ISO/IEC 21823-3

Edition 1.0 2021-09

INTERNATIONAL STANDARD

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Internet of Things (IoT) – Interoperability for IoT systems – Part 3: Semantic interoperability

ISO/IEC 21823-3:2021-09(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 35.020; 35.110

ISBN 978-2-8322-1019-4

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

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FOREWORD

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

Draft	Report on voting
JTC1-SC41/233/FDIS	JTC1-SC41/244/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at: www.iec.ch/members_experts/refdocs and www.iso.org/directives.

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INTRODUCTION

The use of the Internet of Things (IoT) is increasing every year, in application areas such as manufacturing, healthcare, and new cross-domain applications related to smart cities (e.g. water, energy, transport, or health). Most IoT systems want to share information, which can be done by interoperability. Mechanisms are therefore needed on how to exchange information and use associated data and data description.

IoT interoperability is described as a successful interaction among entities specified in ISO/IEC 30141 [1][1], for instance between IoT services provided by different IoT service providers. It can be achieved using the interoperability facet model defined in ISO/IEC 21823-1, which defines five facets: transport, syntactic, semantic, behavioural and policy interoperability.

IoT semantic interoperability is the facet which enables the exchange of data between IoT systems using understood data information models (or semantic meanings). According to a recently published white paper [2]:

> "Semantic interoperability is achieved when interacting systems attribute the same meaning to an exchanged piece of data, ensuring consistency of the data across systems regardless of individual data format. This consistency of meaning can be derived from pre-existing standards or agreements on the format and meaning of data or it can be derived in a dynamic way using shared vocabularies either in a schema form and/or in an ontology-driven approach."

As shown in Figure 1,

- semantic interoperability means that information in different data information models can be translated into understandable meaning and exchanged between applications;
- semantic interoperability provides the capability for applications to understand exchanged information;
- semantic interoperability for IoT is achieved by invoking services, and by using specific knowledge and concepts of IoT.

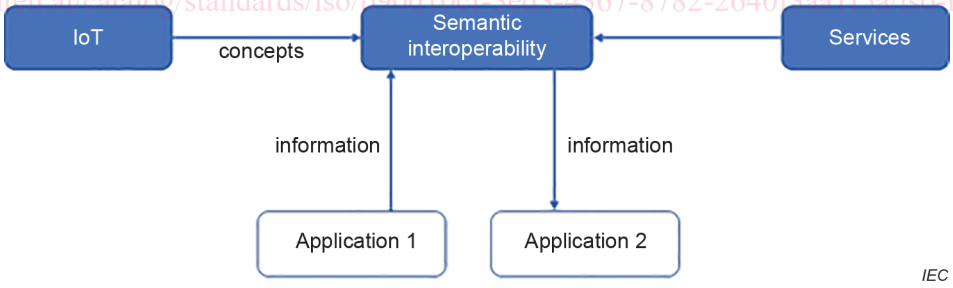

Figure 1 – Semantic interoperability facet for IoT

Semantic interoperability is achieved through the use of metadata, or descriptions of data. The approach of providing data and descriptions has been widely used in IT systems. Two examples are:

a) conceptual schemas have been used to describe database content;

b) record layouts have been used to display the content of a database record.

As shown in Figure 2, many services invoked by semantic interoperability involve metadata, thus enabling their discovery, understanding and (re)usability.

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1 Numbers in square brackets refer to the Bibliography.