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# **ZigBee Cluster Library Window Covering (0x0102) Test Specification Version 1.0**

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Abstract

This document describes the certification tests for devices which implement the ZCL Window Covering cluster.

Keywords

ZCL, window covering, cluster

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## Revision history

Revision	Date	Details	Editor
00	September 2 <sup>nd</sup> , 2015	Created from the cluster test specification example document 15-0041.	Yingbo Li
01	September 25 <sup>th</sup> , 2015	Replaced the PICS code <i>WC</i> by <i>WNCV</i> that designated by ZCL6	Yingbo Li
02	October 28 <sup>th</sup> , 2015	Resolved comments received from ZigBee 3.0 v0.9 letter ballot	Yingbo Li
03	March 1 <sup>st</sup> , 2016	Addressed comments from the ZigBee 3.0 SVEs.	Phil Jamieson
04	April 18 <sup>th</sup> , 2016	Changed status to "approved" and version to 1.0.	Phil Jamieson

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## 1 Introduction

This document contains the PICS, test specification and PICS/test case cross reference for the ZCL *window covering* cluster.

### 1.1 Conformance levels

The key words "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED" and "MAY" in this document are to be interpreted as described in [R7].

### 1.2 Special symbols

Symbol	Description
~	Boolean NOT operator.
&&	Boolean AND operator.
	Boolean OR operator.

## 2 References

### 2.1 Zig Bee Alliance documents

- [R1] ZigBee Cluster Library Specification, ZigBee Alliance document 07-5123.
- [R2] ZigBee Base Device Behavior Specification 13-0402
- [R3] ZCL General Test Specification, ZigBee Alliance document 15-0xxx.
- [R4] ZCL Groups Cluster Test Specification, ZigBee Alliance document 15-0306.
- [R5] ZCL Scenes Cluster Test Specification, ZigBee Alliance document 15-0308.
- [R6] ZCL Window Covering Cluster XML PICS, ZigBee Alliance document 13-0209.

### 2.2 IETF documents

- [R7] S. Bradner, Key words for use in RFCs to Indicate Requirement Levels, IETF RFC 2119, March 1997.

### 3 PICS

All references are for the ZigBee Cluster Library specification [R1] unless otherwise indicated.  
An XML version of these PICS is also available in [R6].

#### 3.1 Usage

Item number	Feature	Reference	Status	Support
WNCV.S	Does the device implement the <i>window covering</i> cluster as a server?	7.4.2	O	No
WNCV.S.Lift	Does the device implementing the <i>window covering</i> server cluster support lift actions?	7.4	WNCV.S: O.1	No
WNCV.S.Tilt	Does the device implementing the <i>window covering</i> server cluster support tilt actions?	7.4	WNCV.S: O.1	No
WNCV.S.ClosedLoop	Does the device implementing the <i>window covering</i> server cluster support Closed Loop control?	7.4	WNCV.S: O	No
WNCV.C	Does the device implement the <i>window covering</i> cluster as a client?	7.4.3	O	Yes

Notes:

O.1 One of the items marked O.1 SHALL be supported.

#### 3.2 Server

##### 3.2.1 Attributes

Item number	Feature	Reference	Status	Support
WNCV.S.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	7.4.1.1	WNCV.S: M	No
WNCV.S.A0000	Does the device implement the <i>WindowCoveringType</i> attribute?	Table 7.40, 7.4.2.1.2	WNCV.S: M	No
WNCV.S.A0001	Does the device implement the <i>PhysicalClosedLimitLift</i> attribute?	Table 7.40, 7.4.2.1.2.1	WNCV.S: O	No
WNCV.S.A0002	Does the device implement the <i>PhysicalClosedLimitTilt</i> attribute?	Table 7.40, 7.4.2.1.2.2	WNCV.S: O	No

Item number	Feature	Reference	Status	Support
WNCV.S.A0003	Does the device implement the <i>CurrentPositionLift</i> attribute?	Table 7.40, 7.4.2.1.2.3	WNCV.S: O	No
WNCV.S.A0004	Does the device implement the <i>CurrentPositionTilt</i> attribute?	Table 7.40, 7.4.2.1.2.4	WNCV.S: O	No
WNCV.S.A0005	Does the device implement the <i>NumberOfActuationsLift</i> attribute?	Table 7.40, 7.4.2.1.2.5	WNCV.S: O	No
WNCV.S.A0006	Does the device implement the <i>NumberOfActuationsTilt</i> attribute?	Table 7.40, 7.4.2.1.2.6	WNCV.S: O	No
WNCV.S.A0007	Does the device implement the <i>Config/Status</i> attribute?	Table 7.40, 7.4.2.1.2.7	WNCV.S: M	No
WNCV.S.A0008	Does the device implement the <i>CurrentPositionLiftPercentage</i> attribute?	Table 7.40, 7.4.2.1.3	(WNCV.S.Lift && WNCV.S.ClosedLoop): M	No
WNCV.S.A0008.Scene	Does the device implement receiving and responding to the scene cluster commands for the <i>CurrentPositionLiftPercentage</i> attribute?	7.4.2.2.6	(WNCV.S.Lift && S.S): M	No
WNCV.S.A0008.Report.DefaultConfig	Does the device implement default reporting configuration for the <i>CurrentPositionLiftPercentage</i> attribute?	[R2] 6.7	(WNCV.S.Lift && WNCV.S.ClosedLoop): M	No
WNCV.S.A0008.Report.Tx	Does the device implement receiving and responding to the global report attribute commands for the <i>CurrentPositionLiftPercentage</i> attribute and sending reports?	7.4.2.2.7	(WNCV.S.Lift && WNCV.S.ClosedLoop): M	No
WNCV.S.A0009	Does the device implement the <i>CurrentPositionTiltPercentage</i> attribute?	Table 7.40, 7.4.2.1.4	(WNCV.S.Tilt && WNCV.S.ClosedLoop): M	No
WNCV.S.A0009.Scene	Does the device implement receiving and responding to the scene cluster commands for the <i>CurrentPositionTiltPercentage</i> attribute?	7.4.2.2.6	(WNCV.S.Tilt && S.S): M	No
WNCV.S.A0009.Report.DefaultConfig	Does the device implement default reporting configuration for the <i>CurrentPositionTiltPercentage</i> attribute?	[R2] 6.7	(WNCV.S.Tilt && WNCV.S.ClosedLoop): M	No

Item number	Feature	Reference	Status	Support
WNCV.S.A0009.Report.Tx	Does the device implement receiving and responding to the global report attribute commands for the <i>CurrentPositionTiltPercentage</i> attribute and sending reports?	7.4.2.2.7	(WNCV.S.Tilt && WNCV.S.ClosedLoop): M	No
WNCV.S.A0010	Does the device implement the <i>InstalledOpenLimitLift</i> attribute?	Table 7.43, 7.4.2.1.5.1	(WNCV.S.Lift && WNCV.S.ClosedLoop): M	No
WNCV.S.A0011	Does the device implement the <i>InstalledClosedLimitLift</i> attribute?	Table 7.43, 7.4.2.1.5.2	(WNCV.S.Lift && WNCV.S.ClosedLoop): M	No
WNCV.S.A0012	Does the device implement the <i>InstalledOpenLimitTilt</i> attribute?	Table 7.43, 7.4.2.1.5.3	(WNCV.S.Tilt && WNCV.S.ClosedLoop): M	No
WNCV.S.A0013	Does the device implement the <i>InstalledClosedLimitTilt</i> attribute?	Table 7.43, 7.4.2.1.5.4	(WNCV.S.Tilt && WNCV.S.ClosedLoop): M	No
WNCV.S.A0014	Does the device implement the <i>VelocityLift</i> attribute?	Table 7.43, 7.4.2.1.5.5	WNCV.S: O	No
WNCV.S.A0015	Does the device implement the <i>AccelerationTimeLift</i> attribute?	Table 7.43, 7.4.2.1.5.6	WNCV.S: O	No
WNCV.S.A0016	Does the device implement the <i>DecelerationTimeLift</i> attribute?	Table 7.43, 7.4.2.1.5.7	WNCV.S: O	No
WNCV.S.A0017	Does the device implement the <i>Mode</i> attribute?	Table 7.43, 7.4.2.1.5.7.1	WNCV.S: M	No
WNCV.S.A0018	Does the device implement the <i>IntermediateSetpointsLift</i> attribute?	Table 7.43, 7.4.2.1.5.8	WNCV.S: O	No
WNCV.S.A0019	Does the device implement the <i>IntermediateSetpointsTilt</i> attribute?	Table 7.43, 7.4.2.1.5.9	WNCV.S: O	No

112 **3.2.2 Commands received**

Item number	Feature	Reference	Status	Support
WNCV.S.C00.Rsp	Does the device implement receiving the <i>Up/Open</i> command?	Table 7.45, 7.4.2.2.1	WNCV.S: M	No
WNCV.S.C01.Rsp	Does the device implement receiving the <i>Down/Close</i> command?	Table 7.45, 7.4.2.2.2	WNCV.S: M	No
WNCV.S.C02.Rsp	Does the device implement receiving the <i>Stop</i> command?	Table 7.45, 7.4.2.2.3	WNCV.S: M	No
WNCV.S.C04.Rsp	Does the device implement receiving the <i>Go To Lift Value</i> command?	Table 7.45, 7.4.2.2.4	WNCV.S: O	No
WNCV.S.C05.Rsp	Does the device implement receiving the <i>Go To Lift Percentage</i> command?	Table 7.45, 7.4.2.2.4.2	WNCV.S: O	No
WNCV.S.C07.Rsp	Does the device implement receiving the <i>Go To Tilt Value</i> command?	Table 7.45, 7.4.2.2.4.3	WNCV.S: O	No
WNCV.S.C08.Rsp	Does the device implement receiving the <i>Go To Tilt Percentage</i> command?	Table 7.45, 7.4.2.2.4.4	WNCV.S: O	No

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114 **3.3 Client**115 **3.3.1 Attributes**

Item number	Feature	Reference	Status	Support
WNCV.C.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	7.4.1.1	WNCV.C: M	Yes
WNCV.C.A0008.Report.Rsp	Does the device implement sending global report attribute command requests and receiving reports for the <i>CurrentPositionLiftPercentage</i> attribute?	7.4.2.2.7	WNCV.C: O	No
WNCV.C.A0009.Report.Rsp	Does the device implement sending global report attribute command requests and receiving reports for the <i>CurrentPositionTiltPercentage</i> attribute?	7.4.2.2.7	WNCV.C: O	No

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117 3.3.2 **Commands generated**

Item number	Feature	Reference	Status	Support
WNCV.C.C00.Tx	Does the device implement sending the <i>Up/Open</i> command?	Table 7.45, 7.4.2.2.1	WNCV.C: O	Yes
WNCV.C.C01.Tx	Does the device implement sending the <i>Down/Close</i> command?	Table 7.45, 7.4.2.2.2	WNCV.C: O	Yes
WNCV.C.C02.Tx	Does the device implement sending the <i>Stop</i> command?	Table 7.45, 7.4.2.2.3	WNCV.C: O	Yes
WNCV.C.C04.Tx	Does the device implement sending the <i>Go To Lift Value</i> command?	Table 7.45, 7.4.2.2.4	WNCV.C: O	Yes
WNCV.C.C05.Tx	Does the device implement sending the <i>Go To Lift Percentage</i> command?	Table 7.45, 7.4.2.2.4.2	WNCV.C: O	Yes
WNCV.C.C07.Tx	Does the device implement sending the <i>Go To Tilt Value</i> command?	Table 7.45, 7.4.2.2.4.3	WNCV.C: O	No
WNCV.C.C08.Tx	Does the device implement sending the <i>Go To Tilt Percentage</i> command?	Table 7.45, 7.4.2.2.4.4	WNCV.C: O	No

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## 4 Test specification

### 4.1 Introduction

#### 4.1.1 Test case overview

The following test cases are available for the *window covering* cluster:

Test ID	Description	Reference
<b>Global tests</b>		
WNCV-TC-01G	Global attributes	4.2.1
<b>Server side tests</b>		
WNCV-TC-01S	Attributes with server as DUT	4.3.1
WNCV-TC-02S	Primary functionality with server as DUT	4.3.2
WNCV-TC-03S	Secondary functionality with server as DUT	4.3.3
WNCV-TC-04S	Scenes functionality with server as DUT	4.3.4
WNCV-TC-05S	Reporting functionality with server as DUT	4.3.5
<b>Client side tests</b>		
WNCV-TC-01C	Functionality with client as DUT	4.4.1

#### 4.1.2 Testing tolerances

In test cases where a change in an attribute value is tested over time, it is permitted for the devices involved in the test to be within a tolerance of  $\pm 15\%$  of the expected value. As such, these test cases indicate that the attribute value must be approximately equal to an expected value, to which the  $\pm 15\%$  tolerance should then be applied. All other attribute values presented are expected to be exact.

#### 4.1.3 Client DUTs

For client test cases, only test steps that pertain to commands supported on the DUT are required to be executed. All commands in this cluster for which support is indicated in the PICS shall be exercised, using valid, application achievable values.

Note that for the client attribute test case, it is permissible for the client not to be able to execute any of the test steps.

The client SHALL ensure that an application link, e.g. a binding link, exists between itself and the test harness. This should be configured before starting the test.



## 4.2 Generic test case s

### 4.2.1 WNCV-TC-01G: Global attributes

This test case verifies the behavior of the global attributes of the *window covering* cluster client and server.

In this test, the PICS notation WNCV.S.Agm and WNCV.C.Agm represents the list of global attributes that are specified as being mandatory for either the server or client, respectively. Similarly, the PICS notation WNCV.S.Ago and WNCV.C.Ago represents the list of global attributes that are specified as being optional for either the server or client, respectively.

#### 4.2.1.1 Scope

General:

- *Read attributes* command (0x00)
- *Read attributes response* command (0x01)
- *Write attributes* command (0x02)
- *Write attributes response* command (0x04)



*Window covering* cluster (0x0102):

- All global attributes

PICS:

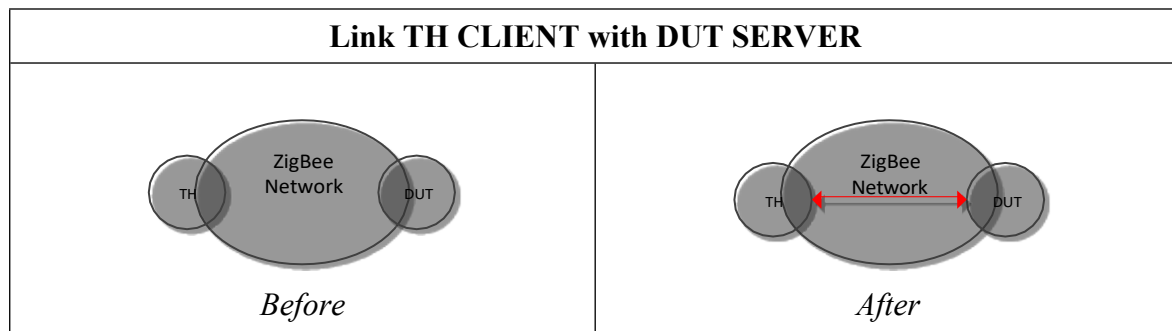
- WNCV.S, WNCV.C
- WNCV.S.Agm, WNCV.C.Agm, WNCV.S.Ago, WNCV.C.Ago

#### 4.2.1.2 Required devices

Designation	Symbol	Description
DUT		Device under test implementing: The <i>window covering</i> cluster server or client.
TH		Test harness implementing: The <i>window covering</i> cluster client or server, i.e. the opposite cluster instantiation as implemented on the DUT.

#### 4.2.1.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

162 **4.2.1.4 Test preparation**

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WNCV-TC-01G: Global attributes		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH and DUT.	TH and DUT are powered on.
P3	Join TH and DUT to a ZigBee network.	Observe appropriate communication between TH, DUT and any other relevant node on the ZigBee network.
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT.
P5	Establish a communication link from an endpoint on TH to a corresponding endpoint on DUT that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH, DUT and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-01G preparation

164 **4.2.1.5 Test procedure**

<b>WNCV-TC-01G: Global attributes</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT pass Verification</b>
1	WNCV.S.Agm, WNCV.C.Agm	TH unicasts a ZCL <i>read attributes</i> command frame to DUT to read each mandatory global attribute of this cluster one at a time.	DUT unicasts a ZCL <i>read attributes response</i> command frame to TH containing each requested attribute.  The data type in each command must match the value listed in the specification(s). The data value in each command for the attribute must fall within the valid range described in the specification(s).
2a	WNCV.S.Agm, WNCV.C.Agm	TH unicasts a ZCL <i>write attributes</i> command frame to DUT to write the respective default value to each mandatory global attribute of this cluster one at a time.	DUT unicasts a ZCL <i>write attributes response</i> command frame to TH for each attribute.  If the access control of DUT is set to READ, the DUT response will indicate that the attribute write command was not a SUCCESS. If the access control of DUT is set to READ/WRITE, the DUT response will indicate that the write command was a SUCCESS.
2b	WNCV.S.Agm, WNCV.C.Agm	TH unicasts a ZCL <i>read attributes</i> command frame to DUT to read back each attribute written in step 2a.	DUT unicasts a ZCL <i>read attributes response</i> command frame to TH containing the requested attribute.  If the <i>Status</i> field of the <i>write attributes response</i> command frame was equal to SUCCESS, the updated value is read back. If the <i>Status</i> field of the <i>write attributes response</i> command frame was not equal to SUCCESS the value is not updated when read back.

Continued...

WNCV-TC-01G: Global attributes			
Item	PICS	Test Harness Step	DUT pass Verification
3	WNCV.S.Ago, WNCV.C.Ago	TH unicasts a ZCL <i>read attributes</i> command frame to DUT to read each optional global attribute of this cluster one at a time.	DUT unicasts a ZCL <i>read attributes response</i> command frame to TH containing each attribute.  If the DUT implements the attribute, the <i>Status</i> field will be equal to SUCCESS and the command will contain the requested attribute. If the DUT does not implement the attribute, the <i>Status</i> field will not be equal to SUCCESS.  The data type in each command must match the value listed in the specification(s). The data value in each command for the attribute must fall within the valid range described in the specification(s).
4a	WNCV.S.Ago, WNCV.C.Ago	TH unicasts a ZCL <i>write attributes</i> command frame to DUT to write the respective default value to each optional global attribute of this cluster one at a time.	DUT unicasts a ZCL <i>write attributes response</i> command frame to TH for each attribute.  If the attribute is not implemented or the access control of DUT is set to READ, the DUT response will indicate that the attribute write command was not a SUCCESS. If the attribute is implemented and the access control of DUT is set to READ/WRITE, the DUT response will indicate that the write command was a SUCCESS.
4b	WNCV.S.Ago, WNCV.C.Ago	TH unicasts a ZCL <i>read attributes</i> command frame to DUT to read back each attribute written in step 4a.	DUT unicasts a ZCL <i>read attributes response</i> command frame to TH containing the requested attribute.  If the <i>Status</i> field of the <i>write attributes response</i> command frame was equal to SUCCESS, the updated value is read back. If the <i>Status</i> field of the <i>write attributes response</i> command frame was not equal to SUCCESS the value is not updated when read back.

--- End of test case LC-TC-01G ---

## 4.3 Server test cases

### 4.3.1 WNCV-TC-01S: Attributes with server as DUT

This test case verifies the behavior of the non-global attributes of the *window covering* cluster server.

In this test, the PICS notation WNCV.S.Am represents the list of non-global attributes that are specified as being mandatory. Similarly, the PICS notation WNCV.S.Ao represents the list of non-global attributes that are specified as being optional.

#### 4.3.1.1 Scope

General:

- *Read attributes* command (0x00)
- *Read attributes response* command (0x01)
- *Write attributes* command (0x02)
- *Write attributes response* command (0x04)



*Window covering* cluster (0x0102):

- All non-global attributes

PICS:

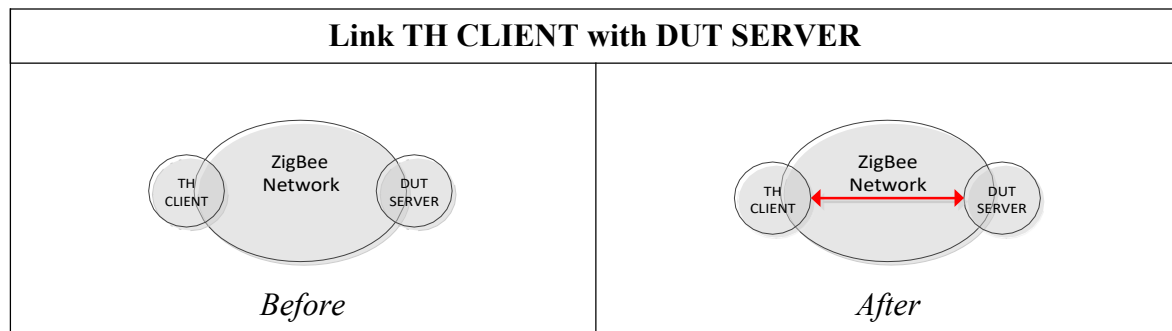
- WNCV.S
- WNCV.S.Lift, WNCV.S.Tilt, WNCV.S.ClosedLoop
- WNCV.S.Am, WNCV.S.Ao

#### 4.3.1.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster server.</li> </ul>

#### 4.3.1.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

188 **4.3.1.4 Test preparation**

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WNCV-TC-01S: Attributes with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH CLIENT and DUT SERVER.	TH CLIENT and DUT SERVER are powered on.
P3	Join TH CLIENT and DUT SERVER to a ZigBee network.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT SERVER.
P5	Establish a communication link from an endpoint on TH CLIENT to a corresponding endpoint on DUT SERVER that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-01C preparation ---

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191 **4.3.1.5 Test procedure**

<b>WNCV-TC-01S: Attributes with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT pass Verification</b>
1	WNCV.S.Am	TH CLIENT unicasts a <i>ZCL read attributes</i> command frame to DUT SERVER to read each mandatory attribute of this cluster one at a time.	DUT SERVER unicasts a <i>ZCL read attributes response</i> command frame to TH CLIENT containing each requested attribute.  The data type in each command must match the value listed in the specification(s). The data value in each command for the attribute must fall within the valid range described in the specification(s).
2a	WNCV.S.Am	TH CLIENT unicasts a <i>ZCL write attributes</i> command frame to DUT SERVER to write the respective default value to each mandatory attribute of this cluster one at a time.	DUT SERVER unicasts a <i>ZCL write attributes response</i> command frame to TH CLIENT for each attribute.  If the access control of the attribute on DUT SERVER is set to READ, the DUT SERVER response will indicate that the write command was not a SUCCESS. If the access control of the attribute on DUT SERVER is set to READ/WRITE, the DUT SERVER response will indicate that the write command was a SUCCESS.
2b	WNCV.S.Am	TH CLIENT unicasts a <i>ZCL read attributes</i> command frame to DUT SERVER to read back each attribute written in step 2a.	DUT SERVER unicasts a <i>ZCL read attributes response</i> command frame to TH CLIENT containing the requested attribute.  If the <i>Status</i> field of the <i>write attributes response</i> command frame was equal to SUCCESS, the value read back shall match the value written in step 2a.  If the <i>Status</i> field of the <i>write attributes response</i> command frame was not equal to SUCCESS, the value read back may be different from the value written in step 2a.

Continued...

<b>WNCV-TC-01S: Attributes with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT pass Verification</b>
3	WNCV.S.Ao	TH CLIENT unicasts a <i>ZCL read attributes</i> command frame to DUT SERVER to read each optional attribute of this cluster one at a time.	<p>DUT SERVER unicasts a <i>ZCL read attributes response</i> command frame to TH CLIENT containing each attribute.</p> <p>If the DUT SERVER implements the attribute, the <i>Status</i> field will be equal to SUCCESS and the command will contain the requested attribute value. Otherwise, the <i>Status</i> field shall be UNSUPPORTED_ATTRIBUTE.</p> <p>The data type in each command must match the value listed in the specification(s). The data value in each command for the attribute must fall within the valid range described in the specification(s).</p>
4a	WNCV.S.Ao	TH CLIENT unicasts a <i>ZCL write attributes</i> command frame to DUT SERVER to write the respective default value to each optional attribute of this cluster one at a time.	<p>DUT SERVER unicasts a <i>ZCL write attributes response</i> command frame to TH CLIENT for each attribute.</p> <p>If the attribute is not implemented or the access control of the attribute on DUT SERVER is set to READ, the response shall indicate that the attribute write command was not a SUCCESS.</p> <p>If the attribute is implemented and the access control of the attribute on DUT SERVER is set to READ/WRITE, the response shall indicate that the write command was a SUCCESS.</p>
4b	WNCV.S.Ao	TH CLIENT unicasts a <i>ZCL read attributes</i> command frame to DUT SERVER to read back each attribute written in step 4a.	<p>DUT SERVER unicasts a <i>ZCL read attributes response</i> command frame to TH CLIENT containing the requested attribute.</p> <p>If the <i>Status</i> field of the <i>write attributes response</i> command frame was equal to SUCCESS, the value read back shall match the value written in step 4a. If the <i>Status</i> field of the <i>write attributes response</i> command frame was not equal to SUCCESS, the value read back may be different from the value written in step 4a.</p>

--- End of test case WNCV-TC-01S ---



### 4.3.2 WNCV-TC-02S: Primary functionality with server as DUT

This test case verifies the primary functionality of the *window covering* cluster server.

#### 4.3.2.1 Scope

General:

- *Read attributes* command (0x00)
- *Read attributes response* command (0x01)
- *Default response* command (0x0b)



*Window covering* cluster (0x0102):

- *CurrentPositionLift* attribute (0x0003)
- *CurrentPositionTilt* attribute (0x0004)
- *CurrentPositionLiftPercentage* attribute (0x0008)
- *CurrentPositionTiltPercentage* attribute (0x0009)
- *InstalledOpenLimitLift* attribute (0x0010)
- *InstalledClosedLimitLift* attribute (0x0011)
- *InstalledOpenLimitTilt* attribute (0x0012)
- *InstalledClosedLimitTilt* attribute (0x0013)
- *Up/Open* command (0x00)
- *Down/Close* command (0x01)
- *Stop* command (0x02)

PICS:

- WNCV.S,
- WNCV.S.Lift, WNCV.S.Tilt, WNCV.S.ClosedLoop
- WNCV.S.A0003-0004, WNCV.S.A0008-0009, WNCV.S.A0010-0013
- WNCV.S.C00.Rsp, WNCV.S.C01.Rsp, WNCV.S.C02.Rsp

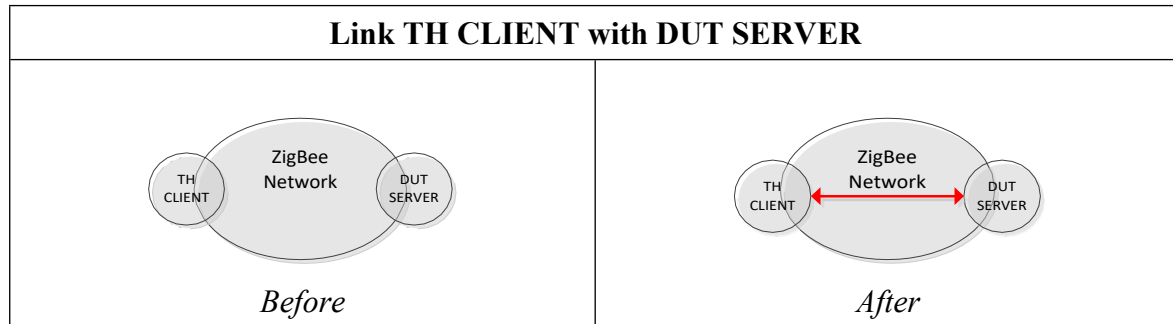
#### 4.3.2.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster server.</li> </ul>

### 218 4.3.2.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

### 219 4.3.2.4 Test preparation



220

WNCV-TC-02S: Primary functionality with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH CLIENT and DUT SERVER.	TH CLIENT and DUT SERVER are powered on.
P3	Join TH CLIENT and DUT SERVER to a ZigBee network.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT SERVER.
P5	Make sure that DUT SERVER is NOT in 100% up/open position if expecting physical action when sending an <i>Up/Open</i> command	Observe DUT SERVER is NOT in 100% up/open position
P6	Establish a communication link from an endpoint on TH CLIENT to a corresponding endpoint on DUT SERVER that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-02S preparation ---

## 221 4.3.2.5 Test procedure

WNCV-TC-02S: Primary functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
1	WNCV.S.C00 .Rsp	TH CLIENT unicasts a ZCL <i>Up/Open</i> command to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates physical lift/tilt action was performed and is in 100% up/open position.
2a	WNCV.S.A00 10	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledOpenLimitLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>InstalledOpenLimitLift</i> attribute value is acquired.
2b	WNCV.S.A00 03	<b><i>Conditional on Closed Loop control, lift action and the CurrentPositionLift attribute being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The value read back for the <i>CurrentPositionLift</i> attribute shall match the <i>InstalledOpenLimitLift</i> attribute value acquired in step 2a.
2c	WNCV.S.A00 08	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>CurrentPositionLiftPercentage</i> attribute shall have the value 0x00 (0%).
3a	WNCV.S.A00 12	<b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledOpenLimitTilt</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>InstalledOpenLimitTilt</i> attribute value is acquired.

Continued...

<b>WNCV-TC-02S: Primary functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
3b	WNCV.S.A0004	<b><i>Conditional on Closed Loop control, tilt action and the CurrentPositionTilt attribute being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTilt</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The value read back for the <i>CurrentPositionTilt</i> attribute shall match the <i>InstalledOpenLimitTilt</i> attribute value acquired in step 3a.
3c	WNCV.S.A0009	<b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The <i>CurrentPositionTilt-Percentage</i> attribute has the value 0x00 (0%).
4	WNCV.S.C01.Rsp	TH CLIENT unicasts a ZCL <i>Down/Close</i> command to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates physical lift/tilt action was performed and is in 100% down/close position.
5a	WNCV.S.A0011	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledClosedLimitLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The <i>InstalledClosedLimitLift</i> attribute value is acquired.
5b	WNCV.S.A0003	<b><i>Conditional on Closed Loop control, lift action and the CurrentPositionLift attribute being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The value read back for the attribute <i>CurrentPositionLift</i> shall match the <i>InstalledClosedLimitLift</i> attribute value acquired in step 5a.

Continued...

WNCV-TC-02S: Primary functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
5c	WNCV.S.A0008	<p><b>Conditional on Closed Loop control and lift action being supported on the DUT:</b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionLiftPercentage</i> attribute has the value 0x64 (100%).</p>
6a	WNCV.S.A0013	<p><b>Conditional on Closed Loop control and tilt action being supported on the DUT:</b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledClosedLimitTilt</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>InstalledClosedLimitTilt</i> attribute value is acquired.</p>
6b	WNCV.S.A0004	<p><b>Conditional on Closed Loop control, tilt action and the <i>CurrentPositionTilt</i> attribute being supported on the DUT:</b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTilt</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The value read back for the <i>CurrentPositionTilt</i> attribute shall match the <i>InstalledClosedLimitTilt</i> attribute value acquired in step 6a.</p>
6c	WNCV.S.A0009	<p><b>Conditional on Closed Loop control and tilt action being supported on the DUT:</b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionTiltPercentage</i> attribute has the value 0x64 (100%).</p>
7a	WNCV.S.C00.Rsp	TH CLIENT unicasts a ZCL <i>Up/Open</i> command to DUT SERVER.	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical lift/tilt action is being performed.</p>

Continued...

<b>WNCV-TC-02S: Primary functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
7b	WNCV.S.C02 .Rsp	After a short while (physical lift/tilt actions can still be observed), TH CLIENT unicasts a <i>ZCL Stop</i> command to DUT SERVER.	If requested, DUT SERVER unicasts a <i>ZCL default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates ongoing physical lift/tilt action was stopped.

--- End of test case WNCV-TC-02S ---

### 4.3.3 WNCV-TC-03S: Secondary functionality with server as DUT

This test case verifies the secondary functionality of the *window covering* cluster server.

#### 4.3.3.1 Scope

General:

- *Read attributes* command (0x00)
- *Read attributes response* command (0x01)
- *Default response* command (0x0b)



*Window covering* cluster (0x0102):

- *CurrentPositionLift* attribute (0x0003)
- *CurrentPositionTilt* attribute (0x0004)
- *CurrentPositionLiftPercentage* attribute (0x0008)
- *CurrentPositionTiltPercentage* attribute (0x0009)
- *InstalledOpenLimitLift* attribute (0x0010)
- *InstalledClosedLimitLift* attribute (0x0011)
- *InstalledOpenLimitTilt* attribute (0x0012)
- *InstalledClosedLimitTilt* attribute (0x0013)
- *Go To Lift Value* command (0x04)
- *Go To Lift Percentage* command (0x05)
- *Go To Tilt Value* command (0x07)
- *Go To Tilt Percentage* command (0x08)

PICS:

- WNCV.S
- WNCV.S.Lift, WNCV.S.Tilt, WNCV.S.ClosedLoop
- WNCV.S.A0003-0004, WNCV.S.A0008-0009, WNCV.S.A0010-0013
- WNCV.S.C04-C05.Rsp, WNCV.S.C07-C08.Rsp

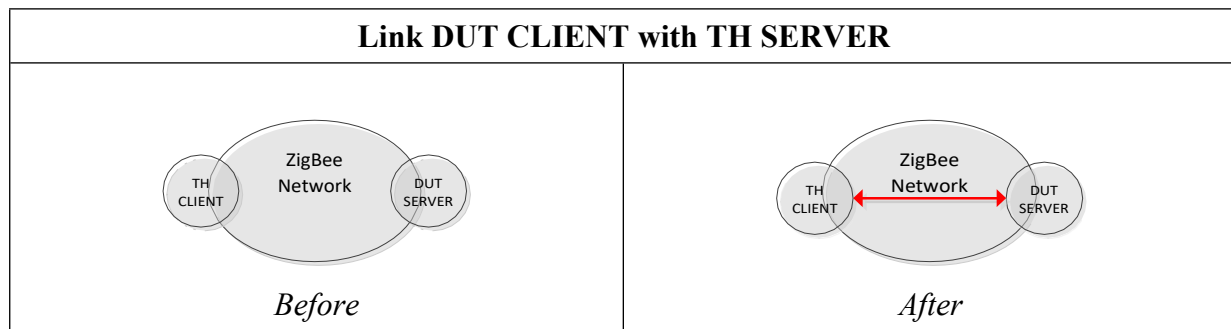
#### 4.3.3.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster server.</li> </ul>

### 4.3.3.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

### 4.3.3.4 Test preparation



WNCV-TC-03S: Secondary functionality with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH CLIENT and DUT SERVER.	TH CLIENT and DUT SERVER are powered on.
P3	Join TH CLIENT and DUT SERVER to a ZigBee network.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT SERVER.
P5	TH CLIENT unicasts a ZCL <i>Up/Open</i> command frame to DUT SERVER.	Observe DUT SERVER is in 100% up/open position.
P6	Establish a communication link from an endpoint on TH CLIENT to a corresponding endpoint on DUT SERVER that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-03C preparation ---



255 **4.3.3.5 Test procedure**

<b>WNCV-TC-03S: Secondary functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
1a	WNCV.S.A0010	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledOpenLimitLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>InstalledOpenLimitLift</i> attribute value is acquired.
1b	WNCV.S.A0011	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledClosedLimitLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>InstalledClosedLimitLift</i> attribute value is acquired.
2	WNCV.S.C04.Rsp	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>Go To Lift Value</i> command to DUT SERVER, with the <i>Lift Value</i> field set to $(\text{InstalledOpenLimitLift} + \text{InstalledClosedLimitLift}) / 2$ ; <b><i>Conditional on Open Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>Go To Lift Value</i> command to DUT SERVER, with the <i>Lift Value</i> field set to a value NOT equal to zero.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS). DUT SERVER indicates physical lift action was performed.
3a	WNCV.S.A0003	<b><i>Conditional on Closed Loop control, lift action and the CurrentPositionLift attribute being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLift</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The value read back for the <i>CurrentPositionLift</i> attribute shall match the value written in step 2.

Continued...

<b>WNCV-TC-03S: Secondary functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
3b	WNCV.S.A0008	<p><b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p><i>CurrentPositionLiftPercentage</i> attribute has the value 0x32 (50%).</p>
4	WNCV.S.C05.Rsp	<p><b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>Go To Lift Percentage</i> command to DUT SERVER, with the <i>Percentage Lift Value</i> field set to 0x19 (25%).</p>	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical lift action was performed.</p>
5a	WNCV.S.A0003	<p><b><i>Conditional on Closed Loop control, lift action and the CurrentPositionlift attribute being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLift</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The value read back for the <i>CurrentPositionLift</i> attribute shall have a value equal to <math>(\text{InstalledOpenLimitLift} * 3 + \text{InstalledClosedLimitLift}) / 4</math></p>
5b	WNCV.S.A0008	<p><b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionLift-Percentage</i> attribute has the value 0x19 (25%).</p>
6a	WNCV.S.A0012	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledOpenLimitTilt</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>InstalledOpenLimitTilt</i> attribute value is acquired.</p>

Continued...

<b>WNCV-TC-03S: Secondary functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
6b	WNCV.S.A0013	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>InstalledClosedLimitTilt</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>InstalledClosedLimitTilt</i> attribute value is acquired.</p>
7	WNCV.S.C07.Rsp	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>Go To Tilt Value</i> command to DUT SERVER, with the <i>Tilt Value</i> field set to <math>(\text{InstalledOpenLimitTilt} + \text{InstalledClosedLimitTilt}) / 2</math>;</p> <p><b><i>Conditional on Open Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>Go To Tilt Value</i> command to DUT SERVER, with the <i>Tilt Value</i> field set to a value NOT equal to zero.</p>	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical tilt action was performed.</p>
8a	WNCV.S.A0004	<p><b><i>Conditional on Closed Loop control, tilt action and the CurrentPositionTilt attribute being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTilt</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The value read back for the <i>CurrentPositionTilt</i> attribute shall match the value written in step 7.</p>
8b	WNCV.S.A0009	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionTilt-Percentage</i> attribute has the value 0x32 (50%).</p>

Continued...

WNCV-TC-03S: Secondary functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
9	WNCV.S.C08 .Rsp	<b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>Go To Tilt Percentage</i> command to DUT SERVER, with the <i>Percentage Tilt Value</i> field set to 0x19 (25%).	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS). DUT SERVER indicates physical tilt action was performed.
10a	WNCV.S.A00 04	<b><i>Conditional on Closed Loop control, tilt action and the CurrentPositionTilt attribute being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTilt</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The value read back for the <i>CurrentPositionTilt</i> attribute shall have a value equal to $(\text{InstalledOpenLimitTilt} * 3 + \text{InstalledClosedLimitTilt}) / 4$
10b	WNCV.S.A00 09	<b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>CurrentPositionTilt-Percentage</i> attribute has the value 0x19 (25%).

--- End of test case WNCV-TC-03S ---

#### 257 4.3.4 **WNCV-TC-04S: Scenes functionality with server as DUT**

258 This test case verifies the scenes functionality of the *window covering* cluster server.

##### 259 **4.3.4.1 Scope**

260 General:

- 261 • *Read attributes* command (0x00)
- 262 • *Read attributes response* command (0x01)
- 263 • *Default response* command (0x0b)

264 *Groups* cluster (0x0004):

- 265 • *Add group* command (0x00)
- 266 • *Add group response* command (0x00)
- 267 • *Get group membership* command (0x02)
- 268 • *Get group membership response* command (0x02)
- 269 • *Remove all groups* command (0x04)

270 *Scenes* cluster (0x0005):

- 271 • *Store scene* command (0x04)
- 272 • *Store scene response* command (0x04)
- 273 • *Recall scene* command (0x05)



274 *Window covering* cluster (0x0102):

- 275 • *CurrentPositionLiftPercentage* attribute (0x0008)
- 276 • *CurrentPositionTiltPercentage* attribute (0x0009)
- 277 • *Up/Open* command (0x00)
- 278 • *Down/Close* command (0x01)

279 PICS:

- 280 • G.S, S.S
- 281 • G.S.C00.Rsp, G.S.C02.Rsp, G.S.C04.Rsp
- 282 • G.S.C00.Tx, G.S.C02.Tx
- 283 • S.S.C04.Rsp
- 284 • S.S.C04.Tx
- 285 • WNCV.S
- 286 • WNCV.S.Lift, WNCV.S.Tilt, WNCV.S.ClosedLoop
- 287 • WNCV.S.A0008-A0009, WNCV.S.A0008-A0009.Scenes
- 288 • WNCV.S.C00-C01.Rsp

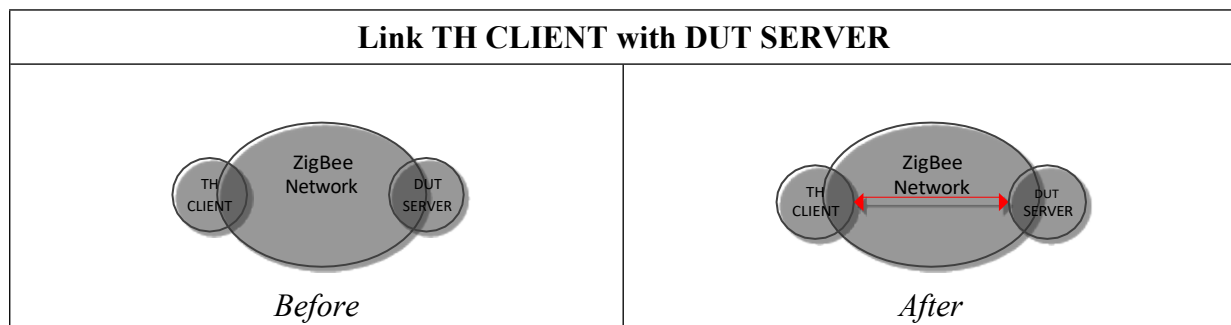
#### 289 4.3.4.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>The <i>groups</i> cluster client,</li> <li>The <i>scenes</i> cluster client and</li> <li>The <i>window covering</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>The <i>groups</i> cluster server,</li> <li>The <i>scenes</i> cluster server and</li> <li>The <i>window covering</i> cluster server.</li> </ul>

#### 290 4.3.4.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

#### 291 4.3.4.4 Test preparation



292

WNCV-TC-04S: Scenes functionality with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH CLIENT and DUT SERVER.	TH CLIENT and DUT SERVER are powered on.
P3	Join TH CLIENT and DUT SERVER to a ZigBee network.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.

<b>WNCV-TC-04S: Scenes functionality with server as DUT</b>		
<b>Item</b>	<b>Preparation Step</b>	<b>Observation</b>
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT SERVER.
P5	Establish a communication link from an endpoint on TH CLIENT to a corresponding endpoint on DUT SERVER that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-04S preparation ---

#### 23 4.3.4.5 Test procedure

<b>WNCV-TC-04S: Scene functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
1a	G.S.C04.Rsp	TH CLIENT unicasts a ZCL <i>remove all groups</i> command frame to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).
1b	G.S.C02.Rsp, G.S.C02.Tx	TH CLIENT unicasts a ZCL <i>get group membership</i> command frame to DUT SERVER with the <i>group count</i> field set to 0x00.	DUT SERVER unicasts a ZCL <i>get group membership response</i> command frame with the <i>group count</i> field equal to 0x00.
1c	G.S.C00.Rsp, G.S.C00.Tx	TH CLIENT unicasts ZCL <i>add group</i> command to DUT SERVER, with the <i>group ID</i> field set to 0x0001.	DUT SERVER unicasts a ZCL <i>add group response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS) and the <i>group ID</i> field equal to 0x0001.

Continued...



WNCV-TC-04S: Scene functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
2a	WNCV.S.C00 .Rsp	TH CLIENT unicasts a ZCL <i>Up/Open</i> command frame to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates physical lift/tilt action was performed if necessary and is in 100% up/open position.
2b	S.S.C04.Rsp, S.S.C04.Tx	TH CLIENT unicasts a ZCL <i>store scene</i> command frame to DUT SERVER with the <i>group ID</i> field set to 0x0001 and the <i>scene ID</i> field set to 0x01.	DUT SERVER unicasts a ZCL <i>store scene response</i> command frame to TH CLIENT with the <i>status</i> field set to 0x00 (SUCCESS), the <i>group ID</i> field set to 0x0001 and the <i>scene ID</i> field set to 0x01.
2c	WNCV.S.A00 08	<b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The <i>CurrentPositionLiftPercentage</i> attribute has the value 0x00 (0%).
2d	WNCV.S.A00 09	<b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b> TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.  The <i>CurrentPositionTiltPercentage</i> attribute has the value 0x00 (0%).
3a	WNCV.S.C01 .Rsp	TH CLIENT unicasts a ZCL <i>Down/Close</i> command frame to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates physical lift/tilt action was performed and is in 100% down/close position.

Continued...



<b>WNCV-TC-04S: Scene functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
3b	WNCV.S.A0008	<p><b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionLiftPercentage</i> attribute has the value 0x64 (100%).</p>
3c	WNCV.S.A0009	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionTiltPercentage</i> attribute has the value 0x64 (100%).</p>
4a	S.S.C05.Rsp	TH CLIENT unicasts a ZCL <i>recall scene</i> command frame to DUT SERVER with the <i>group ID</i> field set to 0x0001 and the <i>scene ID</i> field set to 0x01.	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical lift/tilt action was performed and is in 100% up/open position.</p>
4b	WNCV.S.A0008	<p><b><i>Conditional on Closed Loop control and lift action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionLiftPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionLiftPercentage</i> attribute has the value 0x00 (0%).</p>
4c	WNCV.S.A0009	<p><b><i>Conditional on Closed Loop control and tilt action being supported on the DUT:</i></b></p> <p>TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>CurrentPositionTiltPercentage</i> attribute.</p>	<p>DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT.</p> <p>The <i>CurrentPositionTiltPercentage</i> attribute has the value 0x00 (0%).</p>

--- End of test case WNCV-TC-04S ---

### 4.3.5 WNCV-TC-05S: Reporting functionality with server as DUT

This case test verifies the attribute reporting behavior of the *window covering* cluster server.

#### 4.3.5.1 Scope

General:

- *Configure reporting* command (0x06)
- *Configure reporting response* command (0x07)
- *Read reporting configuration* command (0x08)
- *Read reporting configuration response* command (0x09)
- *Report attributes* command (0x0a)
- *Default response* command (0x0b)



*Window covering* cluster (0x0102):

- *CurrentPositionLiftPercentage* attribute (0x0008)
- *CurrentPositionTiltPercentage* attribute (0x0009)
- *Up/Open* command (0x00)
- *Down/Close* command (0x01)

PICS:

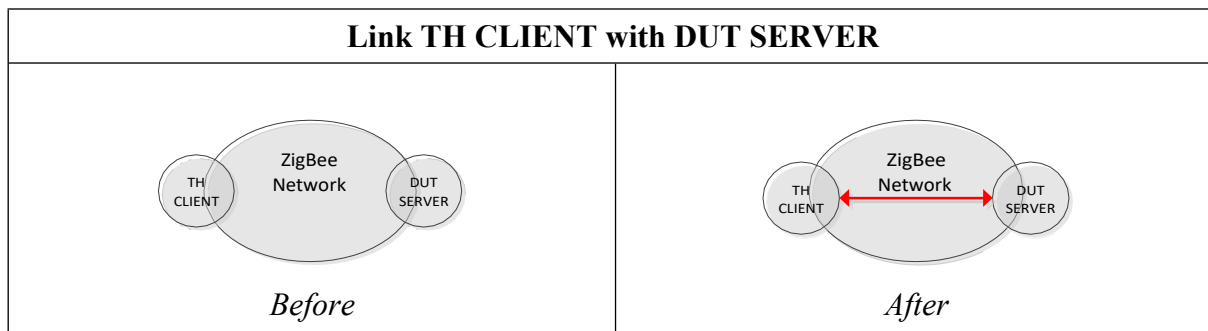
- WNCV.S
- WNCV.S.Lift, WNCV.S.Tilt, WNCV.S.ClosedLoop
- WNCV.S.A0008-A0009
- WNCV.S.A0008-A0009.Report.DefaultConfig, WNCV.S.A0008-A0009.Report.Tx
- WNCV.S.C00-C01.Rsp

#### 4.3.5.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster server.</li> </ul>

#### 4.3.5.3 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

319 **4.3.5.4 Test preparation**

320

WNCV-TC-05S: Reporting functionality with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee network.	Observe appropriate command frame to form the network.
P2	Power on TH CLIENT and DUT SERVER.	TH CLIENT and DUT SERVER are powered on.
P3	Join TH CLIENT and DUT SERVER to a ZigBee network.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.
P4	Manufacturer-specific means, if feasible, might be used to calibrate DUT to enable its full operability. After calibration has been completed, DUT shall operate in normal mode.	Observe appropriate operational behavior of DUT SERVER.
P5	Establish a communication link from an endpoint on TH CLIENT to a corresponding endpoint on DUT SERVER that both support the <i>window covering</i> cluster.	Observe appropriate communication between TH CLIENT, DUT SERVER and any other relevant node on the ZigBee network.
P6	Establish a binding link in the reverse direction from the endpoint on DUT SERVER to the endpoint on TH CLIENT as used in step P4.	Observe appropriate communication between DUT SERVER, TH CLIENT and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-05S preparation ---

321

322 **4.3.5.5 Test procedure**

<b>WNCV-TC-05S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
0	WNCV.S.C00 .Rsp	TH CLIENT unicasts a ZCL <i>Up/Open</i> command to DUT SERVER.	If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).  DUT SERVER indicates physical lift/tilt action was performed if necessary and is in 100% up/open position.
1	WNCV.S.A00 08, WNCV.S.A00 08. Report. DefaultConfig, WNCV.S.A00 09, WNCV.S.A00 09. Report. DefaultConfig	<b><i>Conditional on Closed Loop control and lift/tilt action being supported on the DUT:</i></b>  TH CLIENT unicasts a ZCL <i>read reporting configuration</i> command to DUT SERVER for the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute.	DUT SERVER unicasts a ZCL <i>read reporting configuration response</i> command to TH CLIENT, confirming accordingly the existence of default reporting configuration(s) with the <i>status</i> field set to SUCCESS, the <i>direction</i> field set to 0x00 and the <i>maximum reporting interval</i> field set to either 0x0000 or a value within the range [0x003d, 0xfffe].
2a	WNCV.S.A00 08, WNCV.S.A00 08. Report. Tx, WNCV.S.A00 09, WNCV.S.A00 09. Report. Tx	<b><i>Conditional on Closed Loop control and lift/tilt action being supported on the DUT:</i></b>  TH CLIENT unicasts a ZCL <i>configure reporting</i> command to DUT SERVER for the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute with the <i>direction</i> field set to 0x00, the <i>minimum reporting interval</i> field set to 0x001e (30 seconds), the <i>maximum reporting interval</i> field set to 0x003c (60 seconds) and the <i>reportable change</i> field set to 0x0A (10%).	DUT SERVER unicasts a ZCL <i>configure reporting response</i> command to TH CLIENT, confirming the configured attribute(s) with the <i>status</i> field set to SUCCESS.

*Continued...*

<b>WNCV-TC-05S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
2b	WNCV.S.A0008, WNCV.S.A0008. Report.Tx, WNCV.S.A0009, WNCV.S.A0009. Report.Tx	None	<p><b><i>Conditional on Closed Loop control and lift/tilt action being supported on the DUT:</i></b></p> <p>DUT SERVER starts to periodically unicast ZCL <i>report attributes</i> commands to TH CLIENT with the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTiltPercentage</i> attribute value(s) reported to be 0x00. The time interval between subsequent commands shall be less than 60 seconds.</p> <p>Note that DUT SERVER shall unicast the first ZCL <i>report attributes</i> command to TH CLIENT NOT later than 60 seconds after the step 2a.</p>

*Continued...*

WNCV-TC-05S: Reporting functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
3	WNCV.S.A0008, WNCV.S.A0008.Report.Tx, WNCV.S.A0009, WNCV.S.A0009.Report.Tx, WNCV.S.C01.Rsp	TH CLIENT unicasts a ZCL <i>Down/Close</i> command to DUT SERVER.	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical lift/tilt action was performed and is in 100% down/close position when finished.</p> <p>DUT SERVER unicasts at least one ZCL <i>report attributes</i> command to TH CLIENT for the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute value(s) reported NOT to be 0x00.</p> <p>Note that DUT SERVER shall unicast the first ZCL <i>report attributes</i> command to TH CLIENT NOT later than 60 seconds after the a ZCL <i>Down/Close</i> command has been sent by TH CLIENT.</p>

Continued...

WNCV-TC-05S: Reporting functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
4	WNCV.S.A0008, WNCV.S.A0008. Report.Tx, WNCV.S.A0009, WNCV.S.A0009. Report.Tx, WNCV.S.C00.Rsp	TH CLIENT unicasts a ZCL <i>Up/Open</i> command to DUT SERVER	<p>If requested, DUT SERVER unicasts a ZCL <i>default response</i> command frame to TH CLIENT with the <i>status</i> field equal to 0x00 (SUCCESS).</p> <p>DUT SERVER indicates physical lift/tilt action was performed and is in 100% up/open position when finished.</p> <p>DUT SERVER unicasts at least one ZCL <i>report attributes</i> command to TH CLIENT for the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute(s).</p> <p>After physical lift/tilt action has been observed to be finished, DUT SERVER unicasts periodically ZCL <i>report attributes</i> command to TH CLIENT with the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute value(s) reported to be 0x00.</p> <p>Note that DUT SERVER shall unicast the first ZCL <i>report attributes</i> command to TH CLIENT NOT later than 60 seconds after the a ZCL <i>Up/Open</i> command has been sent by TH CLIENT.</p>

Continued...

<b>WNCV-TC-05S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
5a	WNCV.S.A0008, WNCV.S.A0008. Report.Tx, WNCV.S.A0009, WNCV.S.A0009. Report.Tx	<b><i>Conditional on Closed Loop control and lift/tilt action being supported on the DUT:</i></b>  TH CLIENT unicasts a ZCL <i>configure reporting</i> command to DUT SERVER for the <i>CurrentPositionLiftPercentage</i> and/or <i>CurrentPositionTilt-Percentage</i> attribute with the <i>maximum reporting interval</i> field set to 0xffff (stop sending reports).	DUT SERVER unicasts a ZCL <i>configure reporting response</i> command to TH CLIENT, confirming the configured attribute and with the <i>status</i> field set to SUCCESS.
5b	WNCV.S.A0008. Report.Tx, WNCV.S.A0009. Report.Tx	Wait for the original maximum reporting interval configured in step 2a.	DUT SERVER does not send any further reports.

--- End of test case WNCV-TC-05S ---

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## 4.4 Client test cases

### 4.4.1 WNCV-TC-01C: Functionality with client as DUT

This case test verifies the functionality of the *window covering* cluster client.

The DUT client SHALL be on the same network as a suitable server, provided by the user, and this device SHALL be used by the client to exercise its functionality. The test case uses the test harness to prompt the user, based on the declared PICS, to exercise the functionality of the *basic* cluster client and to verify the results. A sniffer tool SHALL be used to log the exercised functionality and to determine its validity.

In this test case, the PICS notation WNCV.C.CdTx represents the list of commands that are declared as being transmitted by the DUT.

#### 4.4.1.1 Scope



*Window covering* cluster (0x0102):

- *Up/Open* command (0x00)
- *Down/Close* command (0x01)
- *Stop* command (0x02)
- *Go To Lift Value* command (0x04)
- *Go To Lift Percentage* command (0x05)
- *Go To Tilt Value* command (0x07)
- *Go To Tilt Percentage* command (0x08)

PICS:

- WNCV.C
- WNCV.C.C00-02.Tx, WNCV.C.C04.Tx, WNCV.C.C05.Tx, WNCV.C.C07.Tx, WNCV.C.C08.Tx

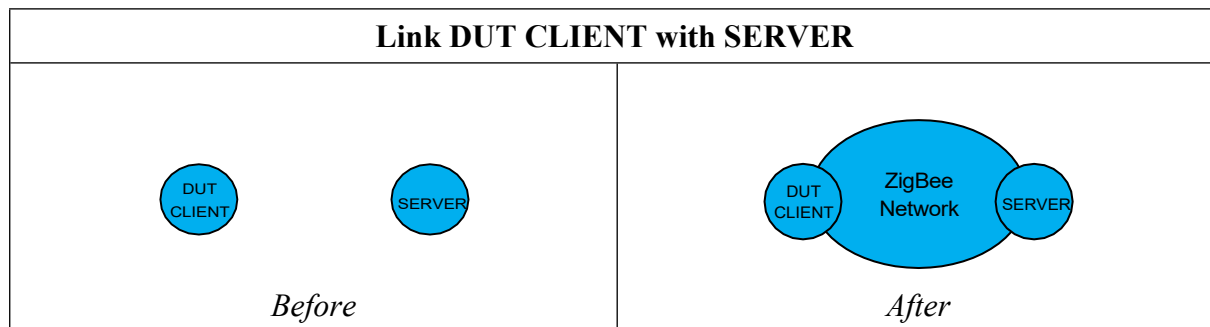
#### 1.1.1.1 Required devices

Designation	Symbol	Description
DUT CLIENT		Device under test client implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster client.</li> </ul>
SERVER		Suitable server device implementing: <ul style="list-style-type: none"> <li>• The <i>window covering</i> cluster server.</li> </ul>

### 1.1.1.2 Initial conditions

Item	Initial Conditions
1	A packet sniffer shall be observing the communication over the air interface.
2	All devices are factory new and powered off until used.

### 1.1.1.3 Test preparation



### WNCV-TC-01C: Functionality with client as DUT

Item	Preparation Step	Observation
P1	Power on the DUT CLIENT device and the SERVER device.	DUT CLIENT and SERVER are powered on.
P2	Ensure the DUT CLIENT device and the SERVER device are on the same ZigBee network.	Observe appropriate communication between DUT CLIENT, SERVER and any other relevant node on the ZigBee network.

--- End of test case WNCV-TC-01C preparation ---

356 **1.1.1.4 Test procedure**

<b>WNCV-TC-01C: Functionality with client as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
1	-	Test harness prompts the user with a list of commands, based on the declared PICS, which the DUT CLIENT indicates it can transmit.	None.
2	WNCV.C.Cd. Tx	None.	DUT CLIENT transmits correctly formed commands in any order and with application achievable values. This is verified using the sniffer log.
3	-	Prompt the user to verify that the cluster commands listed in step 1 were transmitted during step 2.	During step 2, DUT CLIENT has transmitted every command listed by the test harness in step 1.
4	-	Prompt the user to verify that the cluster commands not listed in step 1 were not transmitted during step 2.	During step 2, DUT CLIENT has not transmitted any commands from this cluster that were not listed by the test harness in step 1.

--- End of test case WNCV-TC-01C ---

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## 5 Annex A: PICS to test case cross reference

### 5.1 Server

PICS	Test case					
	WNCV-TC-01G	WNCV-TC-01S	WNCV-TC-02S	WNCV-TC-03S	WNCV-TC-04S	WNCV-TC-05S
WNCV.S	X	X	X	X	X	X
WNCV.S.Lift		X	X	X	X	X
WNCV.S.Tilt		X	X	X	X	X
WNCV.S.ClosedLoop		X	X	X	X	X
WNCV.S.Afffd	X					
WNCV.S.A0000		X				
WNCV.S.A0001		X				
WNCV.S.A0002		X				
WNCV.S.A0003		X	X	X		
WNCV.S.A0004		X	X	X		
WNCV.S.A0005		X				
WNCV.S.A0006		X				
WNCV.S.A0007		X				
WNCV.S.A0008		X	X	X	X	X
WNCV.S.A0008.Scene					X	
WNCV.S.A0008.Report.DefaultConfig						X
WNCV.S.A0008.Report.Tx						X
WNCV.S.A0009		X	X	X	X	X
WNCV.S.A0009.Scene					X	
WNCV.S.A0009.Report.DefaultConfig						X
WNCV.S.A0009.Report.Tx						X
WNCV.S.A0010		X	X	X		
WNCV.S.A0011		X	X	X		
WNCV.S.A0012		X	X	X		
WNCV.S.A0013		X	X	X		
WNCV.S.A0014		X				
WNCV.S.A0015		X				
WNCV.S.A0016		X				
WNCV.S.A0017		X				
WNCV.S.A0018		X				
WNCV.S.A0019		X				

PICS	Test case					
	WNCV-TC-01G	WNCV-TC-01S	WNCV-TC-02S	WNCV-TC-03S	WNCV-TC-04S	WNCV-TC-05S
WNCV.S.C00.Rsp			X		X	X
WNCV.S.C01.Rsp			X		X	X
WNCV.S.C02.Rsp			X			
WNCV.S.C04.Rsp				X		
WNCV.S.C05.Rsp				X		
WNCV.S.C07.Rsp				X		
WNCV.S.C08.Rsp				X		

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PICS	Test case	
	WNCV-TC-01G	WNCV-TC-01C
WNCV.C	X	X
WNCV.C.Afffd	X	
WNCV.C.A0008.Report.Rsp		X
WNCV.C.A0009.Report.Rsp		X
WNCV.C.C00.Tx		X
WNCV.C.C01.Tx		X
WNCV.C.C02.Tx		X
WNCV.C.C04.Tx		X
WNCV.C.C05.Tx		X
WNCV.C.C07.Tx		X
WNCV.C.C08.Tx		X

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