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ZigBee Cluster Library Time Cluster (0x000A) Test Specification Version 0.9

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Abstract This document describes the certification tests for devices
which implement the ZCL Time Cluster.

Keywords ZCL, Time, cluster

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Revision history

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000	April 12 rd , 2017	First draft.	Ezra Hale
001	June 5 th , 2017	Resolves comments from the 0.9 ballot.	Phil Jamieson

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1 Introduction

This document contains the PICS, test specification and PICS/test case cross reference for the ZCL *Time* 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 [R4].

2 References

2.1 ZigBee Alliance documents

[R1] ZigBee Cluster Library Specification, ZigBee Alliance document 07-5123.

[R2] ZCL General Test Specification, ZigBee Alliance document 16-0xxx.

[R3] ZCL Time Cluster XML PICS, ZigBee Alliance document 16-0xxx.

2.2 IETF documents

[R4] 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 [R3].

3.1 Usage

Item number	Feature	Reference	Status	Support
T.S	Does the device implement the <i>Time</i> cluster as a server?	3.12.2	O	Yes/No
T.C	Does the device implement the <i>Time</i> cluster as a client?	3.12.3	O	Yes/No

3.2 Server

3.2.1 Attributes

Item number	Feature	Reference	Status	Support
T.S.A0000	Does the device implement the <i>Time</i> attribute?	3.12.2.2.1	T.S: M	Yes/No
T.S.A0001	Does the device implement the <i>TimeStatus</i> attribute?	3.12.2.2.2	T.S: M	Yes/No
T.S.A0002	Does the device implement the <i>TimeZone</i> attribute?	3.12.2.2.3	T.S: O	Yes/No
T.S.A0003	Does the device implement the <i>DstStart</i> attribute?	3.12.2.2.4	T.S: O	Yes/No
T.S.A0004	Does the device implement the <i>DstEnd</i> attribute?	3.12.2.2.5	T.S: O	Yes/No
T.S.A0005	Does the device implement the <i>DstShift</i> attribute?	3.12.2.2.6	T.S: O	Yes/No
T.S.A0006	Does the device implement the <i>StandardTime</i> attribute?	3.12.2.2.7	T.S: O	Yes/No
T.S.A0007	Does the device implement the <i>LocalTime</i> attribute?	3.12.2.2.8	T.S: O	Yes/No
T.S.A0008	Does the device implement the <i>LastSetTime</i> attribute?	3.12.2.2.9	T.S: O	Yes/No
T.S.A0009	Does the device implement the <i>ValidUntilTime</i> attribute?	3.12.2.2.10	T.S: O	Yes/No
T.S.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	Table 2-1, 2.3.5.1.1	T.S: M	Yes/No

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

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99 3.2.2 Commands received

100 The server receives no commands except those to read and write attributes.

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102 3.2.3 Commands sent

103 The server generates no cluster specific commands.

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105 3.3 Client

106 The client has no cluster specific attributes. No cluster specific commands are generated or received by the client.

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108 3.3.1 Attributes

Item number	Feature	Reference	Status	Support
T.C.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	Table 2-1, 2.3.5.1.1	T.C: M	Yes/No
T.C.Afffe	Does the device implement the <i>AttributeReportingStatus</i> global attribute?	Table 2-1, 2.3.5.1.2	T.C: O	Yes/No

109 3.3.2 Commands received

110 No cluster specific commands are received by the client.

111 3.3.3 Commands sent

112 No cluster specific commands are generated by the client.

4 Test specification

4.1 Introduction

4.1.1 Test case overview

The following test cases are available for the *Time* cluster:

Test ID	Description	Reference
Global tests		
T-TC-01G	Global attributes	4.2.1
Server side tests		
T-TC-01S	Attributes with server as DUT	4.3.1
Client side tests		
	There are no client tests.	

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 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.

4.1.4 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.

4.2 Generic test cases

4.2.1 T-TC-01G: Global attributes

This test case verifies the behavior of the global attributes of the *Time* cluster client and server. In this test, the PICS notation T.S.Agm and T.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 T.S.Ago and T.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)



Time cluster (0x0500):

- All global attributes

PICS:

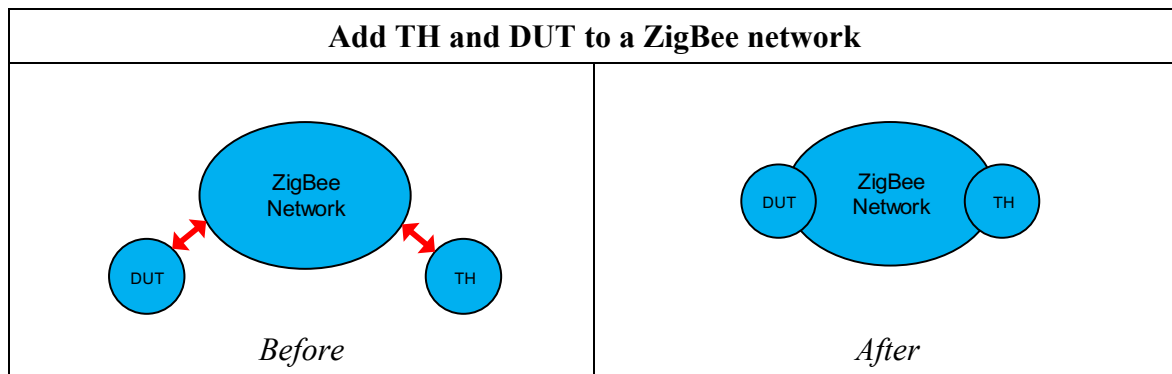
- T.S, T.C
- T.S.Agm, T.C.Agm, T.S.Ago, T.C.Ago

4.2.1.2 Required devices

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

161 **4.2.1.4 Test preparation**

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T-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 T-TC-01G preparation ---

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164 **4.2.1.5 Test procedure**

T-TC-01G: Global attributes			
Item	PICS	Test Harness Step	DUT pass Verification
1	T.S.Agm, T.C.Agm	TH unicasts a <i>ZCL read attributes</i> command frame to DUT to read each mandatory global attribute of this cluster one at a time.	DUT unicasts a <i>ZCL 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	T.S.Agm, T.C.Agm	TH unicasts a <i>ZCL 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 <i>ZCL 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	T.S.Agm, T.C.Agm	TH unicasts a <i>ZCL read attributes</i> command frame to DUT to read back each attribute written in step 2a.	DUT unicasts a <i>ZCL 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...

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

4.3 Server test cases

4.3.1 T-TC-01S: Attributes with server as DUT

This test case verifies the behavior of the attributes of the *Time* cluster server.

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



Time cluster (0x0500):

- All non-global attributes

PICS:

- T.S,
- T.S.Am, T.S.Ao

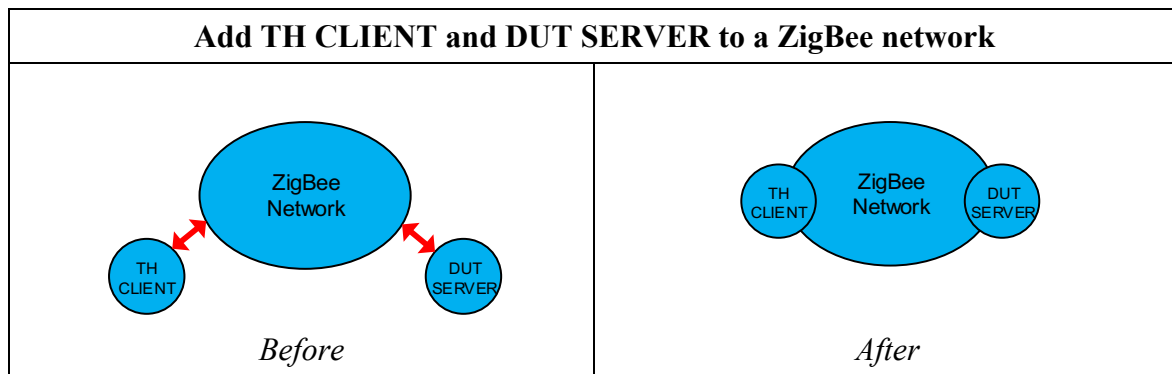
4.3.1.2 Required devices

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

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



T-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 T-TC-01S preparation ---

191 **4.3.1.5 Test procedure**

T-TC-01S: Attributes with server as DUT			
Item	PICS	Test Harness Step	DUT pass Verification
1	T.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	T.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	T.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...

T-TC-01S: Attributes with server as DUT			
Item	PICS	Test Harness Step	DUT pass Verification
3	T.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	T.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...

T-TC-01S: Attributes with server as DUT			
Item	PICS	Test Harness Step	DUT pass Verification
4b	T.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 T-TC-01S ---

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196 **4.4 Client test cases**

197 There are no client test cases.

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5 Annex A: PICS to test case cross reference

5.1 Server

PICS	Test Cases	
	T-TC-01G	T-TC-01S
T.S	X	X
T.S.A0000		X
T.S.A0001		X
T.S.A0002		X
T.S.A0003		X
T.S.A0004		X
T.S.A0005		X
T.S.A0006		X
T.S.A0007		X
T.S.A0008		X
T.S.A0009		X
T.S.Afffd	X	
T.S.Afffe	X	

5.2 Client

PICS	Test Case
	T-TC-01G
T.C	X
T.C.Afffd	X
T.C.Afffe	X