OCF Resource to LWM2M Object Mapping Specification

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Introduction

This document, and all the other parts associated with this document, were developed in response to worldwide demand for smart home focused Internet of Things (IoT) devices, such as appliances, door locks, security cameras, sensors, and actuators; these to be modelled and securely controlled, locally and remotely, over an IP network.

While some inter-device communication existed, no universal language had been developed for the IoT. Device makers instead had to choose between disparate frameworks, limiting their market share, or developing across multiple ecosystems, increasing their costs. The burden then falls on end users to determine whether the products they want are compatible with the ecosystem they bought into, or find ways to integrate their devices into their network, and try to solve interoperability issues on their own.

In addition to the smart home, IoT deployments in commercial environments are hampered by a lack of security. This issue can be avoided by having a secure IoT communication framework, which this standard solves.

The goal of these documents is then to connect the next 25 billion devices for the IoT, providing secure and reliable device discovery and connectivity across multiple OSs and platforms. There are multiple proposals and forums driving different approaches, but no single solution addresses the majority of key requirements. This document and the associated parts enable industry consolidation around a common, secure, interoperable approach.

The OCF specification suite is made up of nineteen discrete documents, the documents fall into logical groupings as described herein:

- Core framework
  - Core Specification
  - Security Specification
  - Onboarding Tool Specification
- Bridging framework and bridges
  - Bridging Specification
  - Resource to Alljoyn Interface Mapping Specification
  - OCF Resource to oneM2M Resource Mapping Specification
  - OCF Resource to BLE Mapping Specification
  - OCF Resource to EnOcean Mapping Specification
  - OCF Resource to LWM2M Mapping Specification
  - OCF Resource to UPlus Mapping Specification
  - OCF Resource to Zigbee Cluster Mapping Specification
  - OCF Resource to Z-Wave Mapping Specification
- Resource and Device models
  - Resource Type Specification
  - Device Specification
- Core framework extensions
  - Easy Setup Specification
  - Core Optional Specification

- OCF Cloud
  - Cloud API for Cloud Services Specification
  - Device to Cloud Services Specification
  - Cloud Security Specification

OCF Resource to LwM2M Object Mapping Specification

1 Scope

This document provides detailed mapping information to provide equivalency between LWM2M defined Objects and OCF defined Resources.

A LWM2M Bridge is Asymmetric Client Bridge, therefore this document provides some OCF Device Types for unidirectional mapping, identifies equivalent OCF Resources for specific LWM2M Objects, and defines the detailed Property by Property mapping using OCF defined extensions to JSON schema to programmatically define the mappings.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 30118-1, Information technology -- Open Connectivity Foundation (OCF) Specification -- Part 1: Core specification
https://www.iso.org/standard/53238.html
Latest version available at: https://openconnectivity.org/specs/OCF_Core_Specification.pdf

ISO/IEC 30118-2, Information technology – Open Connectivity Foundation (OCF) Specification – Part 2: Security specification
https://www.iso.org/standard/74239.html
Latest version available at: https://openconnectivity.org/specs/OCF_Security_Specification.pdf

ISO/IEC 30118-4, Information technology – Open Connectivity Foundation (OCF) Specification – Part 4: Resource type specification
https://www.iso.org/standard/74241.html
Latest version available at:
https://openconnectivity.org/specs/OCF_Resource_Type_Specification.pdf

Derived Models for Interoperability between IoT Ecosystems, Stevens & Merriam, March 2016
https://www.iab.org/wp-content/IAB-uploads/2016/03/OCF-Derived-Models-for-Interoperability-Between-IoT-Ecosystems_v2-examples.pdf

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 30118-1 and ISO/IEC 30118-2 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
LWM2M Resource
an atomic piece of information that can be read, written, or executed.

3.1.2
LWM2M Object
a collection of LWM2M Resources. Within LWM2M Object, LWM2M Resources are logically organized.

3.1.3
LWM2M Application
represents the LWM2M entity (i.e. LWM2M Client of Server), being mapped to a virtual OCF Client, where LWM2M Object instances and LWM2M Resource instances are organized.

4 Document conventions and organization

4.1 Conventions

In this document a number of terms, conditions, mechanisms, sequences, parameters, events, states, or similar terms are printed with the first letter of each word in uppercase and the rest lowercase (e.g., Network Architecture). Any lowercase uses of these words have the normal technical English meaning.

4.2 Notation

In this document, features are described as required, recommended, allowed or DEPRECATED as follows:

Required (or shall or mandatory).

These basic features shall be implemented to comply with OIC Core Architecture. The phrases “shall not”, and “PROHIBITED” indicate behavior that is prohibited, i.e. that if performed means the implementation is not in compliance.

Recommended (or should).

These features add functionality supported by OIC Core Architecture and should be implemented. Recommended features take advantage of the capabilities OIC Core Architecture, usually without imposing major increase of complexity. Notice that for compliance testing, if a recommended feature is implemented, it shall meet the specified requirements to be in compliance with these guidelines. Some recommended features could become requirements in the future. The phrase “should not” indicates behavior that is permitted but not recommended.

Allowed (or allowed).

These features are neither required nor recommended by OIC Core Architecture, but if the feature is implemented, it shall meet the specified requirements to be in compliance with these guidelines.

Conditionally allowed (CA)

The definition or behaviour depends on a condition. If the specified condition is met, then the definition or behaviour is allowed, otherwise it is not allowed.

Conditionally required (CR)

The definition or behaviour depends on a condition. If the specified condition is met, then the definition or behaviour is required. Otherwise the definition or behaviour is allowed as default unless specifically defined as not allowed.

DEPRECATED

Although these features are still described in this specification, they should not be implemented except for backward compatibility. The occurrence of a deprecated feature during operation of an implementation compliant with the current specification has no effect on the implementation's operation and does not produce any error conditions. Backward compatibility may require that a feature is implemented and functions as specified but it shall never be used by implementations compliant with this specification.

Strings that are to be taken literally are enclosed in “double quotes”.

Words that are emphasized are printed in *italic*.

5 Theory of Operation

5.1 Interworking Approach

The interworking between LWM2M defined Objects and OCF defined Resource Types is modelled using the derived model syntax described in Derived Models for Interoperability.

5.2 Mapping Syntax

5.2.1 Introduction

Within the defined syntax for derived modelling used by this document there are two blocks that define the actual Property-Property equivalence or mapping. These blocks are identified by the keywords "x-to-ocf" and "x-from-ocf". Derived Models for Interoperability does not define a rigid syntax for these blocks; they are free form string arrays that contain pseudo-coded mapping logic.

Within this document we apply the rules defined in clause 5.2 to these blocks to ensure consistency and re-usability and extensibility of the mapping logic that is defined.

In this document, Python (version >= 3.0) syntax is used to describe translation rules.

The JSON skeleton shows typical translation block used in the derived models.

```
"<LWM2M Object Name(ID)>" : {
        "type": "object",
        "properties": {
                "<LWM2M Resource Name(ID)>" : {
                        "x-ocf-conversion" : {
                                "x-ocf-alias": "<corresponding OCF Resource type>",
                                "x-to-ocf": [
                                        ...
                                        ...
                                ],
                                "x-from-ocf": [
                                        ...
                                        ...

                                ]
                        }
                }
        }
}
```

– <LWM2M Object Name>: this is the LWM2M Object with prefix string,”lwm2m.o”(e.g. "lwm2m.0.buzzer")

– <LWM2M Resource Name(ID) >: this is the LWM2M Resource name with LWM2M Resource ID in parentheses.(e.g. “on/off(5850)”)

– <corresponding OCF Resource type>: an OCF Resource type which is corresponding to this LWM2M Object.

5.2.2 General

All statements are terminated with a carriage return.

5.2.3 Value Assignment

The equals sign (=) is used to assign one value to another. The assignee is on the left of the operator; the value being assigned on the right.

5.2.4 Property Naming

All Property names are identical to the name used by the original model; for example, from the OCF Temperature Resource the Property name "temperature" is used whereas when referred to the derived ecosystem then the semantically equivalent Property name is used.

5.2.5 Arrays

An array element is indicated by the use of square brackets "[]" with the index of the element contained therein, e.g. range[1]. All arrays start at an index of 0. If an entire array is being referenced, then no index is included.

5.2.6 Conditional Mapping

When a mapping is dependent on the meeting of other conditions then the syntax:

if "condition", "mapping".

is applied.

6 LWM2M Translation

6.1 Operational Scenarios

The purpose of the LWM2M Bridge Platform is to enable access by the LWM2M ecosystem to select OCF Servers. Figure 2 shows an overview of the LWM2M Bridge Platform and its general topology. The LWM2M Bridging Function supports Asymmetric bridging. This is accomplished by creating Virtual OCF Clients to represent the necessary access levels to the OCF servers that are exposed to the LWM2M ecosystem. The LWM2M Bridge Platform then exposes native LWM2M entities(i.e. LWM2M devices) that map to those Virtual OCF Clients.

The LWM2M bridging is an Asymmetric Client Bridging.

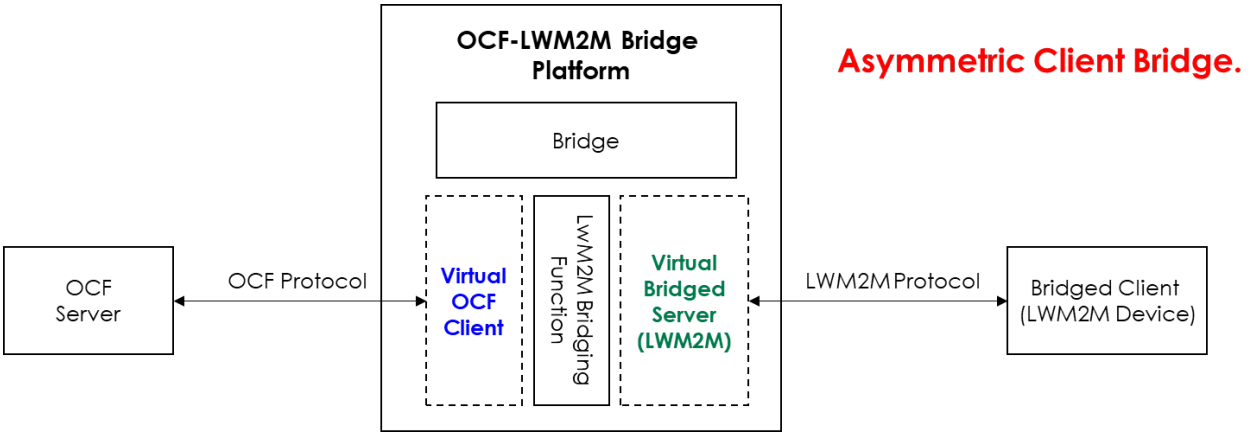

Figure 1 – OCF-LWM2M Asymmetric Client Bridge

Figure 3 shows OCF-LWM2M Data Model Translation. When LWM2M device boots up, firstly it tries to register its resources (e.g., LWM2M Objects, and LWM2M Resource) to a LWM2M Server. Although the LWM2M Server doesn't discover devices, it is able to access to the LWM2M Client through the registered resources. LWM2M basically does not define the device type. As shown in Figure 3, while OCF Resource corresponds to LWM2M Object and OCF property corresponds to LWM2M Resource, there is no LWM2m data model corresponding to OCF device.

OCF Resource-Property		LWM2M Object-Resource
OCF device type	⇒	N/A
OCF Resource type	⇒	LWM2M Object
OCF Resource Property	⇒	LWM2M Resource

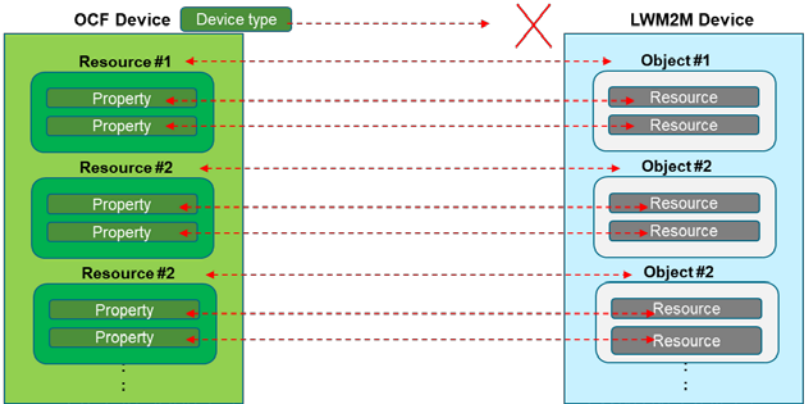

Figure 2 – OCF-LWM2M Data Model Translation

The mapping between the OCF data models and the LWM2M data models is specified in Programmatic (i.e. On-the-fly) data model translation is not supported.

6.2 Enabling LWM2M Application access to OCF Servers

Each level of LWM2M Application access for OCF servers is modelled as a Virtual OCF Client. In this way, LWM2M Application access can be appropriately restricted and enforced by the OCF security capabilities. Figure 3 provides more details on the relationship between an LWM2M Application, objects and resources.

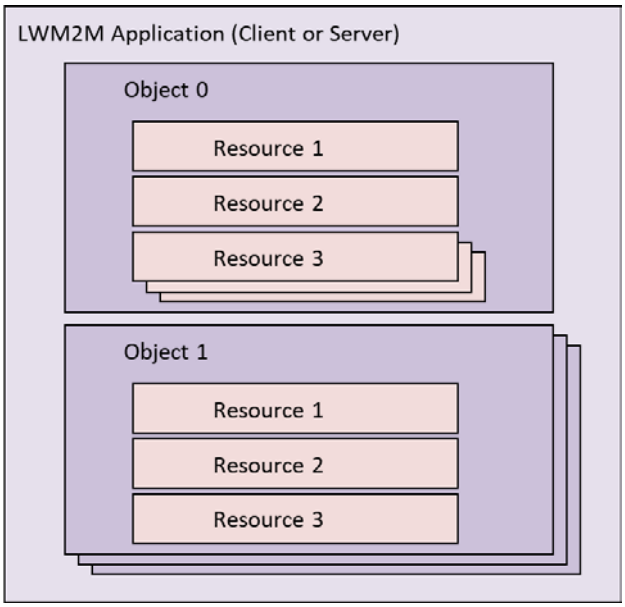

Figure 3 – Relationship between LWM2M Application, Object, and Resource

6.3 Enabling OCF Client access to LWM2M Devices

This capability is not supported.

6.4 On-the-fly Translation

All devices and resources have been aligned between the OCF and LWM2M ecosystems, so on the-fly translation is not required.

If new OCF devices are not reflected into the LWM2M ecosystem by updates to the LWM2M specifications, the Bridge Platform will not provide a successful translation of those devices.

7 Device Type Mapping

7.1 Introduction

This clause contains the OCF Device Types for OCF Resource to LWM2M Object mapping.

7.2 OCF Device Types for OCF Resources to LWM2M Object mapping

In LWM2M Specification, there is no definition for Device type but the definition for LWM2M object, which is similar to OCF Resource type. Table 1 captures the list of the supported OCF Device Types for OCF Resource to LWM2M Object mapping.

Table 1 – Supported OCF Device Types for OCF Resources to LWM2M Object Mapping

LWM2M Object name	OCF Resource Type	OCF Device Type
On/Off switch	oic.r.switch.binary	oic.d.airconditioner
Temperature	oic.r.temperature	
On/Off switch	oic.r.switch.binary	oic.d.airpurifier
On/Off switch	oic.r.switch.binary	oic.d.washerdryer
On/Off switch	oic.r.switch.binary	oic.d.dehumidifier
Power	oic.r.energy.consumption	oic.d.electricmeter

Power	oic.r.energy.consumption	oic.d.energymonitor
On/Off switch	oic.r.switch.binary	oic.d.fan
Temperature	oic.r.temperature	oic.d.refrigerator
On/Off switch	oic.r.switch.binary	oic.d.humidifier
On/Off switch	oic.r.switch.binary	oic.d.light
On/Off switch	oic.r.switch.binary	oic.d.oven
Temperature	oic.r.temperature	
On/Off switch	oic.r.switch.binary	oic.d.stb
Lock	oic.r.lock.status	oic.d.smartlock
On/Off switch	oic.r.switch.binary	oic.d.smartplug
Temperature	oic.r.temperature	oic.d.thermostat
On/Off switch	oic.r.switch.binary	oic.d.waterheater
Temperature	oic.r.temperature	

8 Resource to LWM2M Object Equivalence

8.1 Introduction

This clause lists the complete set of applicable LWM2M Objects and provides the equivalent OCF Resource Type(s) to which the Objects map.

8.2 LWM2M Objects to OCF Resources

Table 2 captures the equivalency mapping between LWM2M defined Objects and OCF defined Resource Types (see ISO/IEC 30118-4). Detailed Property by Property mappings are provided in clause 9.

Table 2 – LWM2M Object to OCF Resource Type Mapping

LWM2M Object Name	LWM2M Object ID	OCF Resource Type
Actuation	3306	oic.r.audio
Buzzer	3338	oic.r.door
Device	3	oic.wk.d
		oic.wk.p
		oic.r.energy.battery
Digital Input	3300	oic.r.vehicleconnector
Door	10351	oic.r.door
Energy	3331	oic.r.energy.consumption
Humidity	3304	oic.r.humidity
Load Control	3310	oic.r.time.period
Lock	10359	oic.r.lock.status
On/Off switch	3342	oic.r.switch.binary
Positioner	3337	oic.r.openlevel
Power	3328	oic.r.energy.consumption

Temperature	3303	oic.r.temperature

9 Detailed Mapping

9.1 Introduction

This clause provides an API and mapping description that aligns with the Derived Modelling syntax described in Derived Models for Interoperability for all Objects and Resources that are within scope.

The derived model definitions presented in clause 9 are formatted for readability, and so may appear to have extra line breaks.

9.2 Actuation

9.2.1 Derived model

The derived model: "lwm2m.o.actuation".

9.2.2 Property definition

Table 3 provides the detailed per Property mapping for "lwm2m.o.actuation".

Table 3 – The Property mapping for "lwm2m.o.actuation".

LWM2M Resource name	OCF Resource	To OCF	From OCF
On/Off(5850)	oic.r.audio	oic.r.audio.mute = On/Off(5850)	On/Off(5850) = oic.r.audio.mute
Dimmer(5851)	oic.r.audio	oic.r.audio.volume = Dimmer(5851)	Dimmer(5851) = oic.r.audio.volume
Application Type(5750)	oic.r.audio	oic.r.audio.n = Application Type(5750)	Application Type(5750) = oic.r.audio.n

Table 4 provides the details of the Properties that are part of "lwm2m.o.actuation".

Table 4 – The Properties of "lwm2m.o.actuation".

LWM2M Resource name	Type	Required	Description
On/Off(5850)	boolean	yes	On/off control. Boolean value where True is On and False is Off.
Dimmer(5851)	integer	no	This resource represents a dimmer setting, which has an Integer value between 0 and 100 as a percentage.
Application Type(5750)	string	no	The application type of the sensor or actuator as a string depending on the use case.

9.2.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Actuation",
  "definitions": {
    "lwm2m.o.actuation": {
      "type": "object",
      "properties": {
        "On/Off(5850)": {
          "type": "boolean",
```



```
            "description": "On/off control. Boolean value where True is On and False is Off.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.audio",
              "x-to-ocf": [
                "oic.r.audio.mute = On/Off(5850)"
              ],
              "x-from-ocf": [
                "On/Off(5850) = oic.r.audio.mute"
              ]
            }
          },
          "Dimmer(5851)": {
            "type": "integer",
            "description": "This resource represents a dimmer setting, which has an Integer value
between 0 and 100 as a percentage.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.audio",
              "x-to-ocf": [
                "oic.r.audio.volume = Dimmer(5851)"
              ],
              "x-from-ocf": [
                "Dimmer(5851) = oic.r.audio.volume"
              ]
            }
          },
          "Application Type(5750)": {
            "type": "string",
            "description": "The application type of the sensor or actuator as a string depending on
the use case.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.audio",
              "x-to-ocf": [
                "oic.r.audio.n = Application Type(5750)"
              ],
              "x-from-ocf": [
                "Application Type(5750) = oic.r.audio.n"
              ]
            }
          }
        }
      }

    },
    "type": "object",
    "allOf": [
      {"$ref": "#/definitions/lwm2m.o.actuation"}
    ],
    "required": ["On/Off(5850)"]
}
```

9.3 Buzzer

9.3.1 Derived model

The derived model: "lwm2m.o.buzzer".

9.3.2 Property definition

Table 5 provides the detailed per Property mapping for "lwm2m.o.buzzer".

Table 5 – The Property mapping for "lwm2m.o.buzzer".

LWM2M Resource name	OCF Resource	To OCF	From OCF
On/Off(5850)	oic.r.door	oic.r.door.openAlarm = On/Off(5850)	On/Off(5850) = oic.r.door.openAlarm
Application Type(5750)	oic.r.door		Application Type(5750) = "Door Open Alarm"

Table 6 provides the details of the Properties that are part of "lwm2m.o.buzzer".

Table 6 – The Properties of "lwm2m.o.buzzer".

LWM2M Resource name	Type	Required	Description
On/Off(5850)	boolean	yes	On/off control. Boolean value where True is On and False is Off.
Application Type(5750)	string	no	The application type of the sensor or actuator as a string depending on the use case.

9.3.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Buzzer",
  "definitions": {
    "lwm2m.o.buzzer": {
      "type": "object",
      "properties": {
        "On/Off(5850)": {
          "type": "boolean",
          "description": "On/off control. Boolean value where True is On and False is Off.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.door",
            "x-to-ocf": [
                                "oic.r.door.openAlarm = On/Off(5850)"
            ],
            "x-from-ocf": [
              "On/Off(5850) = oic.r.door.openAlarm"
            ]
          }
        },
                    "Application Type(5750)": {
          "type": "string",
          "description": "The application type of the sensor or actuator as a string depending on
the use case.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.door",
            "x-to-ocf": [""],
            "x-from-ocf": [
              "Application Type(5750) = \"Door Open Alarm\""
            ]
          }
        }
      }
    }

  },
  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.buzzer"}
  ],
  "required": ["On/Off(5850)"]
}
```

9.4 Device

9.4.1 Derived model

The derived model: "lwm2m.o.device".

9.4.2 Property definition

Table 7 provides the detailed per Property mapping for "lwm2m.o.device".

335 **Table 7 – The Property mapping for "lwm2m.o.device".**

LWM2M Resource name	OCF Resource	To OCF	From OCF
Battery Level (9)	oic.r.energy.battery	oic.r.energy.battery.charge = Battery Level(9)	Battery Level(9) = oic.r.energy.battery.charge
Device Type (17)	oic.wk.d	oic.wk.d.n = Device Type (17)	Device Type (17) = oic.wk.d.n
Battery Status (20)	oic.r.energy.battery	switch (Battery Status (20)) { Case 0 : oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = FALSE; oic.r.energy.battery.lowbattery = FALSE; break; Case 1 : oic.r.energy.battery.charging = TRUE; oic.r.energy.battery.defect = FALSE; oic.r.energy.battery.lowbattery = FALSE; break; Case 2 : oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = FALSE; oic.r.energy.battery.lowbattery = FALSE; break; Case 3 : oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = TRUE; oic.r.energy.battery.lowbattery = FALSE; break; Case 4 : oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = FALSE; oic.r.energy.battery.lowbattery = TRUE; break;	If (oic.r.energy.battery.charing == TRUE) {Battery Status (20) = 1;} alse { if (oic.r.energy.battery.defect == TRUE) {Battery Status (20) = 3;} if (oic.r.energy.battery.lowbattery == TRUE) {Battery Status (20) = 4;} if(oic.r.energy.battery.charge == 100) {Battery Status (20) = 2;} else {Battery Status (20) = 0;} }
Manufacturer (0)	oic.wk.p	oic.wk.p.mnmn = Manufacturer (0)	Manufacturer (0) = oic.wk.p.mnmn
Model Number (1)	oic.wk.p	oic.wk.p.mnmo = Model Number (1)	Model Number (1) = oic.wk.p.mnmo
Serial Number (2)	oic.wk.p	oic.wk.p.mnsel = Serial Number (2)	Serial Number (2) = oic.wk.p.mnsel
Firmware Version (3)	oic.wk.p	oic.wk.p.mnfv = Firmware Version (3)	Firmware Version (3) = oic.wk.p.mnfv
Hardware Version (18)	oic.wk.p	oic.wk.p.mnhw = Hardware Version (18)	Hardware Version (18) = oic.wk.p.mnhw

336 Table 8 provides the details of the Properties that are part of "lwm2m.o.device".

337 **Table 8 – The Properties of "lwm2m.o.device".**

LWM2M Resource name	Type	Required	Description
Battery Level (9)	integer	no	Contains the current battery level as a percentage (with a range from 0 to 100). This value

			is only valid for the Device internal Battery if present (one Available Power Sources Resource Instance is 1).
Device Type (17)	string	no	Type of the device (manufacturer specified string: e.g. smart meters / dev Class...)
Battery Status (20)	integer	no	This value is only valid for the Device Internal Battery if present
Manufacturer (0)	string	no	Human readable manufacturer name
Model Number (1)	string	no	A model identifier (manufacturer specified string)
Serial Number (2)	string	no	Serial Number
Firmware Version (3)	string	no	Current firmware version of the Device.
Hardware Version (18)	string	no	Current hardware version of the device.

9.4.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Device",
  "definitions": {
    "lwm2m.o.device": {
      "type": "object",
      "properties": {
        "Battery Level (9)": {
          "type": "integer",
          "description": "Contains the current battery level as a percentage (with a range from 0 to
100). This value is only valid for the Device internal Battery if present (one Available Power
Sources Resource Instance is 1).",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.energy.battery",
            "x-to-ocf": [
               "oic.r.energy.battery.charge = Battery Level(9)"
            ],
            "x-from-ocf": [
               "Battery Level(9)  = oic.r.energy.battery.charge"
            ]
          }
        },
        "Device Type (17)": {
          "type": "string",
          "description": "Type of the device (manufacturer specified string: e.g. smart meters / dev
Class…)",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.wk.d",
            "x-to-ocf": [
              "oic.wk.d.n = Device Type (17)"
            ],
            "x-from-ocf": [
              "Device Type (17) = oic.wk.d.n"
            ]
          }
        },
        "Battery Status (20)": {
          "type": "integer",
          "description": "This value is only valid for the Device Internal Battery if present",
          "x-ocf-conversion": {
```

```
              "x-ocf-alias": "oic.r.energy.battery",
              "x-to-ocf": [
                "switch (Battery Status (20)) {",
                "Case 0 :   oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect =
FALSE; oic.r.energy.battery.lowbattery = FALSE; break;",
                "Case 1 :   oic.r.energy.battery.charging = TRUE; oic.r.energy.battery.defect = FALSE;
oic.r.energy.battery.lowbattery = FALSE; break;",
                "Case 2 :  oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = FALSE;
oic.r.energy.battery.lowbattery = FALSE; break;",
                "Case 3 :  oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = TRUE;
oic.r.energy.battery.lowbattery = FALSE; break;",
                "Case 4 :  oic.r.energy.battery.charging = FALSE; oic.r.energy.battery.defect = FALSE;
oic.r.energy.battery.lowbattery = TRUE;  break;"
              ],
              "x-from-ocf": [
                "If (oic.r.energy.battery.charing == TRUE) {Battery Status (20) = 1;} ",
                "alse { if (oic.r.energy.battery.defect == TRUE) {Battery Status (20) = 3;} ",
                "if (oic.r.energy.battery.lowbattery == TRUE) {Battery Status (20) = 4;} ",
                "if(oic.r.energy.battery.charge == 100) {Battery Status (20)",
                "= 2;} ",
                "else {Battery Status (20) = 0;} }"
              ]
            }
          },
          "Manufacturer (0)": {
            "type": "string",
            "description": "Human readable manufacturer name",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.wk.p",
              "x-to-ocf": [
                "oic.wk.p.mnmn = Manufacturer (0)"
              ],
              "x-from-ocf": [
                "Manufacturer (0) = oic.wk.p.mnmn"
              ]
            }
          },
          "Model Number (1)": {
            "type": "string",
            "description": "A model identifier (manufacturer specified string)",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.wk.p",
              "x-to-ocf": [
                "oic.wk.p.mnmo = Model Number (1)"
              ],
              "x-from-ocf": [
                "Model Number (1) = oic.wk.p.mnmo"
              ]
            }
          },
          "Serial Number (2)": {
            "type": "string",
            "description": "Serial Number",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.wk.p",
              "x-to-ocf": [
                "oic.wk.p.mnsel = Serial Number (2)"
              ],
              "x-from-ocf": [
                "Serial Number (2) = oic.wk.p.mnsel"
              ]
            }
          },
          "Firmware Version (3)": {
            "type": "string",
            "description": "Current firmware version of the Device.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.wk.p",
              "x-to-ocf": [
                "oic.wk.p.mnfv = Firmware Version (3)"
              ],
              "x-from-ocf": [
```



```
              "Firmware Version (3) = oic.wk.p.mnfv"
            ]
          }
        },
        "Hardware Version (18)": {
          "type": "string",
          "description": "Current hardware version of the device.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.wk.p",
            "x-to-ocf": [
              "oic.wk.p.mnhw = Hardware Version (18)"
            ],
            "x-from-ocf": [
              "Hardware Version (18) = oic.wk.p.mnhw"
            ]
          }
        }
      }
    }
  },
  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.device"}
  ],
  "required": []
}
```

9.5 Digital Input

9.5.1 Derived model

The derived model: "lwm2m.o.digitalinput".

9.5.2 Property definition

Table 9 provides the detailed per Property mapping for "lwm2m.o.digitalinput".

Table 9 – The Property mapping for "lwm2m.o.digitalinput".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Digital Input state (5500)	oic.r.vehicle.connector	oic.r.vehicle.connector.connected = Digital Input state (5500)	Digital Input state (5500) = oic.r.vehicle.connector.connected
Sensor Type (5751)	oic.r.vehicle.connector		Sensor Type (5751) = "Vehicle Connector"
Application Type (5750)	oic.r.vehicle.connector		Application Type (5750) = "Vehicle Connector"

Table 10 provides the details of the Properties that are part of "lwm2m.o.digitalinput".

Table 10 – The Properties of "lwm2m.o.digitalinput".

LWM2M Resource name	Type	Required	Description
Digital Input state (5500)	boolean	yes	The current state of a digital input.
Sensor Type (5751)	string	no	The type of the sensor
Application Type (5750)	string	no	The minimum value that can be measured by the sensor.

9.5.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
```



```
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Digital Input",
  "definitions": {
    "lwm2m.o.digitalinput": {
      "type": "object",
      "properties": {
        "Digital Input state (5500)": {
          "type": "boolean",
          "description": "The current state of a digital input.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.vehicle.connector",
            "x-to-ocf": [
              "oic.r.vehicle.connector.connected = Digital Input state (5500)"
            ],
            "x-from-ocf": [
              "Digital Input state (5500) = oic.r.vehicle.connector.connected"
            ]
          }
        },
        "Sensor Type (5751)": {
          "type": "string",
          "description": "The type of the sensor",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.vehicle.connector",
            "x-to-ocf": [
              ""
            ],
            "x-from-ocf": [
              "Sensor Type (5751) = \"Vehicle Connector\""
            ]
          }
        },
        "Application Type (5750)": {
          "type": "string",
          "description": "The minimum value that can be measured by the sensor.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.vehicle.connector",
            "x-to-ocf": [
              ""
            ],
            "x-from-ocf": [
              "Application Type (5750) = \"Vehicle Connector\""
            ]
          }
        }
      }
    }
  },
  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.digitalinput"}
  ],
  "required": ["Digital Input state (5500)"]
}
```

9.6 Door

9.6.1 Derived model

The derived model: "lwm2m.o.door".

9.6.2 Property definition

Table 11 provides the detailed per Property mapping for "lwm2m.o.door".

Table 11 – The Property mapping for "lwm2m.o.door".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Door status(50)	oic.r.door	If (Door status(50) == 1) {oic.r.door.openState =	if(oic.r.door.openState == “open”) {Door status(50) =

		“open”;} else {oic.r.door.openState = “closed”;}	1; } else { Door statue(50) = 0;}
Door Name(1)	oic.r.door	oic.r.door.n = Door Name(1)	Door Name(1) = oic.r.door.n

Table 12 provides the details of the Properties that are part of "lwm2m.o.door".

Table 12 – The Properties of "lwm2m.o.door".

LWM2M Resource name	Type	Required	Description
Door status(50)	boolean	yes	The status of the door, 1:Opened, 0:Closed.
Door Name(1)	float	yes	The name of the door.

9.6.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Door",
  "definitions": {
    "lwm2m.o.door": {
      "type": "object",
      "properties": {
        "Door status(50)": {
          "type": "boolean",
          "description": "The status of the door, 1:Opened, 0:Closed.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.door",
            "x-to-ocf": [
              "If (Door status(50) == 1) {oic.r.door.openState = “open”;} else {oic.r.door.openState
= “closed”;}"
            ],
            "x-from-ocf": [
              "if(oic.r.door.openState == “open”) {Door status(50) = 1; } else { Door statue(50) =
0;}"
            ]
          }
        },
        "Door Name(1)": {
          "type": "float",
          "description": "The name of the door.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.door",
            "x-to-ocf": [
              "oic.r.door.n = Door Name(1)"
            ],
            "x-from-ocf": [
              "Door Name(1) = oic.r.door.n"
            ]
          }
        }
      }
    }
  },
  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.door"}
  ],
  "required": ["Door status(50)", "Door Name(1)"]
}
```

9.7 Energy

9.7.1 Derived model

The derived model: "lwm2m.o.energy".

9.7.2 Property definition

Table 13 provides the detailed per Property mapping for "lwm2m.o.energy".

Table 13 – The Property mapping for "lwm2m.o.energy".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Sensor Value (5700)	oic.r.energy.consumption	oic.r.energy.consumption.energy = Sensor Value(5700)	Sensor Value(5700) = oic.r.energy.consumption.energy
Application Type (5750)	oic.r.energy.consumption		Application Type (5750) = “Energy consumption”

Table 14 provides the details of the Properties that are part of "lwm2m.o.energy".

Table 14 – The Properties of "lwm2m.o.energy".

LWM2M Resource name	Type	Required	Description
Sensor Value (5700)	float	yes	Last or Current Measured Value from the Sensor. (energy consumption (Cumulative Power) of an electrical load)
Application Type (5750)	float	no	The application type of the sensor or actuator as a string depending on the use case.

9.7.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Energy",
  "definitions": {
    "lwm2m.o.energy": {
      "type": "object",
      "properties": {
        "Sensor Value (5700)": {
          "type": "float",
          "description": "Last or Current Measured Value from the Sensor. (energy consumption
(Cumulative Power) of an electrical load)",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.energy.consumption",
            "x-to-ocf": [
              "oic.r.energy.consumption.energy = Sensor Value(5700)"
            ],
            "x-from-ocf": [
              "Sensor Value(5700) = oic.r.energy.consumption.energy"
            ]
          }
        },
        "Application Type (5750)": {
          "type": "float",
          "description": "The application type of the sensor or actuator as a string depending on
the use case.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.energy.consumption",
            "x-to-ocf": [""],
            "x-from-ocf": [
              "Application Type (5750) = “Energy consumption”"
            ]
          }
        }
      }
    }
```



```
    },

  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.energy"}
  ],
  "required": ["Sensor Value (5700)"]
}
```

9.8 Humidity

9.8.1 Derived model

The derived model: "lwm2m.o.humidity".

9.8.2 Property definition

Table 15 provides the detailed per Property mapping for "lwm2m.o.humidity".

Table 15 – The Property mapping for "lwm2m.o.humidity".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Sensor Value (5700)	oic.r.humidity	oic.r.humidity.humidity = Sensor Value(5700)	Sensor Value(5700) = oic.r.humidity.humidity

Table 16 provides the details of the Properties that are part of "lwm2m.o.humidity".

Table 16 – The Properties of "lwm2m.o.humidity".

LWM2M Resource name	Type	Required	Description
Sensor Value (5700)	float	yes	Last or Current Measured Value from the Sensor.

9.8.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Humidity",
  "definitions": {
    "lwm2m.o.humidity": {
      "type": "object",
      "properties": {
        "Sensor Value (5700)": {
          "type": "float",
          "description": "Last or Current Measured Value from the Sensor.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.humidity",
            "x-to-ocf": [
              "oic.r.humidity.humidity = Sensor Value(5700)"
            ],
            "x-from-ocf": [
              "Sensor Value(5700) = oic.r.humidity.humidity"
            ]
          }
        }
      }
    }
  },

  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.humidity"}
  ],
  "required": ["Sensor Value (5700)"]
}
```


9.9 Load Control

9.9.1 Derived model

The derived model: "lwm2m.o.loadcontrol".

9.9.2 Property definition

Table 17 provides the detailed per Property mapping for "lwm2m.o.loadcontrol".

Table 17 – The Property mapping for "lwm2m.o.loadcontrol".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Start Time(5824)	oic.r.time.period	oic.r.time.period.startTime = Start Time(5824)	Start Time(5824) = oic.r.time.period.startTime
Duration in Min(5825)	oic.r.time.period	oic.r.time.period.interval = Duration in Min(5825)	Duration in Min(5825) = oic.r.time.period.interval
Event Identifier(5823)	oic.r.time.period	oic.r.time.period.id = Event Identifier(5823)	Event Identifier(5823) = oic.r.time.period.id

Table 18 provides the details of the Properties that are part of "lwm2m.o.loadcontrol".

Table 18 – The Properties of "lwm2m.o.loadcontrol".

LWM2M Resource name	Type	Required	Description
Start Time(5824)	time	yes	Start time
Duration in Min(5825)	integer	yes	Duration
Event Identifier(5823)	string	yes	Identifier

9.9.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Load Control",
  "definitions": {
    "lwm2m.o.loadcontrol": {
      "type": "object",
      "properties": {
        "Start Time(5824)": {
          "type": "time",
          "description": "Start time",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.time.period",
            "x-to-ocf": [
              "oic.r.time.period.startTime = Start Time(5824)"
            ],
            "x-from-ocf": [
              "Start Time(5824) = oic.r.time.period.startTime"
            ]
          }
        },
        "Duration in Min(5825)": {
          "type": "integer",
          "description": "Duration",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.time.period",
            "x-to-ocf": [
              "oic.r.time.period.interval = Duration in Min(5825)"
            ],
            "x-from-ocf": [
              "Duration in Min(5825) = oic.r.time.period.interval"
            ]
          }
        },
```

```
          "Event Identifier(5823)": {
            "type": "string",
            "description": "Identifier",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.time.period",
              "x-to-ocf": [
                "oic.r.time.period.id = Event Identifier(5823)"
              ],
              "x-from-ocf": [
                "Event Identifier(5823) = oic.r.time.period.id"
              ]
            }
          }
        }
      }
    },

    "type": "object",
    "allOf": [
      {"$ref": "#/definitions/lwm2m.o.loadcontrol"}
    ],
    "required": ["Start Time(5824)","Duration in Min(5825)", "Event Identifier(5823)"]
  }
```

9.10 Lock

9.10.1 Derived model

The derived model: "lwm2m.o.lock".

9.10.2 Property definition

Table 19 provides the detailed per Property mapping for "lwm2m.o.lock".

Table 19 – The Property mapping for "lwm2m.o.lock".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Lock Status(50)	oic.r.lock.status	If(Lock Status(50) == 1) {oic.r.lock.status.lockState = “Locked”;} else {oic.r.lock.status.lockState = “Unlocked”;}	If(oic.r.lock.status.lockState == “Locked”) {Lock Status(50) = 1;} else {Lock Status(50) = 0;}
Lock Name(1)	oic.r.lock.status	oic.r.lock.status.n = Lock Name(1);	Lock Name(1) = oic.r.lock.status.n

Table 20 provides the details of the Properties that are part of "lwm2m.o.lock".

Table 20 – The Properties of "lwm2m.o.lock".

LWM2M Resource name	Type	Required	Description
Lock Status(50)	boolean	no	The status of the lock, 1:Locked, 0:Unlocked.
Lock Name(1)	string	yes	Name

9.10.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Buzzer",
  "definitions": {
    "lwm2m.o.lock": {
      "type": "object",
      "properties": {
        "Lock Status(50)": {
          "type": "boolean",
```



```
            "description": "The status of the lock, 1:Locked, 0:Unlocked.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.lock.status",
              "x-to-ocf": [
                "If(Lock Status(50) == 1) {oic.r.lock.status.lockState = “Locked”;} else
{oic.r.lock.status.lockState = “Unlocked”;}"
              ],
              "x-from-ocf": [
                "If(oic.r.lock.status.lockState == “Locked”) {Lock Status(50) = 1;} else {Lock
Status(50) = 0;}"
              ]
            }
          },
          "Lock Name(1)": {
            "type": "string",
            "description": "Name",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.lock.status",
              "x-to-ocf": [
                "oic.r.lock.status.n = Lock Name(1);"
              ],
              "x-from-ocf": [
                "Lock Name(1) = oic.r.lock.status.n"
              ]
            }
          }
        }
      }
    },

    "type": "object",
    "allOf": [
      {"$ref": "#/definitions/lwm2m.o.lock"}
    ],
    "required": ["Lock Name(1)"]
}
```

9.11 On/Off switch

9.11.1 Derived model

The derived model: "lwm2m.o.onoffswitch".

9.11.2 Property definition

Table 21 provides the detailed per Property mapping for "lwm2m.o.onoffswitch".

Table 21 – The Property mapping for "lwm2m.o.onoffswitch".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Digital Input State (5500)	oic.r.switch.binary	oic.r.switch.binary.value = Digital Input State(5500)	Digital Input State(5500) = oic.r.switch.binary.value
Application Type (5750)	oic.r.switch.binary	oic.r.switch.binary.id = Application Type (5750)	Application Type (5750) = oic.r.switch.binary.id

Table 22 provides the details of the Properties that are part of "lwm2m.o.onoffswitch".

Table 22 – The Properties of "lwm2m.o.onoffswitch".

LWM2M Resource name	Type	Required	Description
Digital Input State (5500)	boolean	yes	The current state of a digital input.
Application Type (5750)	string	no	The application type of the sensor or actuator as a string depending on the use case.

9.11.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "On/Off switch",
  "definitions": {
    "lwm2m.o.onoffswitch": {
      "type": "object",
      "properties": {
        "Digital Input State (5500)": {
          "type": "boolean",
          "description": "The current state of a digital input.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.switch.binary",
            "x-to-ocf": [
              "oic.r.switch.binary.value = Digital Input State(5500)"
            ],
            "x-from-ocf": [
              "Digital Input State(5500) = oic.r.switch.binary.value"
            ]
          }
        },
        "Application Type (5750)": {
          "type": "string",
          "description": "The application type of the sensor or actuator as a string depending on
the use case.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.switch.binary",
            "x-to-ocf": [
              "oic.r.switch.binary.id = Application Type (5750)"
            ],
            "x-from-ocf": [
              "Application Type (5750) = oic.r.switch.binary.id"
            ]
          }
        }
      }
    }
  },

  "type": "object",
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.onoffswitch"}
  ],
  "required": ["Digital Input State (5500)"]
}
```

9.12 Position

9.12.1 Derived model

The derived model: "lwm2m.o.position".

9.12.2 Property definition

Table 23 provides the detailed per Property mapping for "lwm2m.o.position".

Table 23 – The Property mapping for "lwm2m.o.position".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Current Position (5536)	oic.r.openlevel	oic.r.openlevel.openLevel = Current Position(5536)	Current Position(5536) = oic.r.openlevel.openLevel
Min Limit (5520)	oic.r.openlevel	oic.r.openlevel.ragne[0] = Min Limit (5520)	Min Limit (5520) = oic.r.openlevel.ragne[0]
Max Limit (5750)	oic.r.openlevel	oic.r.openlevel.ragne[1]= Max Limit (5750)	Max Limit (5750) = oic.r.openlevel.ragne[1]

Table 24 provides the details of the Properties that are part of "lwm2m.o.position".

Table 24 – The Properties of "lwm2m.o.position".

LWM2M Resource name	Type	Required	Description
Current Position (5536)	float	no	Current position or desired position of a positioner actuator.
Min Limit (5520)	float	no	The minimum value that can be measured by the sensor.
Max Limit (5750)	float	no	The maximum value that can be measured by the sensor.

9.12.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Position",
  "definitions": {
    "lwm2m.o.position": {
      "type": "object",
      "properties": {
        "Current Position (5536)": {
          "type": "float",
          "description": "Current position or desired position of a positioner actuator.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.openlevel",
            "x-to-ocf": ["oic.r.openlevel.openLevel = Current Position(5536)"
            ],
            "x-from-ocf": [
              "Current Position(5536) =  oic.r.openlevel.openLevel"
            ]
          }
        },
        "Min Limit (5520)": {
          "type": "float",
          "description": "The minimum value that can be measured by the sensor.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.openlevel",
            "x-to-ocf": [
              "oic.r.openlevel.ragne[0] = Min Limit (5520)"
            ],
            "x-from-ocf": [
              "Min Limit (5520) = oic.r.openlevel.ragne[0]"
            ]
          }
        },
        "Max Limit (5750)": {
          "type": "float",
          "description": "The maximum value that can be measured by the sensor.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.openlevel",
            "x-to-ocf": [
              "oic.r.openlevel.ragne[1]= Max Limit (5750)"
            ],
            "x-from-ocf": [
              "Max Limit (5750) = oic.r.openlevel.ragne[1]"
            ]
          }
        }
      }
    }
  },

  "type": "object",
```

```
  "allOf": [
    {"$ref": "#/definitions/lwm2m.o.position"}
  ],
  "required": ["Current Position(5536)"]
}
```

9.13 Power

9.13.1 Derived model

The derived model: "lwm2m.o.power".

9.13.2 Property definition

Table 25 provides the detailed per Property mapping for "lwm2m.o.power".

Table 25 – The Property mapping for "lwm2m.o.power".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Sensor Value (5700)	oic.r.energy.consumption	oic.r.energy.consumption.power = Sensor Value(5700)	Sensor Value(5700) = oic.r.energy.consumption.power
Application Type (5750)	oic.r.energy.consumption		Application Type (5750) = “Power consumption”

Table 26 provides the details of the Properties that are part of "lwm2m.o.power".

Table 26 – The Properties of "lwm2m.o.power".

LWM2M Resource name	Type	Required	Description
Sensor Value (5700)	float	yes	Last or Current Measured Value from the Sensor. (power measurements)
Application Type (5750)	float	no	The application type of the sensor or actuator as a string depending on the use case.

9.13.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Power",
  "definitions": {
    "lwm2m.o.power": {
      "type": "object",
      "properties": {
        "Sensor Value (5700)": {
          "type": "float",
          "description": "Last or Current Measured Value from the Sensor. (power measurements)",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.energy.consumption",
            "x-to-ocf": ["oic.r.energy.consumption.power = Sensor Value(5700)"
            ],
            "x-from-ocf": [
              "Sensor Value(5700) = oic.r.energy.consumption.power"
            ]
          }
        },
        "Application Type (5750)": {
          "type": "float",
          "description": "The application type of the sensor or actuator as a string depending on
the use case.",
          "x-ocf-conversion": {
            "x-ocf-alias": "oic.r.energy.consumption",
```

```
            "x-to-ocf": [      ""],
            "x-from-ocf": [
              "Application Type (5750) = “Power consumption”"
            ]
          }
        }
      }
    },

    "type": "object",
    "allOf": [
      {"$ref": "#/definitions/lwm2m.o.power"}
    ],
    "required": ["Sensor Value (5700)"]
}
```

9.14 Temperature

9.14.1 Derived model

The derived model: "lwm2m.o.temperature".

9.14.2 Property definition

Table 27 provides the detailed per Property mapping for "lwm2m.o.temperature".

Table 27 – The Property mapping for "lwm2m.o.temperature".

LWM2M Resource name	OCF Resource	To OCF	From OCF
Sensor Value (5700)	oic.r.temperature	oic.r.temperature.temperature = Sensor Value(5700)	Sensor Value(5700) = oic.r.temperature.temperature
Sensor units (5701)	oic.r.temperature	oic.r.temperature.units = Sensor units (5701)	Sensor units (5701) = oic.r.temperature.units
Min Range Value (5603)	oic.r.temperature	oic.r.temperature.range[0] = Min Range Value (5603)	Min Range Value (5603) = oic.r.temperature.range[0]
Max Range Value (5604)	oic.r.temperature	oic.r.temperature.range[1] = Max Range Value (5604)	Max Range Value (5604) = oic.r.temperature.range[1]

Table 28 provides the details of the Properties that are part of "lwm2m.o.temperature".

Table 28 – The Properties of "lwm2m.o.temperature".

LWM2M Resource name	Type	Required	Description
Sensor Value (5700)	float	yes	Last or Current Measured Value from the Sensor.
Sensor units (5701)	string	no	Measurement Units Definition.
Min Range Value (5603)	float	no	The minimum value that can be measured by the sensor.
Max Range Value (5604)	float	no	The maximum value that can be measured by the sensor.

9.14.3 Derived model definition

```
{
  "id": "http://openinterconnect.org/asamapping/schemas/asa.environment.currentairquality.json#",
  "$schema": "http://json-schema.org/draft-04/schema#",
  "description" : "Copyright (c) 2017 Open Connectivity Foundation, Inc. All rights reserved.",
  "title": "Temperature",
  "definitions": {
```

```
      "lwm2m.o.temperature": {
        "type": "object",
        "properties": {
          "Sensor Value (5700)": {
            "type": "float",
            "description": "Last or Current Measured Value from the Sensor.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.temperature",
              "x-to-ocf": [
                "oic.r.temperature.temperature = Sensor Value(5700)"
              ],
              "x-from-ocf": [
                "Sensor Value(5700) = oic.r.temperature.temperature"
              ]
            }
          },
          "Sensor units (5701)": {
            "type": "string",
            "description": "Measurement Units Definition.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.temperature",
              "x-to-ocf": [
                "oic.r.temperature.units = Sensor units (5701)"
              ],
              "x-from-ocf": [
                "Sensor units (5701) = oic.r.temperature.units"
              ]
            }
          },
          "Min Range Value (5603)": {
            "type": "float",
            "description": "The minimum value that can be measured by the sensor.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.temperature",
              "x-to-ocf": [
                "oic.r.temperature.range[0] = Min Range Value (5603)"
              ],
              "x-from-ocf": [
                "Min Range Value (5603) = oic.r.temperature.range[0]"
              ]
            }
          },"Max Range Value (5604)": {
            "type": "float",
            "description": "The maximum value that can be measured by the sensor.",
            "x-ocf-conversion": {
              "x-ocf-alias": "oic.r.temperature",
              "x-to-ocf": [
                "oic.r.temperature.range[1] = Max Range Value (5604)"
              ],
              "x-from-ocf": [
                "Max Range Value (5604) = oic.r.temperature.range[1]"
              ]
            }
          }
        }
      }
    },

    "type": "object",
    "allOf": [
      {"$ref": "#/definitions/lwm2m.o.temperature"}
    ],
    "required": ["Sensor Value (5700)"]
  }
```

