

This is a preview of "ISO/IEC 21823-1:2019". [Click here to purchase the full version from the ANSI store.](#)



Edition 1.0 2019-02

# INTERNATIONAL STANDARD



---

## Internet of things (IoT) – Interoperability for iot systems – Part 1: Framework





**Copyright © 2019 ISO/IEC, Geneva, Switzerland**

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

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

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

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

**About IEC publications**

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

**IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)**

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 It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

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

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

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

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)**

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

This is a preview of "ISO/IEC 21823-1:2019". [Click here to purchase the full version from the ANSI store.](#)



Edition 1.0 2019-02

# INTERNATIONAL STANDARD



---

## Internet of things (IoT) – Interoperability for iot systems – Part 1: Framework

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 33.020

ISBN 978-2-8322-6567-3

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

## CONTENTS

|   |    |
|---|----|
| FOREWORD.....   | 4  |
| INTRODUCTION.....   | 5  |
| 1 Scope.....  | 6  |
| 2 Normative references .....  | 6  |
| 3 Terms and definitions .....   | 6  |
| 4 Abbreviated terms .....   | 8  |
| 5 Overview of Internet of Things interoperability .....                             | 8  |
| 5.1 Descriptions.....   | 8  |
| 5.2 Considerations for Internet of Things interoperability .....                    | 8  |
| 5.3 Internet of Things interoperability facet model.....                            | 9  |
| 5.3.1 General .....   | 9  |
| 5.3.2 Transport interoperability .....  | 10 |
| 5.3.3 Syntactic interoperability.....   | 10 |
| 5.3.4 Semantic interoperability .....   | 11 |
| 5.3.5 Behavioural interoperability .....  | 11 |
| 5.3.6 Policy interoperability .....   | 11 |
| 5.3.7 Summary of Internet of Things interoperability facet model.....               | 11 |
| 5.4 Issues affecting Internet of Things interoperability .....                      | 12 |
| 6 Consideration of the interoperability requirement for IoT characteristics .....   | 13 |
| 6.1 General descriptions .....  | 13 |
| 6.2 IoT system characteristics.....   | 13 |
| 6.2.1 Network communication.....  | 13 |
| 6.2.2 Self-description .....  | 13 |
| 6.2.3 Other IoT system characteristics not considered in interoperability .....     | 13 |
| 6.3 IoT component characteristics .....   | 14 |
| 6.3.1 Discoverability.....  | 14 |
| 6.3.2 Network connectivity.....   | 14 |
| 6.3.3 Unique identification .....   | 14 |
| 6.3.4 Other IoT component characteristics not considered in interoperability .....  | 14 |
| 6.4 Legacy support .....  | 14 |
| 6.5 Security .....  | 14 |
| 6.5.1 Confidentiality.....  | 14 |
| 6.5.2 Integrity .....   | 14 |
| 6.5.3 Protection of personally identifiable information .....                       | 14 |
| 6.6 Heterogeneity .....   | 14 |
| 6.7 Compliance.....   | 14 |
| 6.8 Other IoT characteristics not considered in interoperability .....              | 15 |
| 7 Framework for interoperable IoT systems based on IoT reference architecture ..... | 15 |
| 7.1 Context for interoperability within and between IoT systems .....               | 15 |
| 7.2 General description.....  | 16 |
| 7.3 Interoperability of IoT entities.....   | 17 |
| Annex A (informative) Overall IoT infrastructure at high-level.....                 | 18 |
| Bibliography.....   | 20 |

This is a preview of "ISO/IEC 21823-1:2019". [Click here to purchase the full version from the ANSI store.](#)

|  |    |
|--|----|
| Figure 1 – Facets of IoT interoperability .....                        | 10 |
| Figure 2 – Entities and interactions in IoT systems .....              | 15 |
| Figure 3 – Concepts for interoperability of IoT entities .....         | 16 |
| Figure A.1 – Integration of an IoT system with others.....             | 18 |
| Figure A.2 – An overall IoT infrastructure.....                        | 19 |
| <br>   |    |
| Table 1 – Summary of different facets of IoT interoperability [1]..... | 12 |

# INTERNET OF THINGS (IoT) – INTEROPERABILITY FOR IoT SYSTEMS –

## Part 1: Framework

### FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.
- 2) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees and ISO member bodies.
- 3) IEC, ISO and ISO/IEC publications have the form of recommendations for international use and are accepted by IEC National Committees and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO, IEC or ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.
- 5) ISO and IEC do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. ISO or IEC are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC National Committees or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC publication or any other IEC, ISO or ISO/IEC publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this ISO/IEC publication may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 21823-1 was prepared by subcommittee 41: Internet of Things and related technologies, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 21823 series, under the general title *Information technology – Internet of Things (IoT) – Interoperability for IoT systems*, can be found on the IEC and ISO websites.

The text of this standard is based on the following documents:

|                   |                  |
|-------------------|------------------|
| FDIS              | Report on voting |
| JTC1-SC41/75/FDIS | JTC1-SC41/87/RVD |

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

**IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.**

This is a preview of "ISO/IEC 21823-1:2019". [Click here to purchase the full version from the ANSI store.](#)

## INTRODUCTION

Internet of Things (IoT) systems involve communications between different entities. This applies to connections between different IoT systems. It also applies to the many connections that exist within IoT systems. The various entities and their connections are described in ISO/IEC 30141.

The ISO/IEC 21823 series addresses issues that relate to interoperability of the communications between IoT systems entities. ISO/IEC 21823-1 describes a general framework for interoperability of IoT systems. This includes a facet model for interoperability which includes five facets of interoperability (i.e. transport, syntactic, semantic, behavioural and policy). This document addresses the framework to achieve interoperability for IoT; the specific facets are addressed in other parts of ISO/IEC 21823.