

OCF 2.0 – UPlus Bridging Translation – Core Technology WG CR 2502

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1 Scope

This document specifies a framework for translation between OCF devices and other ecosystems, and specifies the behaviour of a translator that exposes servers in non-OCF ecosystem to OCF clients and/or exposes OCF servers to clients in non-OCF ecosystem. Translation per specific device is left to other specification (deep translation). This document provides generic requirements that apply unless overridden by a more specific document.

2 Normative references

U+ Developer Website

<http://developer.haigeek.com:7900/developercenter/static/index.html#/system/login>

OCF Core Specification, *Open Connectivity Foundation Core Specification*, Version 2.0

https://openconnectivity.org/specs/OCF_Core_Specification_v2.0.0.pdf

OCF Resource Type Specification, *Open Connectivity Foundation Security Specification*, Version 2.0

https://openconnectivity.org/specs/OCF_Resource_Type_Specification_v2.0.0.pdf

OCF Bridging Specification, *Open Connectivity Foundation Bridging Specification*, Version 1.3
https://openconnectivity.org/specs/OCF_Bridging_Specification_v1.3.0.pdf

OCF Security Specification, *Open Connectivity Foundation Security Specification*, Version 2.0
https://openconnectivity.org/specs/OCF_Security_Specification_v2.0.0.pdf

IETF RFC 4122, *A Universally Unique IDentifier (UUID) URN Namespace*, July 2005
<https://www.rfc-editor.org/info/rfc4122>

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

3.1.1 Symmetric, Asymmetric Bridging

In symmetric bridging, a bridge device not only exposes OCF server to other ecosystem but also exposes other ecosystem's server to OCF, on the other hand, in asymmetric bridging a bridge device exposes OCF server to other ecosystem only or exposes other ecosystem's server to OCF only.

3.1.2 Bridged Protocol

Another protocol (e.g. AllJoyn, U+) that is being translated to or from OCF protocols

3.1.3 U+ Property

A U+ Property describes an aspect or a parameter of a U+ device.

11 U+ Translation

11.1 Operational Scenarios

The goal is to make Bridged U+ Servers appear to OCF Clients as if they were native OCF Servers. "Deep translation" between specific U+ properties and OCF resources is specified in the OCF Resource to U+ Property Mapping Specification.

Figure 1 shows overview of OCF U+ Bridge Device and its general topology. The U+ Translator supports asymmetric bridging. It exposes U+ Servers to OCF Clients. Each Bridged U+ Server is represented as a Virtual OCF Server.

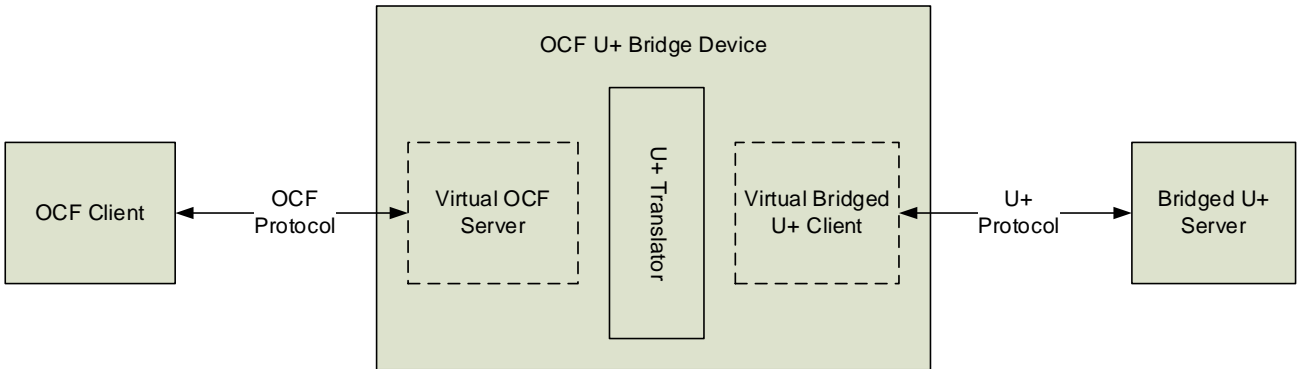


Figure 1 OCF U+ Bridge Device Components

11.1.1 Use case for U+ Bridging

Figure 2 shows a use case for U+ bridging. U+ washer air conditioner is installed in the user's house. The user uses OCF client application on the smartphone to control the washer. OCF U+ Bridge Device is a virtual device which can reside in different physical platform, for example, the smartphone, the washer or the gateway device.

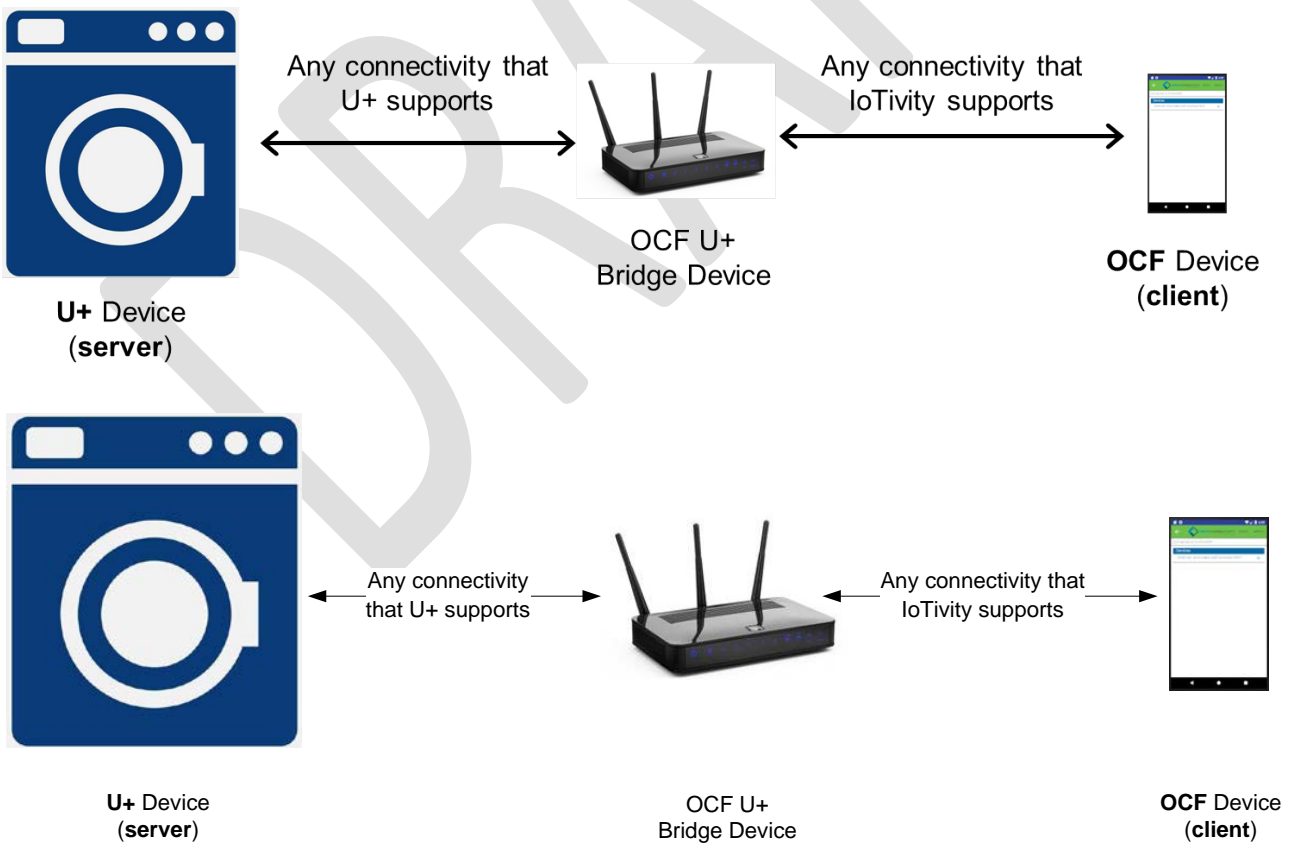


Figure 2 U+ Bridging Use Case

11.2 Requirements specific to U+ Translator

OCF U+ Bridge Device shall satisfy section X.X General Requirements of OCF Bridging Specification.

11.2.1 Requirements specific to U+

This document refers to version 5.0.0 or higher of U+ SDK (uGW).

11.2.2 Exposing U+ servers to OCF clients

Table 1 shows translation rule between U+ and OCF data model. One U+ Device Type shall be mapped to one OCF Device Type or one OCF Composite Device. One or more U+ Properties shall be mapped to one OCF Resource Type.

Table 1 Translation Rule between U+ and OCF Data Model

| From U+ | mapping count | To OCF | mapping count |
|----------------|---------------|-----------------|---------------|
| U+ Device Type | 1 | OCF Device Type | 1 |
| U+ Property | 1 or n | OCF Resource | 1 |
| | | OCF Property | 1 or n |

Table 2 shows an example of the translation rule, which maps U+ air conditioner to OCF air conditioner.

- U+ Property “onOffStatus” is mapped to OCF Resource Property “value” which belongs to OCF Resource “oic.r.switch.binary”.
- U+ Property “targetTemperature” is mapped to OCF Resource Property “temperature” and “units” combined which both belong to OCF Resource “oic.r.temperature”.
- U+ Property “indoorTemperature”, “windDirectionVertical”, “windDirectionHorizontal” and “windSpeed” together are mapped to OCF Resource Property “supportedDirections”, “direction”, “speed” and “automode” combined which all belong to OCF Resource “oic.r.airflow”.
- U+ Property “operationMode” and “healthMode” together are mapped to OCF Resource Property “supportedModes” and “modes” combined which both belong to OCF Resource “oic.r.mode”.

Table 2 Example of Translation between U+ and OCF Data Model

| From U+ Air Conditioner | To OCF Air Conditioner | |
|-------------------------|------------------------|-----------------------|
| U+ Property | OCF Resource | OCF Resource Property |
| onOffStatus | oic.r.switch.binary | value |

| | | |
|-------------------------|-------------------|---------------------|
| targetTemperature | oic.r.temperature | temperature |
| | | units |
| indoorTemperature | oic.r.airflow | supportedDirections |
| windDirectionVertical | | direction |
| windDirectionHorizontal | | speed |
| windSpeed | | automode |
| operationMode | oic.r.mode | supportedModes |
| healthMode | | modes |

11.2.2.1 Deep translation for U+ property

All U+ devices are well defined. [Table 3](#) is the mapping between U+ devices and their properties and OCF devices and resources. [Table 3](#) includes a full list of U+ devices to be mapped to OCF. Table 4, 5 and 6 are the mapping between OCF core resources and U+ properties.

Table 1 Mapping between U+ Device and Property and OCF Device and Resource

| U+ Device | U+ Property | OCF Resource Type | OCF Device Name | OCF Device Type ("rt") |
|-----------------|-------------------|------------------------|-----------------|------------------------|
| Air Conditioner | onOffStatus | oic.r.switch.binary | Air Conditioner | oic.d.airconditioner |
| | targetTemperature | oic.r.temperature | | |
| | | oic.r.selectablelevels | | |
| | | | | |
| | operationMode | oic.r.mode | | |
| | | | | |
| | | | | |
| Water Heater | onOffStatus | oic.r.switch.binary | Water Heater | oic.d.waterheater |
| | targetTemperature | oic.r.temperature | | |
| | | | | |
| | | | | |
| | | | | |

| | | | | |
|--------------|-------------|-------------------------|--------------|-------------------|
| Air Purifier | onOffStatus | oic.r.switch.binary | Air Purifier | oic.d.airpurifier |
| | mode | oic.r.operational.state | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | windSpeed | oic.r.selectablelevels | | |

Table 4 shows how the properties of "oic.wk.d" Resource Type (Table 25 in OCF Core Specification v2.0) shall be mapped to the properties of U+ device.

Table 4 oic.wk.d Resource Type definition

| To OCF Property title | OCF Property name | OCF Description | OCF Mandatory | From U+ Property value | U+ Description | U+ Mandatory |
|-----------------------|-------------------|--|---------------|------------------------|-----------------------------------|--------------|
| (Device) Name | n | Human friendly name defined by the vendor. In the presence of "n" Property of "/oic/con", both have the same Property Value. When "n" Property Value of "/oic/con" is modified, it shall be reflected to "n" Property Value of "/oic/d". | yes | deviceId | An unique ID of the device | yes |
| Spec Version | icv | Spec version of the core specification this device is implemented to, The syntax is "ocf.<major>.<minor>.<sub-version>" where <major>, <minor>, and <sub-version> are the major, minor and sub-version numbers of the specification respectively. This version of the specification the string value shall be "ocf.2.0.0". | yes | (none) | Translator returns its own value. | no |

| | | | | | | |
|-------------------------|------|--|-----|-------------|--|-----|
| Device ID | di | Unique identifier for Device. This value shall be the same value (i.e. mirror) as the doxm.deviceuuid Property as defined in OCF Security. Handling privacy-sensitivity for the "di" Property, refer to section 13.8 in OCF Security. | yes | (none) | As defined in OCF Security Specification | no |
| Data Model Version | dmv | Spec version of the Resource Specification to which this device data model is implemented; if implemented against a Vertical specific device specification(s), then the Spec version of the vertical specification this device model is implemented to. | yes | specVersion | Data model version of the device | yes |
| Protocol Independent ID | piid | A unique and immutable Device identifier. A Client can detect that a single Device supports multiple communication protocols if it discovers that the Device uses a single Protocol Independent ID value for all the protocols it supports. Handling privacy-sensitivity for the "piid" Property, refer to section 13.8 in OCF Security. | yes | (none) | Translator returns its own value. | no |

| | | | | | | |
|------------------------|------|---|----|------------------|--|-----|
| Localized Descriptions | ld | Detailed description of the Device, in one or more languages. This property is an array of objects where each object has a 'language' field (containing an IETF RFC 5646 language tag) and a 'value' field containing the device description in the indicated language. | no | (none) | (none) | no |
| Software Version | sv | Version of the device software. | no | swver | Software version of the device | yes |
| Manufacturer Name | dmn | Name of manufacturer of the Device, in one or more languages. This property is an array of objects where each object has a 'language' field (containing an IETF RFC 5646 language tag) and a 'value' field containing the manufacturer name in the indicated language. | no | manufacturerName | The value of property "manufacturerName" indicates the name of manufacturer. | yes |
| Model Number | dmno | Model number as designated by manufacturer. | no | modelName | The value of property "modelName" indicates the model number of the device. | yes |

Table 5 shows how the properties of "oic.wk.p" Resource Type (Table 26 in OCF Core Specification v2.0) shall be mapped to the properties of U+ device.

Table 5 oic.wk.p Resource Type definition

| To OCF Property title | OCF Property name | OCF Description | OCF Mandatory | From U+ Property value | U+ Description | U+ Mandatory |
|-----------------------|-------------------|-----------------|---------------|------------------------|----------------|--------------|
|-----------------------|-------------------|-----------------|---------------|------------------------|----------------|--------------|

| | | | | | | |
|-------------------|------|--|-----|------------------|--|-----|
| Platform ID | pi | Unique identifier for the physical platform (UIUID); this shall be a UUID in accordance with IETF RFC 4122. It is recommended that the UUID be created using the random generation scheme (version 4 UUID) specific in the RFC. Handling privacy-sensitivity for the "pi" Property, refer to section 13.8 in OCF Security. | yes | (none) | Translator generates a UUID as "pi" value. | / |
| Manufacturer Name | mnmn | Name of manufacturer | yes | manufacturerName | The value of property "manufacturerName" indicates the name of manufacturer. | yes |
| Model Number | mnmo | Model number as designated by manufacturer | no | modelName | The value of property "modelName" indicates the model number of the device. | yes |

Table 6 shows how the properties of "oic.wk.con" Resource Type (Table 20 in OCF Core Specification v2.0) shall be mapped to the properties of U+ device.

Table 6 oic.wk.con Resource Type definition

| To OCF Property title | OCF Property name | OCF Description | OCF Mandatory | From U+ Property value | U+ Description | U+ Mandatory |
|-----------------------|-------------------|--|---------------|------------------------|----------------------------|--------------|
| (Device) Name | n | Human friendly name configurable by the end user (e.g. Bob's thermostat). The "n" Common Property of the oic.wk.con Core Resource and the "n" Common Property of the "/oic/d" Core Resource shall have the same Value. When the "n" Common Property Value of the oic.wk.con Core Resource is modified, it shall be reflected to the "n" Common | yes | deviceId | An unique ID of the device | yes |

| | | | | | | |
|--|--|--|--|--|--|--|
| | | Property of "/oic/d" Core Resource. | | | | |
|--|--|--|--|--|--|--|

11.2.2.2 On-the-fly Translation

If a U+ device is not in the well-defined set, the U+ Translator shall not translate it.

11.2.3 Protocol translation between U+ and OCF

U+ framework is based on CoAP protocol. There are three operations defined for handling the properties on U+ device. [Table 7](#) shows how U+ operations shall be mapped to OCF CRUDN operations.

If a U+ translator receives CREATE or DELETE Request from OCF client, it shall return http status code 405 Method Not Allowed due to no corresponding operation in U+ framework.

Table 7 Mapping of operations between U+ and OCF

| U+ operation | OCF CRUDN |
|-----------------------------------|-----------|
| Not applicable | CREATE |
| GET | RETRIEVE |
| PUT | UPDATE |
| 1 Not applicable | DELETE |
| GET (Option: COAP_OPTION_OBSERVE) | NOTIFY |

The U+ translator shall translate RETRIEVE Request from OCF client into GET Request to U+ server, and translate corresponding Response from U+ server into RETRIEVE Response back to OCF client, as in [Figure 3](#).

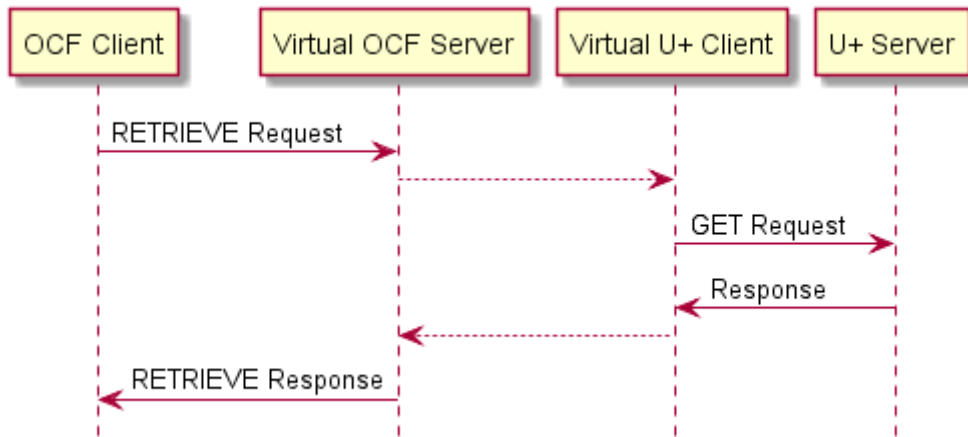


Figure 3 Mapping of RETRIEVE operation

The U+ translator shall translate UPDATE Request from OCF client into PUT Request to U+ server, and translate corresponding Response from U+ server into UPDATE Response back to OCF client, as in [Figure 4](#). The PUT Request shall update all properties needed in the payload, i.e. a full replacement.

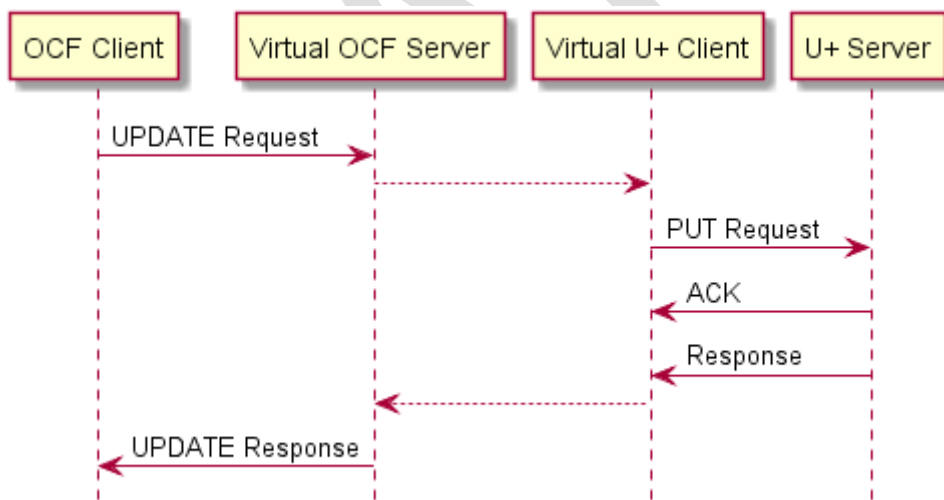


Figure 4 Mapping of UPDATE operation

The U+ translator shall translate RETRIEVE Request (Observe), i.e. Notification, from OCF client into GET Request (Option: COAP_OPTION_OBSERVE) to U+ server, and translate corresponding Response from U+ server into RETRIEVE Response (Observe) back to OCF client, as in [Figure 5](#).

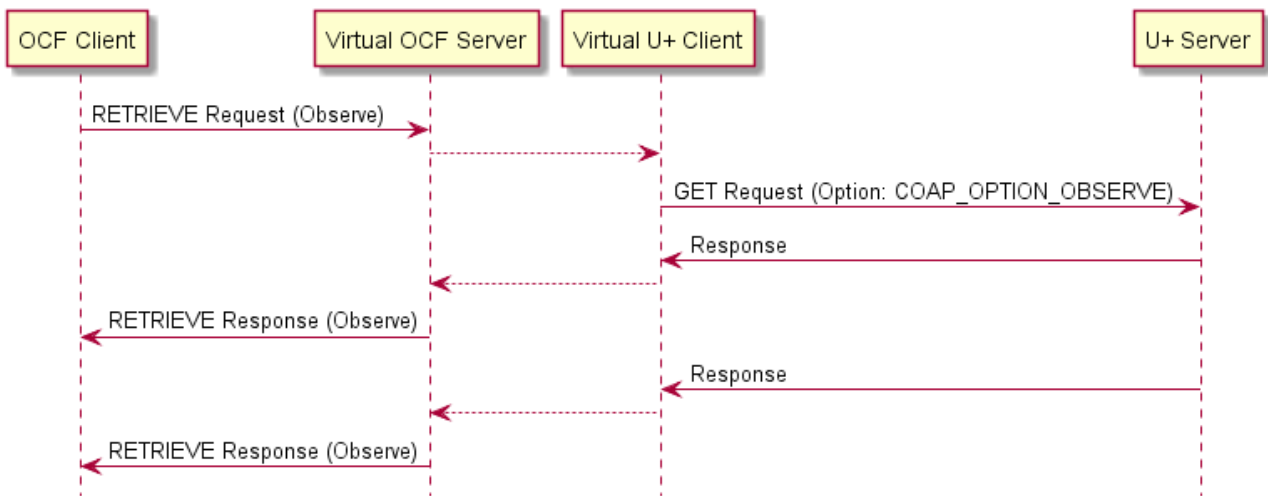


Figure 5 Mapping of NOTIFICATION operation

11.2.3.1 Error Handling

If an U+ operation fails, the translator shall send an appropriate OCF error response to the OCF Client.

11.3 Additional Security Consideration

A U+ server shall support one of the TLS 1.2 cipher suites as in Table 8 defined in RFC 5246. This information is applicable at the time of initial publication, and may become out of date.

Table 8 TLS 1.2 Cipher Suites used by U+

| Cipher Suite |
|--|
| TLS_RSA_WITH_AES_128_CBC_SHA256 |
| TLS_RSA_WITH_AES_256_CBC_SHA256 |
| TLS_RSA_WITH_AES_256_CCM |
| TLS_RSA_WITH_AES_256_CCM_8 |
| TLS_RSA_WITH_AES_256_GCM_SHA384 |
| TLS_DHE_RSA_WITH_AES_256_CBC_SHA256 |
| TLS_DHE_RSA_WITH_AES_256_GCM_SHA384 |
| TLS_ECDH_ECDSA_WITH_AES_256_CBC_SHA384 |
| TLS_ECDH_ECDSA_WITH_AES_256_GCM_SHA384 |

| |
|---|
| TLS_ECDH_RSA_WITH_AES_256_CBC_SHA384 |
| TLS_ECDH_RSA_WITH_AES_256_GCM_SHA384 |
| TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384 |
| TLS_ECDHE_ECDSA_WITH_AES_256_CCM |
| TLS_ECDHE_ECDSA_WITH_AES_256_CCM_8 |
| TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 |
| TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384 |
| TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384 |
| TLS_DHE_RSA_WITH_AES_256_CCM |
| TLS_DHE_RSA_WITH_AES_256_CCM_8 |

14 Device Type definitions

No additional definitions are required.

15 Resource Type definitions

Since on-the-fly translation is out of scope, general Resource Type of Collection Resource for BLE devices, e.g. oic.r.uplusobject is not required.