oneM2M Technical Specification	oneM2M Technical Specification
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Document Name:	oneM2M-SensorThings Interworking\
Date:	2024-09-13
Abstract:	< An abstract of the specification and information that may be used in subsequent electronic searches>
Template Version:	January 2020 (do not modify)

About oneM2M

The purpose and goal of oneM2M is to develop technical specifications which address the need for a common M2M Service Layer that can be readily embedded within various hardware and software, and relied upon to connect the myriad of devices in the field with M2M application servers worldwide.

More information about oneM2M may be found at: http//www.oneM2M.org

Copyright Notification

Notice of Disclaimer & Limitation of Liability

Contents

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[Annexes]

[Annex <A> (Informative/Normative):Remove Informative or Normative as appropriat Title of annex (style H9)]

[Annex <B> (Informative/Normative):Remove Informative or Normative as appropriat Title of annex (style H9)]

[B.1 First clause of the annex (style H1)]

[B.1.1 First subdivided clause of the annex (style H2)]

[Annex <y>:Bibliography]

History

1 Scope

The present document . . .

`EXAMPLE:    The present document provides the necessary adaptions to the endorsed document.`

The Scope **shall not** contain requirements.

2 References

The following text block applies.

References are either specific (identified by date of publication and/or edition number or version number) or nonspecific. For specific references,only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

2.1 Normative references

- [1] OGC SensorThings API "Part 1: Sensing Version 1.1" (http://www.opengis.net/doc/is/sensorthings/1.1)
- [2] oneM2M TS-0033 (V3.0.0): "Interworking Framework"

2.2 Informative references

Clause 2.2 shall only contain informative references which are cited in the document itself.

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- Use the **EX** style, add the letter "i" (for informative) before the number (which shall be in square brackets) and separate this from the title with a tab (you may use sequence fields for automatically numbering references).

- [i.1] oneM2M Drafting Rules (http://www.onem2m.org/images/files/oneM2M-Drafting-Rules.pdf)

3 Definition of terms, symbols and abbreviations

Delete from the above heading the word(s) which is/are not applicable.

3.1 Terms

Clause numbering depends on applicability.

- A definition shall not take the form of, or contain, a requirement.
- The form of a definition shall be such that it can replace the term in context. Additional information shall be given only in the form of examples or notes (see below).
- The terms and definitions shall be presented in alphabetical order.

For the purposes of the present document, the [following] terms and definitions [given in . . . and the following] apply:

Definition format

<defined term>: <definition>

If a definition is taken from an external source, use the format below where [N] identifies the external document which must be listed in Section 2 References.

<defined term>[N]: <definition>

example 1: text used to clarify abstract rules by applying them literally

> NOTE: This may contain additional information.

3.2 Symbols

Clause numbering depends on applicability.

For the purposes of the present document, the [following] symbols [given in . . . and the following] apply:

Symbol format

<symbol> <Explanation>
<2nd symbol> <2nd Explanation>
<3rd symbol> <3rd Explanation>

3.3 Abbreviations

Abbreviations should be ordered alphabetically.

Clause numbering depends on applicability.

For the purposes of the present document, the [following] abbreviations [given in ... and the following] apply:

Abbreviation format

<ABREVIATION1> <Explanation>
<ABREVIATION2> <Explanation>
<ABREVIATION3> <Explanation>

4 Conventions

The key words "Shall", "Shall not", "May", "Need not", "Should", "Should not" in this document are to be interpreted as described in the oneM2M Drafting Rules [i.1]

5 Introduction to OGC SensorThings API

The SensorThings API (STA) is a standard of the Open Geospatial Consortium (OGC). It provides a framework for communication and exchanging data between sensors and applications. The standard is devided in two parts. SensorThings API Part 1 is dedicated to sensing and was published in 2016 and updated in 2021.

A STA-based architecture works in client/server mode. A sensor device pushes data to the SensorThings Server via HTTP. A SensorThings Server may also support MQTT protocol to support publish and subscribe capabilities. An interested application can subscribe to the MQTT-Broker, in order to get notified about new sensor events.
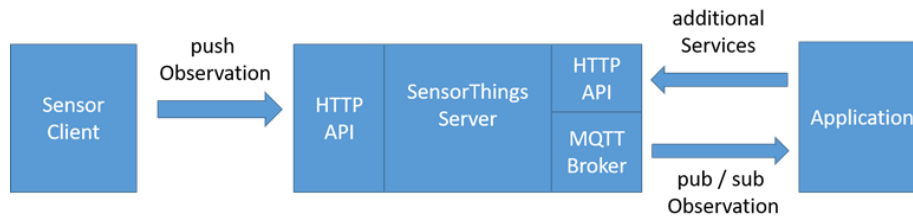

Figure 1: Figure 5-1 STA message flow

The data in the SensorThings server are organized as according to **Sensing Entities** (see Figure 5-2: Sensing Entities data model.

In the Sensing Entities Data Model events or sensor data are called "observations". Before a sensor is able to push an observation to the server it needs at least a 'Thing' and a 'Datastream' entity. This has to be created beforehand. One 'Thing' might have different 'Sensors', one 'Location' or many 'HistoricalLocations'.
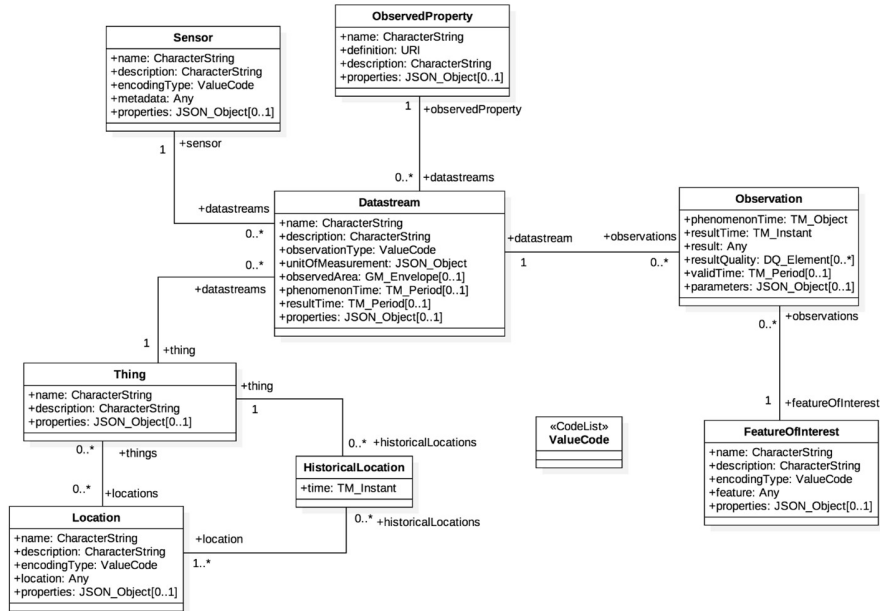
Figure 2: Figure 5-2 STA Sensing Entities Data Model

The Sensing Entities data model and the purpose of data within the data model discloses mainly two data characteristics, associated with a 'thing': - Data observations originated by sensors or commands sent to interact with actuators may be seen as IoT data from oneM2M point of view. While: - Data embedded in the Sensing Entities Data Model, like "historic locations" should be seen as data for documentation purposes.

6 Architecture Model of OGC/STA to oneM2M interworking

6.0 Introduction

Figure 6.0-1 shows an architecture approach for an Interworking Proxy Entity (IPE) between oneM2M and the OGC SensorThings API. The IPE is located between a oneM2M CSE and an OGC/SensorThings API (STA)-Server.

The basic interworking enables applications that are connected to an oneM2M-based system to get data from sensors that are connected to an OGC/STA server. Furthermore, an application that is connected to an OGC/STA server will be able to get data from sensors that are connected to an oneM2M-based system.
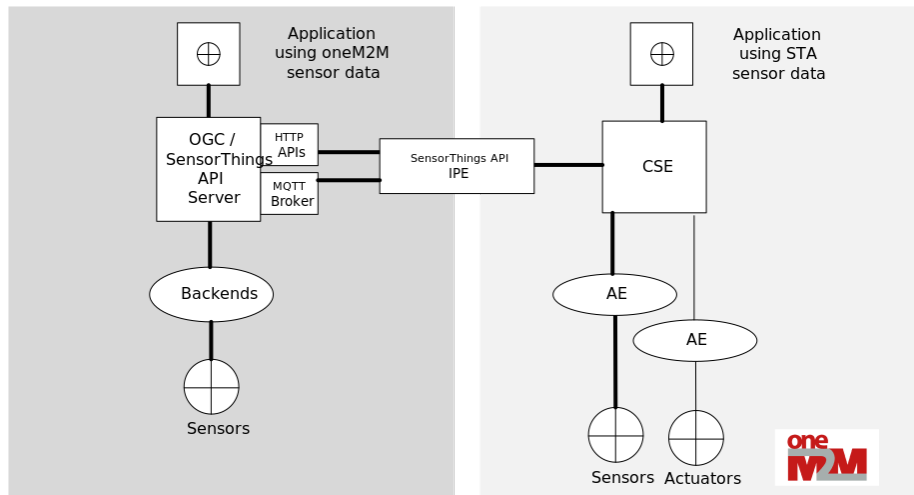
Figure 3: Figure 6.0-1: IPE architecture overview

6.1 OGC/STA-to-oneM2M Data Model Mapping

According to oneM2M TS-0033 [2] a representation of a non-oneM2M Proximal IoT function/device in a oneM2M-specified resource instance is to be synchronized with the entity that it represents. Thus the OGC/STA data model has to be represented in the hosting CSE. The SensorThings data model is comprehensive and should be regarded as a n:m relational database structure, holding both: - sensor (IoT-data); and - administrative data (like historic locations or historic products IDs).

The IPE shall map the 'result' attribute of an OGC/STA 'Observation' to the 'content' attribute of a oneM2M <contentInstance>, and vice versa as shown in Figure 6.1-1.

The following text is to be used when appropriate:

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This text box shall immediately follow after the heading of an element (i.e. clause or annex) containing a proforma or template which is intended to be copied by the user. Such an element shall always start on a new page.
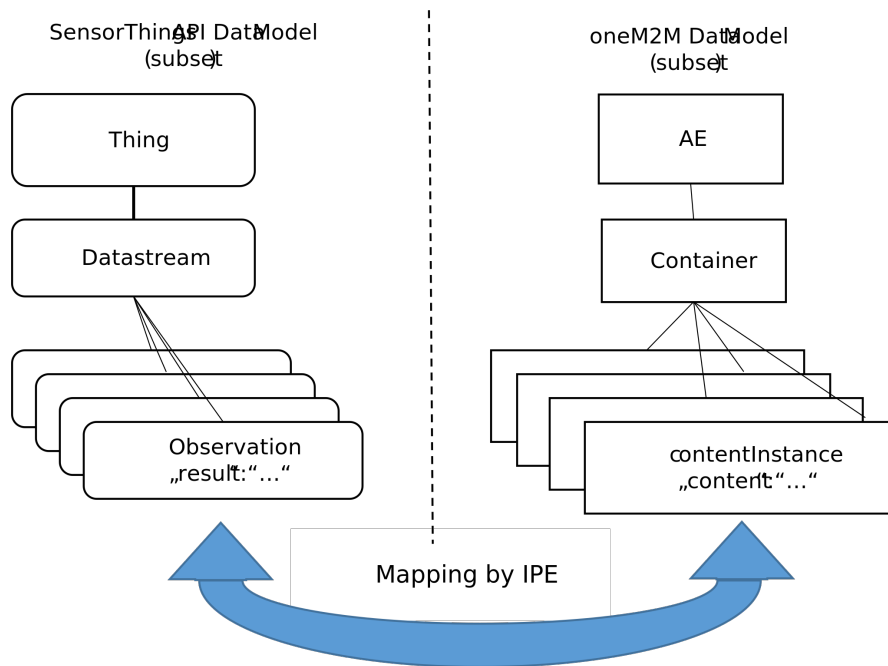
Figure 4: Figure 6.1-1: OGC / STA-to-oneM2M data model mapping

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Annexes

Each annex shall start on a new page (insert a page break between annexes A and B, annexes B and C, etc.).

Use the Heading 9 style for the title and the Normal style for the text.

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Annex <y>:

Bibliography The annex entitled "Bibliography" is optional.

It shall contain a list of standards, books, articles, or other sources on a particular subject which are not mentioned in the document itself

It shall not include references mentioned in the document.

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- <Publication>: "<Title>".

OR

<Publication>: "<Title>".

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History

This clause shall be the last one in the document and list the main phases (all additional information will be removed at the publication stage).

Publication history	Publication history	Publication history
V1.x.x	<yyyy-mm-dd >	<Milestone>

Version (to be removed on publication)	Date (to be removed on publication)	Draft history (to be removed on publication)
V5.0.0	2024-03-01	Includes the following contributions agreed during SDS#58 meeting: SDS-2023-0219R01-initial_OGC_intro
V5.1.0	2024-09-13	Includes the following contributions agreed during SDS#66 meeting: SDS-2024-0064R02_architecture_model and editorials agreed during SDS66