

**OCF 2.3 – Z-Wave Translation – BTG CR 2478**

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26

27

28	3	Terms, definitions, symbols and abbreviations .....	3
29	3.1	Terms and definitions.....	3
30	<b>9</b>	<b>Z-Wave Translation</b> .....	<b>3</b>
31	<b>9.1</b>	<b>Operational scenarios</b> .....	<b>3</b>
32	9.1.1	Overview of OCF-Z-Wave bridging.....	3
33	9.1.2	Use case for OCF Client and Z-Wave server.....	4
34	9.2	Requirements specific to Z-Wave Bridging Function.....	4
35	9.2.1	Requirements specific to a Z-Wave.....	4
36	9.2.2.2	On-the-fly Translation.....	11
37	9.2.3	Security .....	11

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42 **3 Terms, definitions, symbols and abbreviations**

43 **3.1 Terms and definitions**

44 3.1.X

45 **Command Class**

46 A collection of commands used for controlling, querying, and reporting information corresponding to  
47 specific function supported by a Z-Wave device.

48 **9 Z-Wave Translation**

49 **9.1 Operational scenarios**

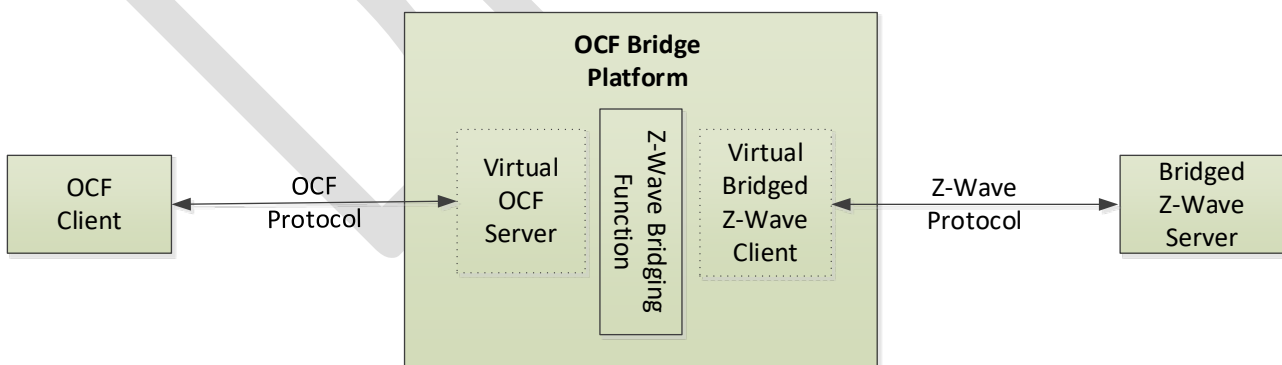
50 The overall goals are to:

- 51 • Make Bridged Z-Wave Servers appear to OCF Clients as if they were native OCF Servers in  
52 the local network or cloud environment

53 “Deep translation” between a specific Z-Wave device and an OCF Device is specified in a separate  
54 document. “On-the-fly” translation is out of scope (refer to section 5.1 “Deep translation” vs. “on-the-  
55 fly” of OCF Bridging Specification).

56 **9.1.1 Overview of OCF-Z-Wave bridging**

57 OCF Z-Wave Bridge Platform provides the bridging function between an OCF Client and a Bridged Z-  
58 Wave Server. The asymmetric bridging is applied to Z-Wave Bridging Function. Z-Wave Bridging  
59 Function is performing the translation to or from a Z-Wave Protocol. The Z-Wave Bridge Platform  
60 exposes Bridged Z-Wave Server to OCF Client and OCF Cloud. Bridged Z-Wave Server provides Z-  
61 Wave specific data via a Z-Wave protocol for a Virtual Bridged Z-Wave Client. Figure 2 presents the  
62 overview of an OCF Z-Wave Bridge Platform and its general topology.



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**Figure 1 OCF Z-Wave Bridge Platform and Components**

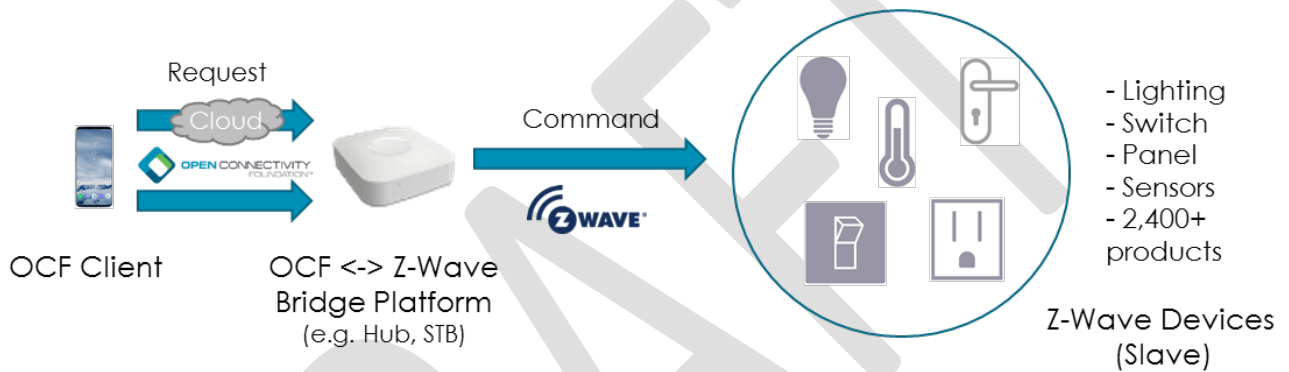
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66 **9.1.2 Use case for OCF Client and Z-Wave server**

67 A use case for an OCF Client and Z-Wave Server is presented in the Figure 3. A smartphone device  
 68 acting as the OCF Client is allowed to send a command for controlling, querying and reporting the  
 69 information of Z-Wave devices via an OCF Z-Wave Bridge Platform. For that, Z-Wave Server devices  
 70 such as door locks with a keypad and light dimmer switch are represented as virtual OCF Z-Wave  
 71 server devices on an OCF Z-Wave Bridge Platform. Any connectivity that OCF supports is used to  
 72 communicate between OCF Client and an OCF Z-Wave Bridge. Furthermore, an OCF Client can also  
 73 communicate with an OCF Z-Wave Bridge Platform via an OCF Cloud.

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77 **Figure 2 OCF Client and Z-Wave Server**

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79 **9.2 Requirements specific to Z-Wave Bridging Function**

80 **9.2.1 Requirements specific to a Z-Wave**

81 The version of Z-Wave device type for OCF Z-Wave Bridging shall be Z-Wave Plus or Z-Wave Plus  
 82 v2. The Z-Wave Bridging Function shall act as Z-Wave Controller which sets up and performs  
 83 maintenance operations such as inclusion and exclusion of devices in a Z-Wave network.

84 The requirements in this section apply when using algorithmic translation, and by default apply to  
 85 deep translation unless the relevant specification for such deep translation specifies otherwise.

86 **9.2.2 Exposing Z-Wave servers to OCF clients**

87 The translation rule between Z-Wave and OCF data model is described in Table 1. The nature of how  
 88 Z-Wave devices are structured may be different than how an OCF Device is structured. For example,  
 89 Light Dimmer Switch is mapped to OCF Light with the device type oic.d.light and a Sensor – Multilevel  
 90 and a Sensor – Notification is mapped to OCF Sensors with the 'Device Type 'oic.d.sensor'. A Z-  
 91 Wave Command Class may be mapped to one or more OCF Resources. For instance, Multilevel  
 92 Switch Command Class is mapped to OCF binary switch and dimming light. Each Command Class  
 93 parameter is conditionally required to be mapped to a Property of an OCF Resource.

94 **Table 1 Translation Rule between Z-Wave and OCF data model**

From Z-Wave	Mapping count	To OCF	Mapping count
<b>Z- Wave Plus Device Type</b>	n	OCF Device	1
<b>Command Class</b>	1	OCF Resource	n
<b>Parameter</b>	1	OCF Resource property	1

95

96 Table 2 is a mapping example of this rule.

 97 **Table 2 Z-Wave → OCF mapping example (Light Dimmer Switch)**

Z-Wave		OCF	
<b>Z- Wave Plus Device Type</b>	Light Dimmer Switch	<b>OCF Device</b>	oic.d.light (Light)
<b>Command Class</b>	Multilevel Switch Command Class (Multilevel Set/Get/Report) Switch	<b>OCF Resource(s)</b>	oic.r.switch.binary (Value)
	Manufacturer Specific Command Class (Manufacturer Get/Report) Specific		oic.r.light.dimming (dimmingSetting)
	Version Command Class (Version Get/Report)		oic.wk.d (Device) oic.wk.p (Platform)
	Z-Wave Plus Info Command Class (Z-Wave Plus Info Get/Report)		
<b>Z-Wave Command Parameter</b>	Value (255 or 0)	<b>OCF Resource Property</b>	Value (True or False)
	Value (1~99)		dimmingSetting (Integer)

98 If Z-Wave Plus device, Z-Wave Command Class, Z-Wave Command Parameter are enlisted in the  
 99 well-defined set as specified in OCF Z-Wave Data Model Mapping, Bridging Function shall follow the  
 100 specification for translating it to an OCF device, OCF resource or OCF resource property (i.e., “deep  
 101 translation”).

102 A Z-Wave Server device maps to a single OCF Device Type. The OCF Device Type is provided by  
 103 using the Device identifier of the Z-Wave Server device. Z-Wave Bridging Function has a table which  
 104 includes the mapping information between the Z-Wave device identifier and the OCF Device Type.  
 105 Based on the table, the Z-Wave Bridging Function finds the Device Type according to the Z-Wave  
 106 device identifier.

107 A Z-Wave device includes one or more Z-Wave Command Class. If a Z-Wave Command Class maps  
 108 to resource type on a single OCF resource, there should be a single Virtual OCF Resource. If a Z-

109 Wave Command Class maps to multiple OCF resource, an OCF resource may exist with an OCF  
 110 Resource Type of ["oic.wk.col"] which is a Collection of links. The links in the collection are the  
 111 Resources with translated Resource Types. The resource mapping between Z-Wave Server and OCF  
 112 Resources is defined in the OCF Z-Wave Data Model Mapping specification. The Z-Wave Bridging  
 113 Function have a table which includes the mapping information between the identifier of Command  
 114 Class and OCF Resource Type(s). After a virtual Bridged Z-Wave Client and Bridged Z-Wave Server  
 115 device have done the inclusion procedure as specified in the Z-wave Plus Role Type Specification, a  
 116 Z-Wave Bridging Function obtains the list of Command Class identifiers. Based upon the table, a Z-  
 117 Wave Bridging Function finds the matched OCF Resource Type(s) according to the identifier of Z-  
 118 Wave Command Class.

119 Since the Bridging Function knows all relationships between OCF Resources and Z-Wave servers,  
 120 the path component of URI can be freely chosen. To maintain the relationship information and URI  
 121 definition is implementation specific.

122 If a Z-Wave operation fails, the Bridging Function sends an appropriate OCF error response to the  
 123 OCF Client. It constructs an appropriate OCF error message (e.g., diagnostic payload if using CoAP)  
 124 from the Z-Wave enumerated status value and Z-Wave error message (if any), using the form "<error  
 125 name>: <error message>", with the <error name> and <error message> taken from the Z-Wave error  
 126 message, and the error code for the OCF network set to an appropriate value.

### 127 9.2.2.1 Translation for well-defined set

128 Table 3 is the list of Z-Wave Plus device types which have corresponding OCF Resources. Translation  
 129 should be done as follows in the table if the Z-Wave Plus device type supports deep translation which  
 130 is aligned with the OCF Device Specification.

131 **Table 3 Z-Wave Device & Command Class – OCF Device & Resource mapping**

Z- Wave Plus Device	Z-Wave Command Class	OCF Resource Type	OCF Device Type	OCF Device Name
<b>Light Dimmer Switch</b>	Multilevel Switch Command Class	oic.r.switch.binary	oic.d.light	Light
	Multilevel Switch Command Class	oic.r.light.dimming		
	Manufacturer Specific Command Class	oic.wk.d		
	Version Command Class Z-Wave Plus Info Command Class	oic.wk.p		
<b>Door Lock – Keypad</b>	Door Lock Command Class	oic.r.lock.status	oic.d.smartlock	Smart Lock
	User Code Command Class	oic.r.lock.code		
	Battery Command Class	oic.r.energy.battery.		
	Manufacturer Specific Command Class Version Command Class Z-Wave Plus Info Command Class	oic.wk.d oic.wk.p		
<b>On/Off Power Switch</b>	Binary Switch Command Class	oic.r.switch.binary	oic.d.switch	Switch
	Battery Command Class	oic.r.energy.battery.		

	Manufacturer Specific Command Class	oic.wk.d		
	Version Command Class			
	Z-Wave Plus Info Command Class	oic.wk.p		
<b>Sensor - Multilevel</b>	Multilevel Sensor Command Class	oic.r.sensor.carbondioxide	oic.d.sensor	Generic Sensor
	Multilevel Sensor Command Class	oic.r.sensor.carbonmonoxide		
	Multilevel Sensor Command Class	oic.r.sensor.water		
	Multilevel Sensor Command Class	oic.r.sensor.smoke		
	Battery Command Class	oic.r.energy.battery.		
	Manufacturer Specific Command Class	oic.wk.d		
Version Command Class				
	Z-Wave Plus Info Command Class	oic.wk.p		
<b>Sensor - Notification</b>	Notification Command Class	oic.r.sensor.carbondioxide	oic.d.sensor	Generic Sensor
	Notification Command Class	oic.r.sensor.carbonmonoxide		
	Notification Command Class	oic.r.sensor.water		
	Notification Command Class	oic.r.sensor.smoke		
	Battery Command Class	oic.r.energy.battery.		
	Manufacturer Specific Command Class	oic.wk.d		
Version Command Class				
	Z-Wave Plus Info Command Class	oic.wk.p		

132 Z-Wave Plus v2 device types which are equivalently mapped to the Z-Wave Plus device types that  
 133 supports deep translation are should be translated as specified in the table as well.

#### 134 9.2.2.1.1 Exposing a Z-Wave Server as a Virtual OCF Server

135 Table 4 shows how OCF Device properties, as specified in Table 25 in the OCF Core Specification,  
 136 shall be derived, typically from fields of Command Parameter of Z-Wave Command Classes specified  
 137 in the Z-Wave Command Class specifications

138 As specified in the OCF Security Specification, the value of the “di” property of OCF Devices (including  
 139 Virtual OCF Devices) shall be established as part of Onboarding of that Virtual OCF Device.

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 141

**Table 4 oic.wk.d Resource Type definition**

To OCF Property title	OCF Property name	OCF Description	OCF Mandat ory	From Z-Wave Field name	Z-Wave Description	Z-Wave Mandatory*
(Device) Name	n	Human friendly name For example, “Bob’s Thermostat”	Y	Translate Product ID to Human friendly name based upon the Product ID/product name	Product ID: a unique ID identifying the actual product as defined by the manufacturer for each product of a given product type.	Product ID: Y

				table within Z-Wave Controller	Defined in Manufacturer Specific Command Class	
Spec Version	icv	Spec version of the core specification this device is implemented to, The syntax is "core.major.minor" ]	Y	(none)	Bridge Platform should return its own value	
Device ID	di	Unique identifier for Device. This value shall be as defined in OCF Security Specification for Device ID.	Y	(none)	Use as defined in the OCF Security Specification	
Protocol-Independent ID	piid	Unique identifier for OCF Device (UUID)	Y	(none)	Bridging Function should return a random-generated UUID as specified in the section 4.4 of IETF RFC 4122	
Data Model Version	dmv	Spec version(s) of the vertical specifications this device data model is implemented to. The syntax is a comma separated list of "<vertical>.major.minor"]. <vertical> is the name of the vertical (i.e. sh for Smart Home)	Y	(none)	Bridge Platform should return its own value	
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 RFC 5646 language tag) and a 'value' field containing the device description in the indicated language.	N	(none)		
Software Version	sv	Version of the device software.	N	Firmware 0 Version	Dedicated to the Z-Wave chip firmware as defined by the manufacturer which assigns a version number Defined in Version Command Class	N
Manufacturer Name	dmn	Name of manufacturer of the Device, in one or more languages. This property is an array of objects	N	Translate Manufacturer ID to Human friendly name based upon the Manufacturer ID/Manufacturer	Manufacturer ID: the unique ID identifying the manufacturer of the device. Defined in Manufacturer Specific Command Class	Y



		where each object has a 'language' field (containing an RFC 5646 language tag) and a 'value' field containing the manufacturer name in the indicated language.		name table within Z-Wave Controller		
Model Number	dmno	Model number as designated by manufacturer.	N	Product ID	A unique ID identifying the actual product as defined by the manufacturer for each product of a given product type. Defined in Manufacturer Specific Command Class	Y

142 Table 5 shows how OCF Device Configuration properties, as specified in Table 20 in OCF Core  
 143 Specification, shall be derived:

144 **Table 5 oic.wk.con Resource Type definition**

To OCF Property title	OCF Property name	OCF Description	OCF Mandatory	From Z-Wave Field name	Z-Wave Description	Z-Wave Mandatory*
(Device) Name	n	Human friendly name For example, "Bob's Thermostat"	Y	Translate Product ID to Human friendly name based upon the Product ID/product name table within Z-Wave Controller	Product ID: a unique ID identifying the actual product as defined by the manufacturer for each product of a given product type Defined in Manufacturer Specific Command Class	Product ID: Y
Location	loc	Provides location information where available.	N	(none)		
Location Name	locn	Human friendly name for location For example, "Living Room".	N	(none)		
Currency	c	Indicates the currency that is used for any monetary transactions	N	(none)		
Region	r	Free form text Indicating the current region in which the device is located geographically. The free form text shall not start with a quote (").	N	(none)		
Localized Names	ln	Human-friendly name of the Device, in one or more languages. This property is an array of objects where each object has a 'language' field (containing an RFC 5646 language tag) and a 'value' field containing the device name in the indicated language. If this	N	Translate Product ID to Human friendly name based upon the Product ID/product name table within Z-Wave Controller	Product ID: a unique ID identifying the actual product as defined by the manufacturer for each product of a given product type Defined in Manufacturer Specific Command Class	Product ID: Y

		property and the Device Name (n) property are both supported, the Device Name (n) value shall be included in this array.				
Default Language	dl	The default language supported by the Device, specified as an RFC 5646 language tag. By default, clients can treat any string property as being in this language unless the property specifies otherwise.	N	Language	Specify the language settings on a device Defined in Language Command Class	N

145 Table 6 shows how OCF Platform properties, as specified in Table 26 in the OCF Core Specification,  
 146 shall be derived, typically from fields of Command Parameter of Z-Wave Command Class specified  
 147 in the Z-Wave Command Class specifications.

148 **Table 6 oic.wk.p Resource Type definition**

To Property title	OCF Property name	OCF Description	OCF Mandatory	From Z-Wave Field name	Z-Wave Description	Z-Wave Mandatory
Platform ID	pi	Unique identifier for the physical platform (UUID); 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.	Y	(none)	Bridging Function should return a random-generated UUID as specified in the section 4.4 of IETF RFC 4122.	
Manufacturer Name	mnmn	Name of manufacturer (not to exceed 16 characters)	Y	Translate Manufacturer ID to Human friendly name based upon the Manufacturer ID/Manufacturer name table within Z-Wave Controller	Manufacturer ID: the unique ID identifying the manufacturer of the device. Defined in Manufacturer Specific Command Class	Y
Manufacturer Details Link (URL)	mnml	URL to manufacturer (not to exceed 32 characters)	N	(none)		
Model Number	mnmo	Model number as designated by manufacturer	N	Product ID	A unique ID identifying the actual product as defined by the manufacturer for each product of a given product type Defined in Manufacturer Specific Command Class	Y
Date of Manufacture	mnmt	Manufacturing date of device	N	(none)		
Platform Version	mnpv	Version of platform – string (defined by manufacturer)	N	(none)		

OS Version	mnos	Version of platform resident OS – string (defined by manufacturer)	N	(none)		
Hardware Version	mnhw	Version of platform hardware	N	Hardware Version	A value which is unique to this particular version of the product Defined in Version Command Class	Y
Firmware version	mnfv	Version of device firmware	N	Firmware 0 Version	Dedicated to the Z-Wave chip firmware as defined by the manufacturer which assigns a version number Defined in Version Command Class	N
Support link	mnsi	URI that points to support information from manufacturer	N	(none)		
SystemTime	st	Reference time for the device	N	(none)		
Vendor ID	vid	Vendor defined string for the platform. The string is freeform and up to the vendor on what text to populate it.	N	(none)		

149 **9.2.2.2 On-the-fly Translation**

150 If a Z-Wave Plus device is not enlisted in a well-defined set, a Z-Wave Bridging Function may not  
 151 translate it.

152 **9.2.3 Security**

153 OCF Z-Wave Bridge Platform follows clause X.X in the OCF Security Specification for general security  
 154 requirements. **In the**