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Part 3:
Media data formats and APIs

Technologies de l'information — Internet des objets media —

Partie 3: API et formats des données

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Information technology — Internet of media things — Part 3: Media data formats and APIs

Technologies de l'information — Internet des objets media —Partie 3: API et formats des données

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Foreword

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see http://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 23093-3:2019), which has been technically revised. The main changes compared to the previous edition are as follows:

— Modification of introduction;

— Modify “analyzer” to “analyser”, “analyze” to “analyse”, and “recognizer” to “recogniser”;

— Addition of APIs for new MSensors, MActuators, and MAnalysers;

— Addition of data types for new MSensors, MActuators, and MAnalysers;

— Addition of binary representation and its semantics;

A list of all parts in the ISO/IEC 23093 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The ISO/IEC 23093 series provides an architecture and specifies APIs and compressed representation of data flowing between media things.

The APIs for the media things facilitate discovering other media things in the network, connecting and efficiently exchanging data between media things. The APIs also provide means for supporting transaction tokens in order to access valuable functionalities, resources, and data from media things.

Media things related information consists of characteristics and discovery data, setup information from a system designer, raw and processed sensed data, and actuation information. The ISO/IEC 23093 series specifies data formats of input and output for media sensors, media actuators, media storages, media analysers, etc. Sensed data from media sensors can be processed by media analysers to produce analysed data, and the media analysers can be cascaded in order to extract semantic information.

This document contains the tools to describe data exchanged between media things (e.g. media sensors, media actuators, media analysers, media storages) and their APIs. It addresses the normative aspects of the data and APIs for media things and also illustrates non-normative examples.

The International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

ISO and the IEC take no position concerning the evidence, validity, and scope of these patent rights.

The holders of these patent rights have assured the ISO and IEC that they are willing to negotiate licenses under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statements of the holders of these patents right are registered with ISO and IEC. Information may be obtained from the patent database available at www.iso.org/patents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified in the patent database. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Information technology — Internet of media things —

Part 3:
Media data formats and API

1 Scope

This document specifies syntax and semantics of description schemes to represent data exchanged by media things (e.g. media sensors, media actuators, media analysers, media storages). Moreover, it specifies the APIs to exchange these data between media things.

This document does not specify how the process of sensing and analysing is carried out but specifies the interfaces between the media things.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 15938-5:2003, *Information technology — Multimedia content description interface — Part 5: Multimedia description schemes*

ISO/IEC 23005-2, *Information technology — Media context and control — Part 2: Control information*

ISO/IEC 23005-5, *Information technology — Media context and control — Part 5: Data formats for interaction devices*

ISO/IEC 23093-1, *Information technology — Internet of media things — Part 1: Architecture*

ISO/IEC 23093-2, *Information technology — Internet of media things — Part 2: Discovery and communication API*

3 Terms, definitions, and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 23093-1 and 23093-2 and the following apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1.1
media actuator
MActuator
MThing that can actuate

3.1.2
media aggregator
MAggregator
MThing that contains multiple MThings

3.1.3
media analyser
MAnalyser
MThing that can analyse media or metadata, and produce interpreted media, metadata, or commands

3.1.4
media manager
MManager
MThing that can register a list of MThings or be facilitated to search other MThings

3.1.5
media sensor
MSensor
MThing that can sense and produce media data

3.1.6
media storage
MStorage
MThing that can save media or metadata

3.2 Abbreviated terms

API application programming interface

MACV media actuator command vocabulary

MAOV media analyser output vocabulary

MSOV media sensor output vocabulary

MTDL media thing description language

SCDV sensor capability description vocabulary

XML extensible mark-up language

XSI XML streaming instructions

3.3 Schema documents

In the main text of this document, the syntax and semantics of data interfacing MThings are provided whenever possible as a single schema document.

In some cases though, and in particular for Clauses 6, 7 and 8, the syntax of data interfacing MThings is provided as a collection of schema snippets imbricated with other text. To form a valid schema document, these schema components are intended to be gathered in the same document with the schema wrapper provided at the head of the clause. For better readability, the relevant schema documents are provided in Annex B.

In all cases, each schema document has a `version` attribute, the value of which is “ISO/IEC 23093-3”. Furthermore, an informative identifier is given as the value of the `id` attribute of the `schema` component. This identifier is non-normative and used as a convention in this document to reference another schema

document. In particular, it is used for the `schemaLocation` attribute of the `include` and `import` schema components.

3.4 Use of prefixes

For clarity, throughout this document, consistent namespace prefixes are used.

"`xsi:`" prefix is not normative. It is a naming convention in this document to refer to an element of the `http://www.w3.org/2001/XMLSchema-instance` namespace.

"`xml:`" and "`xmlns:`" are normative prefixes defined in Reference [1]. The prefix "`xml:`" is by definition bound to "`http://www.w3.org/XML/1998/namespace`". The prefix "`xmlns:`" is used only for namespace bindings and is not itself bound to any namespace name.

All other prefixes used in either the text or examples of this document are not normative, e.g. "`mtdl:`", "`msov:`", "`macv:`", "`maov:`", "`mpeg7:`", "`scdv:`".

In particular, most of the informative examples in this document are provided as XML fragments without the normally required XML document declaration and, thus, miss a correct namespace binding context declaration. In these descriptions fragments, the different prefixes are bound to the `namespaces` as given in Table 1.

Table 1 — Mapping of prefixes to namespaces in examples and text

Prefix	Corresponding namespace
scdv	urn:mpeg:mpeg-v:2017:01-SCDV-NS
mpeg7	urn:mpeg:mpeg7:schema:2004
mtdl	urn:mpeg:mpeg-IoMT:2021:01-MTDL-NS
msov	urn:mpeg:mpeg-IoMT:2021:01-MSOV-NS
macv	urn:mpeg:mpeg-IoMT:2021:01-MACV-NS
maov	urn:mpeg:mpeg-IoMT:2021:01-MAOV-NS
xsi	http://www.w3.org/2001/XMLSchema-instance
xsd	http://www.w3.org/2001/XMLSchema

Unlike the informative descriptions examples, the normative specification of the syntax of tools in XML schema follows the namespace binding context defined in the relevant schema declaration such as the one defined in 6.2.

4 APIs

4.1 General

This subclause specifies APIs and their descriptions to operate MThings and/or exchange structured data between MThings. Figure 1 shows an example of "GET" and "SET" functions invoked between MThings. For example, an MSensor should have "GET" functions to evoke and provide its sensed data. An MStorage should have "SET" functions to save sensed data obtained by an MSensor or to save analysed data provided by a MAnalyser. A MAnalyser should provide "GET" functions to produce metadata by analysing sensed data from MSensors or to generate metadata by analysing data fed by other MAnalysers. Finally, a MActuator should provide "SET" functions to control its functionalities. If there is no structured data exchanged between MThings, each MThing can have simple "SET" functions to be controlled by other MThings.

Figure 2 demonstrates an example of a function call sequence diagram between MThings. A face region detector (AS1) requests an image to a camera (S1) by invoking the function `getImageURL()`. The camera (S1) sends back the corresponding URL to the face region detector (AS1). In this case, the return type of the URL is a simple string. If, however, an MSensor returns data with standard structures, the data can be delivered by the return type class either "MPEGVSensedDataType" or "SensedDataType", which can be described by XMLor Binary representation.

A face verifier (AS2) requests detected face regions extracted from the image (i.e. sensed data from S1) to the face region detector (AS1) by invoking the function `getFaceRegions()`. The face region detector (AS1) sends back the recognised face regions with the standard structure to the face verifier (AS2). The data provided by a MAnalyser can be delivered by either a simple string like a URL or the return type class called "AnalysedDataType", which can be described by XML or Binary representation.

The face region detector (AS1) requests face verification results to the face verifier (AS2) by invoking the function `getFaceVerification()` with reference face information. The face region verifier (AS2) sends back the face verification results with the standard structure (e.g., XML or Binary) to the face region detector (AS1).

Finally, the face region detector (AS1) invokes the function `setLight()` to actuate (e.g., generate the coloured light) the lighting device (AC1). Again, the actuation data feeding to a MActuator can be delivered by either a simple string like a URL or the return type class of "MPEGVCommandType" or "ActuationDataType", which can be described by XML or Binary representation.

The function calls trigger MThings either to generate and exchange data or to control MThings.

The function definitions (APIs) are defined for MSensor, MActuator, MAnalyser, MStorage, MManager, MAggregator, and their return type classes in the following subclauses.

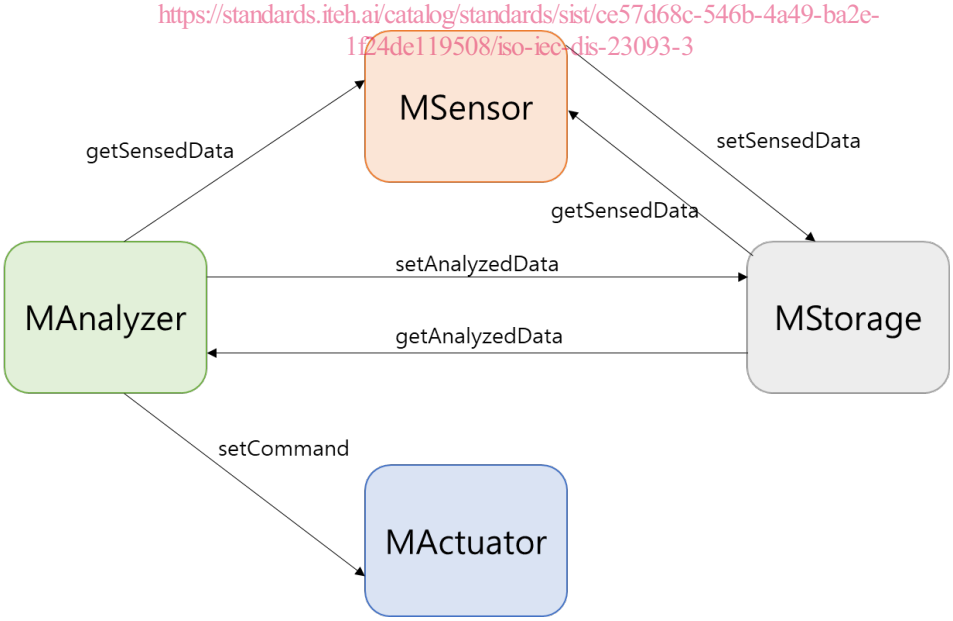

Figure 1 — Function invocation between MThings