



# **ZigBee Cluster Library**

## **Water Content Measurement Cluster**

### **(0x0405, 0x0407, 0x0408)**

### **Test Specification**

### **Version 0.7**

ZigBee Document 16-02866-003

March 10th, 2017

Sponsored by: ZigBee Alliance

Accepted by                      This document has not yet been accepted for release by the  
ZigBee Alliance Board of Directors

Abstract                         This document describes the certification tests for devices  
which implement the ZCL Water Content Measurement  
cluster.

Keywords                        ZCL, Water Content Measurement, Relative Humidity  
Measurement, cluster, test specification, PICS, PICS to test  
case mapping

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## 35 Revision history

Revision	Date	Details	Editor
000	August 18 <sup>th</sup> , 2016	First draft.	Bozena Erdmann
001	September 19 <sup>th</sup> , 2016	First complete draft	Bozena Erdmann
002	September 19 <sup>th</sup> , 2016	Fixing typo in MinMeasuredValue range	Bozena Erdmann
003	March 10 <sup>th</sup> , 2017	Adding the sibling clusters of the Relative Humidity Measurement cluster, also derived from the Water Content Measurement base cluster; incorporating PIXIT item for min and max reporting interval as per CCB #2284	Bozena Erdmann

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# 1 Introduction

This document contains the PICS, test specification and PICS/test case cross reference for the ZCL cluster derived from the *water content measurement* 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].

## 2 References

### 2.1 ZigBee Alliance documents

- [R1] Retail Quality of Goods Specification, ZigBee Alliance document 14-0194r16.
- [R2] Retail Quality of Goods Test Specification, ZigBee Alliance document 14-0501r01.
- [R3] Retail Quality of Goods PICS, ZigBee Alliance document 14-0500r00.
- [R4] ZigBee Cluster Library Specification, ZigBee Alliance document 07-5123.
- [R5] ZCL General Test Specification, ZigBee Alliance document 17-0xxx.
- [R6] ZCL Water Content Measurement cluster XML PICS, ZigBee Alliance document 16-0xxx.

### 2.2 IETF documents

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

### 3 PIXIT items

If the DUT supports multiple clusters derived of the base *Water Content Measurement* cluster, a copy of this document SHALL be filled and testing SHALL be performed for each of those derived clusters.

Item number	Feature	Support
WCM.PIXIT01	Which cluster derived of the base <i>Water Content Measurement</i> cluster does the DUT support?	“0x0405: <i>Relative Humidity Measurement</i> 0x0407: <i>Leaf Wetness</i> 0x0408: <i>Soil Moisture</i> ”
WCM.PIXIT.RC	What is the reportable change to be used for generating a report for the <i>MeasuredValue</i> attribute?	“Reportable change” 500
WCM.PIXIT.MIN RI	What is the minimum reporting interval for reporting attributes?	“Number of seconds, e.g. 30 ” 60
WCM.PIXIT.MA XRI	What is the maximum reporting interval for reporting attributes?	“Number of seconds, e.g. 60 ” 300

## 4 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].

### 4.1 Usage

Item number	Feature	Reference	Status	Support
WCM.S	Does the device implement the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster as a server?	3.3.2	O	Yes/No
WCM.C	Does the device implement the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster as a client?	3.3.3	O	Yes/No

### 4.2 Server

#### 4.2.1 Attributes

Item number	Feature	Reference	Status	Support
WCM.S.A0000	Does the device implement the <i>MeasuredValue</i> attribute?	Table 4.20, 4.7.2.2.1.1	WCM.S: M	Yes/No
WCM.S.A0000.Report.Tx	Does the device implement receiving and responding to the global report attribute commands for the <i>MeasuredValue</i> attribute and sending reports?	4.7.2.5	WCM.S: M	Yes/No
WCM.S.A0001	Does the device implement the <i>MinMeasuredValue</i> attribute?	Table 4.20, 4.7.2.2.1.2	WCM.S: M	Yes/No
WCM.S.A0002	Does the device implement the <i>MaxMeasuredValue</i> attribute?	Table 4.20, 4.7.2.2.1.3	WCM.S: M	Yes/No
WCM.S.A0003	Does the device implement the <i>Tolerance</i> attribute?	Table 4.20, 4.7.2.2.1.4	WCM.S: O	Yes/No
<sup>1</sup>				
WCM.S.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	Table 2-1, 2.3.5.1.1	WCM.S: M	Yes/No

<sup>1</sup> CCB #2241

Item number	Feature	Reference	Status	Support
WCM.S.Afffe	Does the device implement the <i>AttributeReportingStatus</i> global attribute?	Table 2-1, 2.3.5.1.2	WCM.S: O	Yes/ <b>No</b>

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106 **4.3 Client**107 **4.3.1 Attributes**

Item number	Feature	Reference	Status	Support
WCM.C.A0000.Report.Rsp	Does the device implement sending global report attribute command requests and receiving reports for the <i>MeasuredValue</i> attribute?	4.7.2.5	WCM.C: O	Yes/ <b>No</b>
<sup>2</sup>				
WCM.C.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	Table 2-1, 2.3.5.1.1	WCM.C: M	Yes/ <b>No</b>
WCM.C.Afffe	Does the device implement the <i>AttributeReportingStatus</i> global attribute?	Table 2-1, 2.3.5.1.2	WCM.C: O	Yes/ <b>No</b>

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<sup>2</sup> CCB #2241

## 5 Test specification

### 5.1 Introduction

#### 5.1.1 Test case overview

The following test cases are available for the WCM.PIXIT01 cluster derived from the *water content measurement* cluster:

Test ID	Description	Reference
<b>Global tests</b>		
WCM-TC-01G	Global attributes	5.2.1
<b>Server side tests</b>		
WCM-TC-01S	Attributes with server as DUT	5.3.1
WCM-TC-02S	Primary functionality with server as DUT	5.3.2
WCM-TC-03S	Reporting functionality with server as DUT	5.3.3
<b>Client side tests</b>		
WCM-TC-01C	Functionality with client as DUT	5.4.1

#### 5.1.2 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.

#### 5.1.3 Client DUTs

For client test cases only test steps that pertain to commands that are 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.

#### 5.1.4 Test steps manipulating attributes

In test case steps that require more than one attribute to be manipulated (e.g. read), the tester may decide whether it is appropriate or practical to send a single attribute manipulation command, containing multiple attributes, or multiple attribute manipulation commands, each containing a single attribute. The test case is designed to verify the behavior of the device supporting the attribute rather than verifying the attribute manipulation command in question.

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## 5.2 Generic test cases

### 5.2.1 WCM-TC-01G: Global attributes

This test case verifies the behavior of the global attributes of the WCM.PIXIT01 cluster derived from the *water content measurement* cluster client and server.

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

#### 5.2.1.1 Scope

General:

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

Cluster derived from the *water content measurement* cluster (WCM.PIXIT01):

- All global attributes



PIXIT:

- WCM.PIXIT01

PICS:

- WCM.S, WCM.C
- WCM.S.Agm, WCM.C.Agm, WCM.S.Ago, WCM.C.Ago

#### 5.2.1.2 Required devices

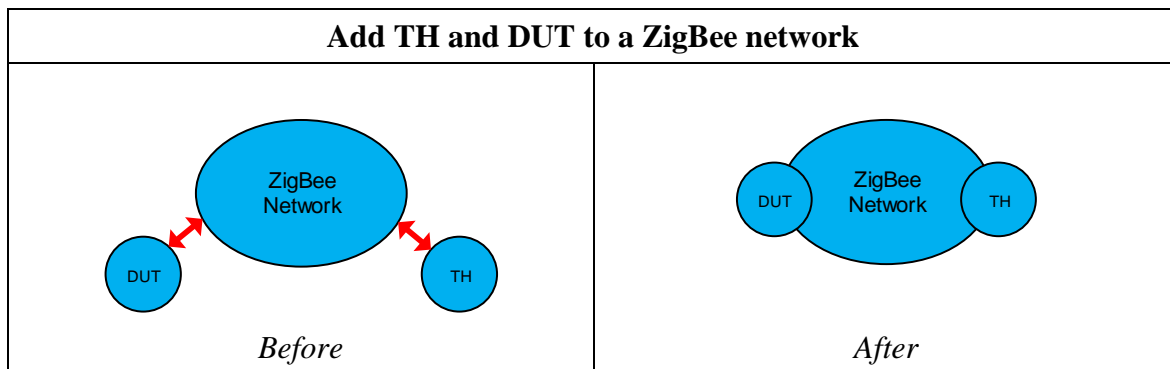
Designation	Symbol	Description
DUT		Device under test implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster server or client.</li> </ul>
TH		Test harness implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster client or server, i.e. the opposite cluster instantiation as implemented on the DUT.</li> </ul>



### 5.2.1.3 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.

### 5.2.1.4 Test preparation



WCM-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.

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

164 **5.2.1.5 Test procedure**

<b>WCM-TC-01G: Global attributes</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT pass Verification</b>
1	WCM.S.Agm, WCM.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	WCM.S.Agm, WCM.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	WCM.S.Agm, WCM.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...*

WCM-TC-01G: Global attributes			
Item	PICS	Test Harness Step	DUT pass Verification
3	WCM.S.Ago, WCM.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	WCM.S.Ago, WCM.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	WCM.S.Ago, WCM.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 WCM-TC-01G ---

## 5.3 Server test cases

### 5.3.1 WCM-TC-01S: Attributes with server as DUT

This test case verifies the behavior of the attributes of the WCM.PIXIT01 cluster derived from the *water content measurement* cluster server.

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

#### 5.3.1.1 Scope

General:

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

Cluster derived from the *water content measurement* cluster (WCM.PIXIT01):

- All non-global attributes



PIXIT:

- WCM.PIXIT01

PICS:

- WCM.S,
- WCM.S.Am, WCM.S.Ao

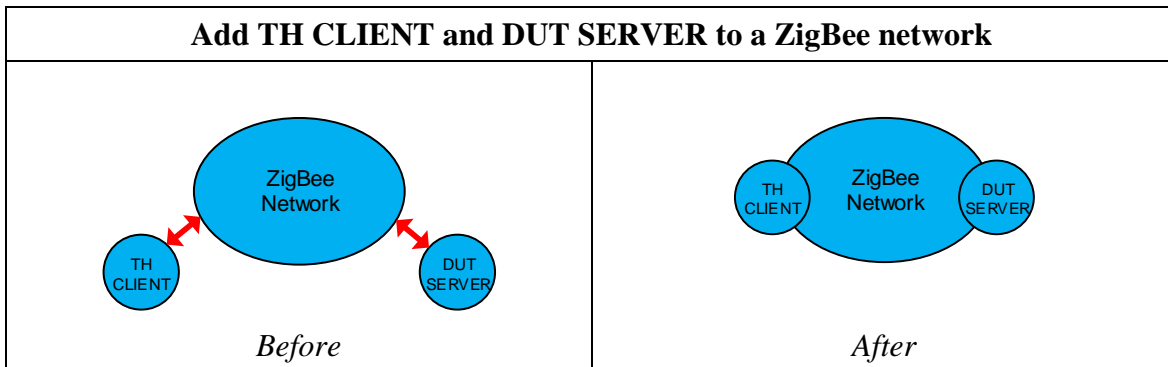
#### 5.3.1.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster client.</li> </ul>
DUT SERVER		Device under test server: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster server.</li> </ul>

### 5.3.1.3 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.

### 5.3.1.4 Test preparation



WCM-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.

--- End of test case WCM-TC-01S preparation ---

194 **5.3.1.5 Test procedure**

<b>WCM-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	WCM.S.Am	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read each mandatory attribute of this cluster one at a time.	DUT SERVER unicasts a ZCL <i>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	WCM.S.Am	TH CLIENT unicasts a ZCL <i>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 ZCL <i>write attributes response</i> command frame to TH CLIENT for each attribute.  If the access control of DUT SERVER is set to READ, the DUT SERVER response will indicate that the attribute write command was not a SUCCESS. If the access control of DUT SERVER is set to READ/WRITE, the DUT SERVER response will indicate that the write command was a SUCCESS.
2b	WCM.S.Am	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read back each attribute written in step 2a.	DUT SERVER unicasts a ZCL <i>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 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...

WCM-TC-01S: Attributes with server as DUT			
Item	PICS	Test Harness Step	DUT pass Verification
3	WCM.S.Ao	TH CLIENT unicasts a ZCL <i>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 ZCL <i>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. If the DUT SERVER does not implement the attribute, the <i>Status</i> field will not be equal to SUCCESS.</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	WCM.S.Ao	TH CLIENT unicasts a ZCL <i>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 ZCL <i>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 DUT SERVER is set to READ, the DUT SERVER response will indicate that the attribute write command was not a SUCCESS. If the attribute is implemented and the access control of DUT SERVER is set to READ/WRITE, the DUT response will indicate that the write command was a SUCCESS.</p>

Continued...

<b>WCM-TC-01S: Attributes with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT pass Verification</b>
4b	WCM.S.Ao	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read back each attribute written in step 4a.	DUT SERVER unicasts a ZCL <i>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 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 WCM-TC-01S ---

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### 5.3.2 WCM-TC-02S: Primary functionality with server as DUT

This test case verifies the primary functionality of the WCM.PIXIT01 cluster derived from the *water content measurement* cluster server in respect to measuring the water content changes.

#### 5.3.2.1 Scope

General:

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

Cluster derived from the *water content measurement* cluster (WCM.PIXIT01):

- *MeasuredValue* attribute (0x0000)
- *MinMeasuredValue* attribute (0x0001)
- *MaxMeasuredValue* attribute (0x0002)



PIXIT:

- WCM.PIXIT01

PICS:

- WCM.S
- WCM.S.A0000, WCM.S.A0001, WCM.S.A0002

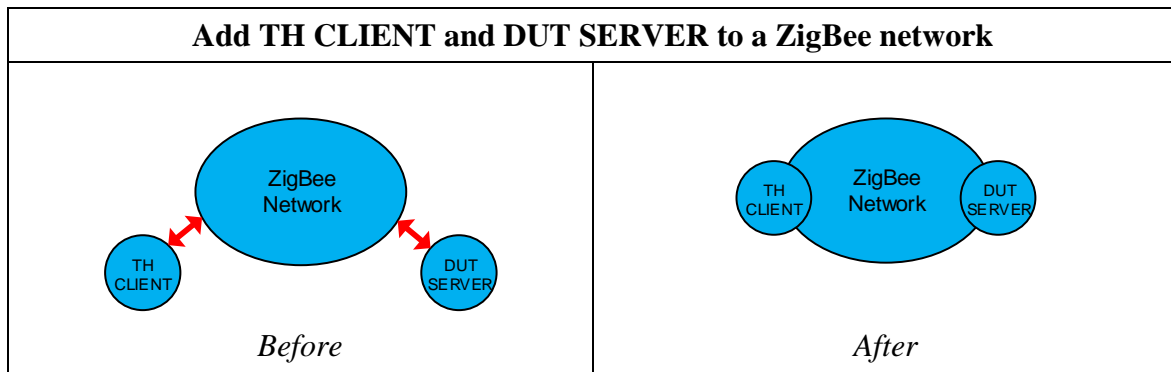
#### 5.3.2.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster client.</li> </ul>
DUT SERVER		Device under test server: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster server.</li> </ul>
-	-	An adjustable water source to adjust the water content.

#### 5.3.2.3 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.

#### 5.3.2.4 Test preparation



WCM-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.

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

220 **5.3.2.5 Test procedure**

<b>WCM-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>
1a	WCM.S.A000 1	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>MinMeasuredValue</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>MinMeasuredValue</i> attribute has a value in the range 0x0000 – 0x270f.
1b	WCM.S.A000 2	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>MaxMeasuredValue</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. The <i>MaxMeasuredValue</i> attribute has a value in the range 0x0001 – 0x2710 and higher than the value of the <i>MinMeasuredValue</i> .
1c	WCM.S.A000 0	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>MeasuredValue</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. <i>MeasuredValue</i> attribute has a value in the range <i>MinMeasuredValue</i> – <i>MaxMeasuredValue</i> .
2	-	Adjust the output of the water source such that the measured water content is different to the starting value.	None.
3	WCM.S.A000 0	TH CLIENT unicasts a ZCL <i>read attributes</i> command frame to DUT SERVER to read the <i>MeasuredValue</i> attribute.	DUT SERVER unicasts a ZCL <i>read attributes response</i> command frame to TH CLIENT. <i>MeasuredValue</i> attribute has a value in the range <i>MinMeasuredValue</i> – <i>MaxMeasuredValue</i> but different to the value returned in step 1c.

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

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### 5.3.3 WCM-TC-03S: Reporting functionality with server as DUT

This case test verifies the attribute reporting behavior of the WCM.PIXIT01 cluster derived from the *water content measurement* cluster server.

#### 5.3.3.1 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)

Cluster derived from the *water content measurement* cluster (WCM.PIXIT01):

- *MeasuredValue* attribute (0x0000)



PIXIT:

- WCM.PIXIT01, WCM.PIXIT.MINRI, WCM.PIXIT.MAXRI

PICS:

- WCM.S
- WCM.S.A0000
- WCM.S.A0000.Report.Tx

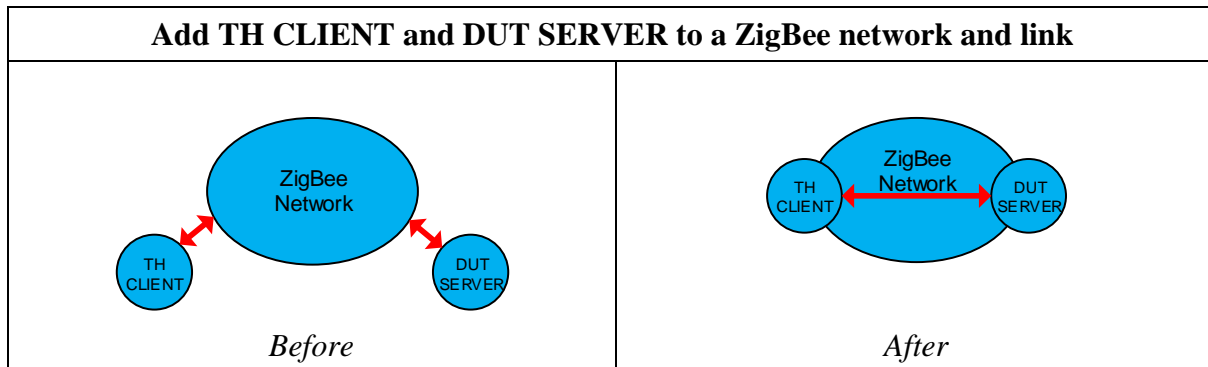
#### 5.3.3.2 Required devices

Designation	Symbol	Description
TH CLIENT		Test harness client implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster client.</li> </ul>
DUT SERVER		Device under test server implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster server.</li> </ul>
-	-	An adjustable water source to adjust the water content.

### 5.3.3.3 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.

### 5.3.3.4 Test preparation



WCM-TC-03S: 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.
P5	Establish a binding link from an endpoint on DUT SERVER to a corresponding endpoint on TH CLIENT that both support the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster.	Observe appropriate communication between DUT SERVER, TH CLIENT and any other relevant node on the ZigBee network.

--- End of test case WCM-TC-03S preparation ---

250 **5.3.3.5 Test procedure**

<b>WCM-TC-03S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
1a	WCM.S.A0000, WCM.S.A0000.Report.Tx	TH CLIENT unicasts a ZCL <i>read reporting configuration</i> command to DUT SERVER for the <i>MeasuredValue</i> attribute of the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster.	<p>DUT SERVER unicasts a ZCL <i>read reporting configuration response</i> command to TH CLIENT, carrying default reporting configuration for the <i>MeasuredValue</i> attribute of the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster, with:</p> <ul style="list-style-type: none"> <li>- <i>Status</i> field set to 0x00 (SUCCESS);</li> <li>- <i>Direction</i> field set to 0x00 (reported attribute);</li> <li>- <i>Attribute Data Type</i> field present and set to 0x21;</li> <li>- <i>Minimum</i> and <i>Maximum reporting interval</i> fields present;</li> <li>- <i>Reportable change</i> field present;</li> <li>- <i>Timeout period</i> field omitted.</li> </ul> <p>Set <math>RI_{max}</math> to the value of the <i>maximum reporting interval</i> field.</p> <p>Store the default report parameters contained in the <i>read reporting configuration response</i> command frame.</p>
1b	WCM.S.A0000, WCM.S.A0000.Report.Tx	If practical (depending on the reporting interval of the default reporting configuration), wait for the attribute report according to default configuration.	At a time $\leq (RI_{max} + 2)$ seconds, as specified by the default reporting configuration of step 0a, DUT SERVER unicasts a ZCL <i>report attributes</i> command to TH CLIENT with the <i>MeasuredValue</i> attribute.

<b>WCM-TC-03S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
2a	WCM.S.A0000, WCM.S.A0000.Report.Tx	TH CLIENT unicasts a ZCL <i>configure reporting</i> command to DUT SERVER for the <i>MeasuredValue</i> attribute with a <i>direction</i> field set to 0x00, the <i>minimum reporting interval</i> field set to WCM.PIXIT.MINRI, the <i>maximum reporting interval</i> field set to WCM.PIXIT.MAXRI and the <i>reportable change</i> field set to WCM.PIXIT.RC.	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.
2b	WCM.S.A0000, WCM.S.A0000.Report.Tx	None	At a time approximately WCM.PIXIT.MAXRI after receiving the <i>configure reporting response</i> command frame in step 2a, DUT SERVER unicasts a ZCL <i>report attributes</i> command to TH CLIENT with the <i>MeasuredValue</i> attribute.
3a	-	Adjust the output of the water source such that it has changed by more than WCM.PIXIT.RC from its last value.	DUT SERVER does nothing.
3b	WCM.S.A0000, WCM.S.A0000.Report.Tx	None.	At a time approximately WCM.PIXIT.MINRI after the new water content level is reached in step 3a, DUT SERVER unicasts a ZCL <i>report attributes</i> command to TH CLIENT with the <i>MeasuredValue</i> attribute.
3c	WCM.S.A0000, WCM.S.A0000.Report.Tx	None.	At a time approximately WCM.PIXIT.MAXRI after sending the report in step 3b, DUT SERVER unicasts a ZCL <i>report attributes</i> command to TH CLIENT with the <i>MeasuredValue</i> attribute

<b>WCM-TC-03S: Reporting functionality with server as DUT</b>			
<b>Item</b>	<b>PICS</b>	<b>Test Harness Step</b>	<b>DUT Pass Verification</b>
4a	WCM.S.A0000, WCM.S.A0000.Report.Tx	TH CLIENT unicasts a ZCL <i>configure reporting</i> command to DUT SERVER for the <i>MeasuredValue</i> attribute the <i>maximum reporting interval</i> field set to 0xffff (do not send 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.
4b	WCM.S.A0000.Report.Tx	Wait for (WCM.PIXIT.MAXRI + 2) seconds after the report sent in step 3c.	DUT SERVER does not send any further reports.
5	WCM.S.A0000	TH CLIENT unicasts a ZCL <i>read reporting configuration</i> command frame to DUT SERVER to read the default reporting configuration of the <i>MeasuredValue</i> attribute.	DUT SERVER unicasts a ZCL <i>read reporting configuration response</i> command frame to TH CLIENT with a single attribute reporting configuration record for the <i>MeasuredValue</i> attribute and the <i>status</i> field set to 0x8b (NOT_FOUND).
6a	WCM.S.A0000, WCM.S.A0000.Report.Tx	TH CLIENT unicasts a ZCL <i>configure reporting</i> command to DUT SERVER for the <i>MeasuredValue</i> attribute with a <i>direction</i> field set to 0x00, the <i>maximum reporting interval</i> field set to 0xffff, <i>minimum reporting interval</i> field set to 0x0000 and the <i>reportable change</i> field set equal to 0 (reset to default reporting configuration).	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.
6b	WCM.S.A0000.Report.Tx	TH CLIENT unicasts a ZCL <i>read reporting configuration</i> command to DUT SERVER for the <i>MeasuredValue</i> attribute of the WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster.	DUT SERVER unicasts a ZCL <i>read reporting configuration response</i> command frame to TH CLIENT with a single attribute reporting configuration record for the <i>MeasuredValue</i> attribute and the <i>status</i> field set to SUCCESS.  Verify that the default reporting configuration is commensurate with the parameters stored in step 1a.



WCM-TC-03S: Reporting functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
6c	WCM.S.A0000, WCM.S.A0000.Report.Tx	Wait for the attribute report according to the default configuration.	At a time $\leq (RI_{max} + 2)$ seconds, DUT SERVER unicasts a ZCL <i>report attributes</i> command frame to TH CLIENT with the <i>MeasuredValue</i> attribute.

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

## 5.4 Client test cases

### 5.4.1 WCM-TC-01C: Functionality with client as DUT

This case test verifies the functionality of the WCM.PIXIT01 cluster derived from the *water content measurement* 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 WCM.PIXIT01 cluster derived from the *water content measurement* 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 WCM.C.CdTx represents the list of commands that are declared as being transmitted by the DUT.

#### 5.4.1.1 Scope



PIXIT:

- WCM.PIXIT01

PICS:

- WCM.C
- WCM.C.A0000.Report.Rsp

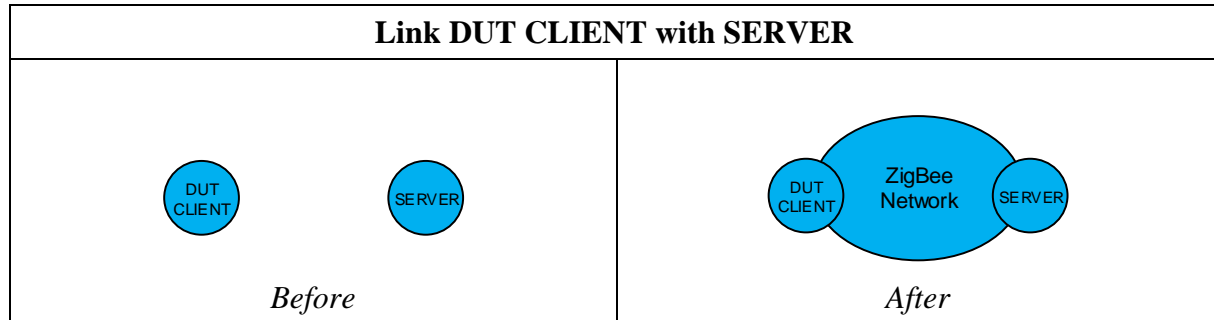
#### 5.4.1.2 Required devices

Designation	Symbol	Description
DUT CLIENT		Device under test client implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster client.</li> </ul>
SERVER		Suitable server device implementing: <ul style="list-style-type: none"> <li>• The WCM.PIXIT01 cluster derived from the <i>water content measurement</i> cluster server.</li> </ul>

### 5.4.1.3 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.

### 5.4.1.4 Test preparation



WCM-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 WCM-TC-01C preparation ---

275 **5.4.1.5 Test procedure**

<b>WCM-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	WCM.C.Cd.T <sub>x</sub>	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 WCM-TC-01C ---

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

### 6.1 Server

PICS	Test case			
	WCM-TC-01G	WCM-TC-01S	WCM-TC-02S	WCM-TC-03S
WCM.S	X	X	X	X
WCM.S.A0000		X	X	X
WCM.S.A0000.Report.Tx				X
WCM.S.A0001		X		
WCM.S.A0002		X		
WCM.S.A0003		X		X
<sup>3</sup>				
WCM.S.Afffd	X			
WCM.S.Afffe	X			

### 6.2 Client

PICS	Test case	
	WCM-TC-01G	WCM-TC-01C
WCM.C	X	X
WCM.S.A0000.Report.Rsp		X
<sup>4</sup>		
WCM.C.Afffd	X	
WCM.C.Afffe	X	

<sup>3</sup> CCB #2241

<sup>4</sup> CCB #2241