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| Input contribution  Use case | |
| Use Case Title:\* | Use cases for semantic control based on automatic ontology mapping |
| Group Name:\* | TP#36 |
| Source:\* | Huawei, China Mobile |
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| Date:\* | 2018-07-17 |
| Abstract:\* | Propose to add the use case illustrates that oneM2M system can support effective and precise command control in multi-ontologies scenarios based on automatic ontology mapping. |
| Agenda Item:\* |  |
| Work item(s): | WI 0015 - oneM2M Use Case Continuation |
| Document(s)  Impacted\* | Technical Specification TR 0001 - oneM2M Use Case Technical Report |
| Intended purpose of  document:\* | Decision  Discussion  Information  Other <specify> |
| Decision requested or recommendation:\* | Approval of the Use Case |

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## 8.x Semantic control based on automatic ontology mapping

### 8.x.1 Description

Semantic descriptions in the oneM2M system can be annotated in heterogeneous ontologies given the data and knowledge can be generated from different domains and stakeholders. In many cases, heterogeneous ontologies may have common/similar concepts that are mappable (linked) between each other. Such mapping relationship is useful to get a more effective and precise command of semantic control.

In this use case, semantic control refers to sending an oneM2M primitive which contains semantic triples that represent some control command(s) targeting at a device. Such control commands may be pertaining to a certain ontology. For example, the control command for device A is “turn on/off” according to Ontology-A, while the same command for device B could be “switch on/off” according to Ontology-B.

A oneM2M application may understand only Ontology-A (not Ontology-B) so that it can normally interact with only device A (not device B) by sending control commands (“turn on/off”) as the semantic payload in the oneM2M primitives (such as CREATE a <contentInstance> resource with the content of RDF triples that contains the semantic description of “turn on/off”).

With the capability of automatic ontology mapping (described in clause 8.y), oneM2M system is able to find the mapping relationships between ontology A and B, so that it has the possibility to convert the semantic control command into different ontologies for different target devices on behalf of the application.

### 8.x.2 Source

Huawei

### 8.x.3 Actors

* Application: the entity performs semantic control with limited knowledge of device ontologies.
* oneM2M Platform: an oneM2M CSE that supports semantic control based on ontology mapping.

### 8.x.4 Pre-conditions

* The oneM2M System stores semantic description of resources annotated in different ontologies (e.g. Ontology-A & Ontology-B).
* The ontology mapping results are saved and managed in the oneM2M System as a resource.

### 8.x.5 Triggers

* The application issues a semantic control request to the oneM2M platform indicating the use of ontology mapping.

### 8.x.6 Normal Flow

The normal message flow is described as follows:

Application

Platform

1. request semantic control using ontology B

3. determine equivalent control command in ontology A

2 retrieve mapping results of ontology A and ontology B

Device A based on ontology A

Device B based on ontology B

4. send the equivalent control command in ontology A

5. send the control command in ontology B

6. return successful response

Figure 8.x.6-1: Message flow for semantic control based on automatic ontology mapping operation

1. An application sends a semantic control request to the oneM2M platform for controlling different devices (device A and device B) that are described based on different ontologies (Ontology-A and Ontology-B respectively). The semantic control request contains a control command based on ontology B and also indicates the use of ontology mapping result between Ontology-A and Ontology-B
2. After receiving the semantic control request, the platform (e.g. IN-CSE) first retrieves the mapping results between Ontology-A and Ontology-B.
3. The oneM2M platform then can determine an equivalent control command described in Ontology-A for device A according to the ontology mapping results;
4. The platform sends the equivalent control command in Ontology-A to device A;
5. The platform sends the original control command in Ontology-B to device B;
6. The platform returns a successful response to the application.

### 8.x.9 Alternative Flow

None.

### 8.x.8 Post-conditions

None.

### 8.x.9 High Level Illustration

None.

### 8.x.10 Potential requirements

1. The oneM2M system shall support semantic control of devices described in heterogeneous ontologies including the support of automatic ontology mapping.