange between information technology systems-- Requirements for local and metropolitan area networks-- Part 1Q: Bridges and bridged networks	2020-08	<a href="https://standards.ieee.org/standard/8802-1Q-2020.html">https://standards.ieee.org/standard/8802-1Q-2020.html</a>
IETF draft-contreras-alto-service-edge Use of ALTO for Determining Service Edge	2022-03	<a href="https://datatracker.ietf.org/doc/draft-contreras-alto-service-edge/">https://datatracker.ietf.org/doc/draft-contreras-alto-service-edge/</a>
IETF draft-ietf-mops-ar-use-case Media Operations Use Case for an Augmented Reality Application on Edge Computing Infrastructure	2021-10	<a href="https://datatracker.ietf.org/doc/draft-ietf-mops-ar-use-case/03/">https://datatracker.ietf.org/doc/draft-ietf-mops-ar-use-case/03/</a>
IETF draft-ietf-mops-streaming-opcons-10 Operational Considerations for Streaming Media	2022-04	<a href="https://datatracker.ietf.org/doc/draft-ietf-mops-streaming-opcons/">https://datatracker.ietf.org/doc/draft-ietf-mops-streaming-opcons/</a>
IIC (Industrial Internet Consortium) Augmented Reality and the Edge	2020-09	<a href="https://www.iiconsortium.org/pdf/IIC-Edge-AR-Tech-Brief.pdf">https://www.iiconsortium.org/pdf/IIC-Edge-AR-Tech-Brief.pdf</a>
IIC (Industrial Internet Consortium) Decentralized Identity for Edge Computing	2020-09	<a href="https://www.iiconsortium.org/pdf/IIC-Edge-DID-Tech-Brief.pdf">https://www.iiconsortium.org/pdf/IIC-Edge-DID-Tech-Brief.pdf</a>
IIC (Industrial Internet Consortium) Introduction to Edge Computing in IIoT	2018-06	<a href="https://www.iiconsortium.org/pdf/Introduction_to_Edge_Computing_in_IIoT_2018-06-18.pdf">https://www.iiconsortium.org/pdf/Introduction_to_Edge_Computing_in_IIoT_2018-06-18.pdf</a>
IIC (Industrial Internet Consortium) The Edge Computing Advantage	2019-10	<a href="https://www.iiconsortium.org/pdf/IIC_Edge_Computing_Advantages_White_Paper_2019-10-24.pdf">https://www.iiconsortium.org/pdf/IIC_Edge_Computing_Advantages_White_Paper_2019-10-24.pdf</a>

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IIC (Industrial Internet Consortium) The Industrial Internet of Things Distributed Computing in the Edge	2020-10	<a href="https://www.iiconsortium.org/pdf/IIoT-Distributed-Computing-in-the-Edge.pdf">https://www.iiconsortium.org/pdf/IIoT-Distributed-Computing-in-the-Edge.pdf</a>
IRTF draft-dwon-t2trg-multiedge-arch Multi-cluster Edge System Architecture and Network Function Requirements	2021-11	<a href="https://datatracker.ietf.org/doc/draft-dwon-t2trg-multiedge-arch/">https://datatracker.ietf.org/doc/draft-dwon-t2trg-multiedge-arch/</a>
IRTF draft-irtf-coinrg-use-cases Use Cases for In-Network Computing	2022-03	<a href="https://datatracker.ietf.org/doc/draft-irtf-coinrg-use-cases/">https://datatracker.ietf.org/doc/draft-irtf-coinrg-use-cases/</a>
IRTF draft-irtf-t2trg-iiot-edge IoT Edge Challenges and Functions	2022-01	<a href="https://datatracker.ietf.org/doc/draft-irtf-t2trg-iiot-edge/">https://datatracker.ietf.org/doc/draft-irtf-t2trg-iiot-edge/</a>
IRTF draft-mcbride-edge-data-discovery-overview Edge Data Discovery for COIN	2020-01	<a href="https://www.ietf.org/archive/id/draft-mcbride-edge-data-discovery-overview-05.txt">https://www.ietf.org/archive/id/draft-mcbride-edge-data-discovery-overview-05.txt</a>
ISO ISO/PAS 19450:2015 Automation systems and integration - Object-Process Methodology	2015-12	<a href="https://www.iso.org/standard/84612.html?browse=tc">https://www.iso.org/standard/84612.html?browse=tc</a>
ISO/IEC 20005:2013 Information technology - Sensor networks - Services and interfaces supporting collaborative information processing in intelligent sensor networks	2013-07	<a href="https://www.iso.org/standard/50952.html?browse=tc">https://www.iso.org/standard/50952.html?browse=tc</a>
ISO/IEC 21823-1:2019 Interoperability for internet of things systems -- Part 1: Framework	2019-02	<a href="https://webstore.iec.ch/publication/60604">https://webstore.iec.ch/publication/60604</a>
ISO/IEC 21823-3:2021 Internet of Things (IoT) - Interoperability for IoT systems - Part 3: Semantic interoperability	2021-09	<a href="https://webstore.iec.ch/publication/61088">https://webstore.iec.ch/publication/61088</a>
ISO/IEC 27032:2012 Information technology – Security techniques – Guidelines for cybersecurity	2012-07	<a href="https://www.iso.org/standard/44375.html">https://www.iso.org/standard/44375.html</a>
ISO/IEC 30141:2018 Internet of things and related technologies	2020-08	<a href="https://webstore.iec.ch/publication/60606">https://webstore.iec.ch/publication/60606</a>
ISO/IEC 30141:2018 Internet of Things (IoT) - Reference Architecture	2018-08	<a href="https://webstore.iec.ch/publication/60606">https://webstore.iec.ch/publication/60606</a>
ISO/IEC 30147:2021 Information technology – Internet of things – Methodology for trustworthiness of IoT system/ service	2021-05	<a href="https://www.iso.org/standard/53267.html">https://www.iso.org/standard/53267.html</a>

Title	Published	Webpage URL
ISO/IEC 30163:2021 System requirements of IoT/SN technology-based integrated platform for chattel asset monitoring supporting financial services	2021-03	<a href="https://www.iso.org/standard/53283.html">https://www.iso.org/standard/53283.html</a>
ISO/IEC 30173 ED1 Digital Twin - Concepts and terminology	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104883">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104883</a>
ISO/IEC 38505-1:2017 Information technology – Governance of IT – Governance of data – Part 1: Application of ISO/IEC 38500 to the governance of data	2017-04	<a href="https://www.iso.org/standard/56639.html">https://www.iso.org/standard/56639.html</a>
ISO/IEC AWI 5392 Information technology – Artificial intelligence – Reference architecture of knowledge engineering	Under development	<a href="https://www.iso.org/standard/81228.html">https://www.iso.org/standard/81228.html</a>
ISO/IEC CD 30149 (2022) IoT Trustworthiness principles	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104432">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104432</a>
ISO/IEC ISO 20140-5:2017 Automation systems and integration - Evaluating energy efficiency and other factors of manufacturing systems that influence the environment - Part 5: Environmental performance evaluation data	2017-04	<a href="https://webstore.iec.ch/publication/34147">https://webstore.iec.ch/publication/34147</a>
ISO/IEC JTC1-SC41-257 ED1 Internet of Things (IoT) - Device model for IoT device interoperability	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108033">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108033</a>
ISO/IEC JTC1-SC41-262 ED1 Internet of Things (IoT) - Functional architecture for resource ID interoperability	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108552">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108552</a>
ISO/IEC PWI JTC1-SC41-5 Digital Twin - Reference Architecture	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104896">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104896</a>
ISO/IEC PWI JTC1-SC41-6 Guidance for IoT and Digital Twin use cases	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104897">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,20,104897</a>
ISO/IEC PWI JTC1-SC41-7 Digital Twin - Maturity model	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108352">https://www.iec.ch/ords/f?p=103:38:523507370720228::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108352</a>
ISO/IEC PWI JTC1-SC41-8 Internet of Things (IoT) - Behavioral and policy interoperability	Under development	<a href="https://www.iec.ch/dyn/www/?p=103:38:17567799116988::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108353">https://www.iec.ch/dyn/www/?p=103:38:17567799116988::::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,108353</a>

Title	Published	Webpage URL
ISO/IEC TR 22417:2017 Information technology - Internet of things (IoT) - IoT use cases	2017-11	<a href="https://www.iso.org/standard/73148.html?browse=tc">https://www.iso.org/standard/73148.html?browse=tc</a>
ISO/IEC TR 27550:2019 Information technology – Security techniques – Privacy engineering for system life cycle processes	2019-09	<a href="https://www.iso.org/standard/72024.html">https://www.iso.org/standard/72024.html</a>
ISO/IEC TR 30148:2019 Internet of things (IoT) - Application of sensor network for wireless gas meters	2019-10	<a href="https://webstore.iec.ch/publication/63562">https://webstore.iec.ch/publication/63562</a>
ISO/IEC TR 30164:2020 Internet of Things (IoT) - Edge computing	2020-04	<a href="https://webstore.iec.ch/publication/62522">https://webstore.iec.ch/publication/62522</a>
ISO/IEC TR 30164:2020 - Internet of things (IoT) - Edge computing	2020-04	<a href="https://webstore.iec.ch/publication/62522">https://webstore.iec.ch/publication/62522</a>
ISO/IEC TR 30164:2020 Internet of Things (IoT) - Edge computing	2020-04	<a href="https://webstore.iec.ch/publication/62522">https://webstore.iec.ch/publication/62522</a>
ISO/IEC TR 30172 ED1 Digital Twin - Use cases	Under development	<a href="https://www.iec.ch/ords/f?p=103:38:523507370_720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104881">https://www.iec.ch/ords/f?p=103:38:523507370_720228:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,104881</a>
ISO/IEC TS 27110:2021 Information technology, cybersecurity and privacy protection – Cybersecurity framework development guidelines	2021-02	<a href="https://www.iso.org/standard/72435.html">https://www.iso.org/standard/72435.html</a>
ISO/IEC TS 27570:2021 Privacy protection – Privacy guidelines for smart cities	2021-01	<a href="https://www.iso.org/standard/71678.html">https://www.iso.org/standard/71678.html</a>
ISO/IEC/IEEE IEEE/ISO/IEC 8802-1AE-2020 ISO/IEC/ IEEE International Standard - Information technology - Telecommunications and exchange between information technology systems -- Requirements for local and metropolitan area networks-- Part 1AE: Media access control (MAC) security -TECHNICAL CORRIGENDUM 1: Tag control information figure	2021-07	<a href="https://standards.ieee.org/standard/8802-1AE-2020.html">https://standards.ieee.org/standard/8802-1AE-2020.html</a>

Title	Published	Webpage URL
ISO/IEC/IEEE IEEE/ISO/IEC 8802-1BA-2016 ISO/IEC/IEEE International Standard - Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 1BA: Audio video bridging (AVB) systems	2016-10	<a href="https://standards.ieee.org/standard/8802-1BA-2016.html">https://standards.ieee.org/standard/8802-1BA-2016.html</a>
ISO/IEC/IEEE IEEE/ISO/IEC 8802-1BR-2016 ISO/IEC/IEEE International Standard for Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 1BR: Virtual bridged local area networks - Bridge port extension	2016-10	<a href="https://standards.ieee.org/standard/8802-1BR-2016.html">https://standards.ieee.org/standard/8802-1BR-2016.html</a>
ISO/IEC/IEEE ISO/IEC/IEEE DIS 24641 Systems and Software engineering – Methods and tools for model-based systems and software engineering	Under development	<a href="https://www.iso.org/standard/79111.html">https://www.iso.org/standard/79111.html</a>
ITU-H.644.4 (06/21) Architecture for mobile/multi-access edge computing enabled content delivery networks	2021-06	<a href="https://www.itu.int/rec/T-REC-H.644.4-202106-l/en">https://www.itu.int/rec/T-REC-H.644.4-202106-l/en</a>
ITU-T - SG11 - Q.5001 Signalling requirements and architecture of intelligent edge computing	2018-10	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?rec=13701&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?rec=13701&amp;lang=en</a>
ITU-T - SG11 - Q.5003 Signalling requirements and architecture for federated multiaccess edge computing	2022-02	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14925&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14925&amp;lang=en</a>
ITU-T - SG11 - Q.IEC-PRO Protocols for microservices based intelligent edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17839">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17839</a>
ITU-T - SG13 - Y. FMSC-MEC Multi-access Edge Computing for fixed, mobile and satellite convergence in IMT-2020 networks and beyond	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18100">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18100</a>
ITU-T - SG13 - Y.3076 Architecture of ICN-enabled Edge Network in IMT-2020	2020-09	<a href="https://www.itu.int/rec/T-REC-Y.3076-202009-l">https://www.itu.int/rec/T-REC-Y.3076-202009-l</a>

Title	Published	Webpage URL
ITU-T - SG13 - Y.3526 Cloud computing - Functional requirements of edge cloud management	2021-11	<a href="https://www.itu.int/rec/T-REC-Y.3526-202111-I">https://www.itu.int/rec/T-REC-Y.3526-202111-I</a>
ITU-T - SG13 - Y.ecloud-reqts Cloud computing - Functional requirements of edge cloud	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18104">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18104</a>
ITU-T - SG13 - Y.ec-reqts Overview and requirements of edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18101">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18101</a>
ITU-T - SG13 - Y.FMC-AAEC-req Use cases and Technical requirements for supporting application addressing in edge computing for future networks including IMT-2020 network	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18079">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18079</a>
ITU-T - SG13 - Y.FMC-AAEC Application addressing in edge computing in IMT-2020 network and beyond	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18131">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18131</a>
ITU-T - SG13 - Y.FMC-EC Unified edge computing for supporting fixed mobile convergence in IMT-2020 networks	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18048">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18048</a>
ITU-T - SG13 - Y.IMT2020-CEFEC Framework of capability exposure function in edge computing for IMT-2020 networks and beyond	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18094">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18094</a>
ITU-T - SG13 - Y.LSMEC Local shunting for multi-access edge computing in IMT- 2020 networks	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18058">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18058</a>
ITU-T - SG16 - F.743.13 Requirements for cooperation of multiple edge gateways	2022-03	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14954&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14954&amp;lang=en</a>
ITU-T - SG16 - F.CEC Requirements and reference framework of cloud-edge collaboration in industrial machine vision systems	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17635">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17635</a>
ITU-T - SG16 - F.DC-CGS-TREC Technical requirements of cloud gaming system for 5G mobile edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17582">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17582</a>
ITU-T - SG16 - F.DVMSF Edge - Distributed vehicular multimedia services framework for V2X based edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17612">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17612</a>

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ITU-T - SG16 - H.VSECArch Architecture for edge computing platform supporting a video surveillance system	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17519">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17519</a>
ITU-T - SG17 - X.5Gsec-ecs Security framework for 5G edge computing services	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17977">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17977</a>
ITU-T - SG17 - X.5Gsec-netec Security capabilities of network layer for 5G edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17985">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17985</a>
ITU-T - SG17 - X.gecds Guideline on edge computing data security	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18025">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18025</a>
ITU-T - SG17 - X.itssec-5 Security guidelines for vehicular edge computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17967">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17967</a>
ITU-T - SG17 - X.sa-ec Security architecture of edge cloud	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18024">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18024</a>
ITU-T - SG20 Framework of decentralized service by using DLT and edge computing technologies for IoT devices	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17928">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17928</a>
ITU-T - SG5 - L.EEMDC Energy Efficiency in Micro Data Centre for Edge Computing	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17702">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17702</a>
ITU-T - SG5 - L.Spec_Edge DC Specification of Edge Data Centre infrastructure	Under development	<a href="https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17700">https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17700</a>
ITU-T F.743.10 (11/2019) Requirements for mobile edge computing enabled content delivery networks	2019-11	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14103&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14103&amp;lang=en</a>
ITU-T F.743.12 (06/2021) Requirements for edge computing in video surveillance	2021-06	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14680&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14680&amp;lang=en</a>
ITU-T F.749.11 (11/2019) Requirements of civilian unmanned aerial vehicles enabled mobile edge computing	2019-11	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14104&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14104&amp;lang=en</a>
ITU-T Study Group 20 ITU-T - SG20 - Internet of things (IoT) and smart cities and communities (SC&C)	N/A	<a href="https://www.itu.int/en/ITU-T/about/groups/Pages/sg20.aspx">https://www.itu.int/en/ITU-T/about/groups/Pages/sg20.aspx</a>
ITU-T Y.3109 (04/2021) Quality of service assurance-related requirements and framework for virtual reality delivery using mobile edge computing supported by IMT-2020	2021-04	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14396&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14396&amp;lang=en</a>



Title	Published	Webpage URL
ITU-T Y.4122 (07/2021) Requirements and capability framework of the edge-computing-enabled gateway in the Internet of things	2021-07	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?id=14735&amp;lang=en">https://www.itu.int/itu-t/recommendations/rec.aspx?id=14735&amp;lang=en</a>
ITU-T Y.4208 Internet of things requirements for support of edge computing	2020-01	<a href="https://www.itu.int/itu-t/recommendations/rec.aspx?rec=14162">https://www.itu.int/itu-t/recommendations/rec.aspx?rec=14162</a>
ITU-T Y.AI-DECCS Functional architecture of AI enabled device-edge-cloud collaborative services for IoT and smart city	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16856">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16856</a>
ITU-T Y.CDML-arc Reference architecture of collaborative decentralized machine learning for intelligent IoT services	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16865">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16865</a>
ITU-T Y.dec-IoT-arch Decentralized IoT communication architecture based on information centric networking and blockchain	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14650">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=14650</a>
ITU-T Y.IoT-DES-fr Framework of decentralized service by using DLT and edge computing technologies for IoT devices	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16855">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16855</a>
ITU-T Y.IoT-DSE-arc Reference architecture of service exposure for decentralized services for IoT applications	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16862">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16862</a>
ITU-T Y.RA-FML Requirements and reference architecture of IoT and smart city and community service based on federated machine learning	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16676">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16676</a>
ITU-T Y.scdt-reqts Requirements and capabilities of a digital twin system for smart cities	Under development	<a href="https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16396">https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=16396</a>
“State of the Edge 2022” - Linux Foundation Edge	2022	<a href="https://www.lfedge.org/wp-content/uploads/2022/07/State_of_the_Edge_2022_062822.pdf">https://www.lfedge.org/wp-content/uploads/2022/07/State_of_the_Edge_2022_062822.pdf</a>
NGI-0 Discovery NEUROPIIL	Under development	<a href="https://gitlab.com/pi-lar/neuropil">https://gitlab.com/pi-lar/neuropil</a>
NGI-Fed4Fire COMPUTATION OFFLOADING FOR IOT ENABLED APPLICATIONS	Under development	<a href="https://www.fed4fire.eu/demo-stories/oc2/comfort-app/">https://www.fed4fire.eu/demo-stories/oc2/comfort-app/</a>
NGI-Ontochain ADOS (AirTrace Decentralized Oracle System)	Under development	<a href="https://ontochain.ngi.eu/content/ados">https://ontochain.ngi.eu/content/ados</a>
NGI-Trust B-Smart	Under development	<a href="https://things.is/">https://things.is/</a>
NGI-Trust D-SBOM (Distributed Software Bill of Materials)	Under development	<a href="https://www.trublo.eu/d-sbom/">https://www.trublo.eu/d-sbom/</a>

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NGI-Trust EDGE-TINC	Under development	<a href="https://edge-tinc.gitlab.io/fluentic/">https://edge-tinc.gitlab.io/fluentic/</a>
NGI-Trust IZI	Under development	<a href="https://github.com/mizolotu/izi">https://github.com/mizolotu/izi</a>
NGI-Trust PY	Under development	<a href="https://www.panga.fr/">https://www.panga.fr/</a>
NGI-Trust PY 2.0	Under development	<a href="https://www.pyguard.fr/">https://www.pyguard.fr/</a>
NGI-Trust Totem	Under development	<a href="https://insigh.io/">https://insigh.io/</a>
OASIS OASIS Advanced Message Queuing Protocol (AMQP) TC	N/A	<a href="https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=amqp">https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=amqp</a>
OASIS OASIS Message Queuing Telemetry Transport (MQTT) TC	N/A	<a href="https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=mqtt">https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=mqtt</a>
OMA IPSO IPSO Smart Object Guidelines	2018-03	<a href="https://omaspecworks.org/develop-with-oma-specworks/ipsa-smart-objects/guidelines/">https://omaspecworks.org/develop-with-oma-specworks/ipsa-smart-objects/guidelines/</a>
OMA IPSO Repo Public IPSO Repository	2018-03	<a href="https://technical.openmobilealliance.org/OMNA/LwM2M/LwM2MRegistry.html">https://technical.openmobilealliance.org/OMNA/LwM2M/LwM2MRegistry.html</a>
OMA-AD-GwMO-V1_1-20170725-A Gateway Management Object Architecture	2017-07	<a href="https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-AD-GwMO-V1_1-20170725-A.pdf">https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-AD-GwMO-V1_1-20170725-A.pdf</a>
OMA-ERELD-GwMO-V1_1-20170725-A Enabler Release Definition for Gateway Management Object (GwMO)	2017-07	<a href="https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-ERELD-GwMO-V1_1-20170725-A.pdf">https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-ERELD-GwMO-V1_1-20170725-A.pdf</a>
OMA-RD-GwMO-V1_1-20170725-A GwMO Requirements	2017-07	<a href="https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-RD-GwMO-V1_1-20170725-A.pdf">https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-RD-GwMO-V1_1-20170725-A.pdf</a>
OMA-TS-DM-GwMO_ZigBeeMO-V1_0-20170725-A Management Objects for ZigBee Devices	2017-07	<a href="https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO_ZigBeeMO-V1_0-20170725-A.pdf">https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO_ZigBeeMO-V1_0-20170725-A.pdf</a>
OMA-TS-GwMO-V1_1-20170725-A Gateway Management Object Technical Specification	2017-07	<a href="https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO-V1_1-20170725-A.pdf">https://www.openmobilealliance.org/release/GwMO/V1_1-20170725-A/OMA-TS-GwMO-V1_1-20170725-A.pdf</a>
OneM2M oneM2M-TR-0052-V-0.13.1 Study on Edge and Fog Computing in oneM2M systems	2020-09	<a href="https://member.onem2m.org/Application/documentapp/downloadLatestRevision/default.aspx?docID=32633">https://member.onem2m.org/Application/documentapp/downloadLatestRevision/default.aspx?docID=32633</a>
oneM2M TR-0017-V2.0.0 Home Domain Abstract Information Model	2016-8	<a href="https://onem2m.org/images/files/deliverables/Release2/TR-0017-Home_Domain_Abstract_Information_Model-V2_0_0.pdf">https://onem2m.org/images/files/deliverables/Release2/TR-0017-Home_Domain_Abstract_Information_Model-V2_0_0.pdf</a>
RIOT RIOT OS RIOT OS, the friendly Operating System for the Internet of Things	2014/05	<a href="https://www.riot-os.org/">https://www.riot-os.org/</a>

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W3C TR/2020/REC-wot-architecture-20200409 Web of Things (WoT) Architecture	2020-04	<a href="https://www.w3.org/TR/2020/REC-wot-architecture-20200409/">https://www.w3.org/TR/2020/REC-wot-architecture-20200409/</a>
W3C TR/2020/REC-wot-thing-description-20200409 Web of Things (WoT) Thing Description	2020-04	<a href="https://www.w3.org/TR/2020/REC-wot-thing-description-20200409/">https://www.w3.org/TR/2020/REC-wot-thing-description-20200409/</a>
W3C TR/2021/WD-wot-discovery-20210602 Web of Things (WoT) Discovery	2021-06	<a href="https://www.w3.org/TR/wot-discovery/">https://www.w3.org/TR/wot-discovery/</a>







StandICT.eu has received funding from the European Union's Horizon 2020 (H2020) research and innovation programme under the Grant Agreement no. GA 951972.