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ZigBee Cluster Library Touchlink Commissioning Cluster (0x1000) Test Specification Version 1.0

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Abstract This document describes the certification tests for devices which implement the ZCL Touchlink Commissioning cluster.

Keywords ZCL, Touchlink Commissioning, cluster

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Revision history

Revision	Date	Details	Editor
00	May, 2015	Created from ZLL test specifications.	Phil Jamieson
01	August 12 th , 2015	Resolved comments received since the Hull test event in June 2015.	Phil Jamieson
02	September 28 th , 2015	Added the new mandatory global attributes.	Phil Jamieson
03	October 30 th , 2015	Removed the binding link preparatory step in all tests.	Phil Jamieson
04	March 1 st , 2016	Addressed comments from the ZigBee 3.0 SVEs.	Phil Jamieson
05	April 18 th , 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 *touchlink commissioning* 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 [R5].

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 15-0xxx.
- [R3] ZCL Touchlink Commissioning Cluster XML PICS, ZigBee Alliance document 15-0xxx.
- [R4] ZigBee Base Device Behavior Test Specification, ZigBee Alliance document 14-0439.

2.2 IETF documents

- [R5] 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
TC.S	Does the device implement the <i>touchlink commissioning</i> cluster as a server?	13.3.2	O	Yes
TC.C	Does the device implement the <i>touchlink commissioning</i> cluster as a client?	13.3.3	O	No

3.2 Server

3.2.1 Attributes

Item number	Feature	Reference	Status	Support
TC.S.Afffd	Does the device implement the <i>ClusterRevision</i> global attribute?	Table 2-1, 2.3.5.1.1	TC.S: M	Yes

3.2.2 Commands received

Item number	Feature	Reference	Status	Support
TC.S.C00.Rsp	Does the device implement receiving the <i>scan request</i> command?	Table 13.13, 13.3.2.2.1	TC.S: M	Yes
TC.S.C02.Rsp	Does the device implement receiving the <i>device information request</i> command?	Table 13.13, 13.3.2.2.2	TC.S: M	Yes
TC.S.C06.Rsp	Does the device implement receiving the <i>identify request</i> command?	Table 13.13, 13.3.2.2.3	TC.S: M	Yes
TC.S.C07.Rsp	Does the device implement receiving the <i>reset to factory new request</i> command?	Table 13.13, 13.3.2.2.4	TC.S: M	Yes
TC.S.C10.Rsp	Does the device implement receiving the <i>network start request</i> command?	Table 13.13, 13.3.2.2.5	TC.S: M	Yes

Item number	Feature	Reference	Status	Support
TC.S.C12.Rsp	Does the device implement receiving the <i>network join router request</i> command?	Table 13.13, 13.3.2.2.6	TC.S: M	Yes
TC.S.C14.Rsp	Does the device implement receiving the <i>network join end device request</i> command?	Table 13.13, 13.3.2.2.7	TC.S: M	Yes
TC.S.C16.Rsp	Does the device implement receiving the <i>network update request</i> command?	Table 13.13, 13.3.2.2.8	TC.S: M	Yes
TC.S.C41.Rsp	Does the device implement receiving the <i>get group identifiers request</i> command?	Table 13.13, 13.3.2.2.9	TC.S: M	Yes
TC.S.C42.Rsp	Does the device implement receiving the <i>get endpoint list request</i> command?	Table 13.13, 13.3.2.2.10	TC.S: M	Yes

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109 **3.2.3 Commands generated**

Item number	Feature	Reference	Status	Support
TC.S.C01.Tx	Does the device implement sending the <i>scan response</i> command?	Table 13.15, 13.3.2.3.1	TC.S: M	Yes
TC.S.C03.Tx	Does the device implement sending the <i>device information response</i> command?	Table 13.15, 13.3.2.3.2	TC.S: M	Yes
TC.S.C11.Tx	Does the device implement sending the <i>network start response</i> command?	Table 13.15, 13.3.2.3.3	TC.S: M	Yes
TC.S.C13.Tx	Does the device implement sending the <i>network join router response</i> command?	Table 13.15, 13.3.2.3.4	TC.S: M	Yes
TC.S.C15.Tx	Does the device implement sending the <i>network join end device response</i> command?	Table 13.15, 13.3.2.3.5	TC.S: M	Yes
TC.S.C40.Tx	Does the device implement sending the <i>endpoint information</i> command?	Table 13.15, 13.3.2.3.6	TC.S: M	Yes
TC.S.C41.Tx	Does the device implement sending the <i>get group identifiers response</i> command?	Table 13.15, 13.3.2.3.7	TC.S: M	Yes

Item number	Feature	Reference	Status	Support
TC.S.C42.Tx	Does the device implement sending the <i>get endpoint list response</i> command?	Table 13.15, 13.3.2.3.8	TC.S: M	Yes

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111 3.3 Client

112 3.3.1 Attributes

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

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114 3.3.2 Commands received

Item number	Feature	Reference	Status	Support
TC.C.C01.Rsp	Does the device implement receiving the <i>scan response</i> command?	Table 13.19, 13.3.2.3.1	TC.C: M	No
TC.C.C03.Rsp	Does the device implement receiving the <i>device information response</i> command?	Table 13.19, 13.3.2.3.2	TC.C: M	No
TC.C.C11.Rsp	Does the device implement receiving the <i>network start response</i> command?	Table 13.19, 13.3.2.3.3	TC.C: M	No
TC.C.C13.Rsp	Does the device implement receiving the <i>network join router response</i> command?	Table 13.19, 13.3.2.3.4	TC.C: M	No
TC.C.C15.Rsp	Does the device implement receiving the <i>network join end device response</i> command?	Table 13.19, 13.3.2.3.5	TC.C: M	No
TC.C.C40.Rsp	Does the device implement receiving the <i>endpoint information</i> command?	Table 13.19, 13.3.2.3.6	TC.C: O	No
TC.C.C41.Rsp	Does the device implement receiving the <i>get group identifiers response</i> command?	Table 13.19, 13.3.2.3.7	TC.C.C41.Tx: M	No
TC.C.C42.Rsp	Does the device implement receiving the <i>get endpoint list response</i> command?	Table 13.19, 13.3.2.3.8	TC.C.C42.Tx: M	No

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116 **3.3.3 Commands generated**

Item number	Feature	Reference	Status	Support
TC.C.C00.Tx	Does the device implement sending the <i>scan request</i> command?	Table 13.20, 13.3.2.2.1	TC.C: M	No
TC.C.C02.Tx	Does the device implement sending the <i>device information request</i> command?	Table 13.20, 13.3.2.2.2	TC.C: M	No
TC.C.C06.Tx	Does the device implement sending the <i>identify request</i> command?	Table 13.20, 13.3.2.2.3	TC.C: M	No
TC.C.C07.Tx	Does the device implement sending the <i>reset to factory new request</i> command?	Table 13.20, 13.3.2.2.4	TC.C: M	No
TC.C.C10.Tx	Does the device implement sending the <i>network start request</i> command?	Table 13.20, 13.3.2.2.5	TC.C: M	No
TC.C.C12.Tx	Does the device implement sending the <i>network join router request</i> command?	Table 13.20, 13.3.2.2.6	TC.C: M	No
TC.C.C14.Tx	Does the device implement sending the <i>network join end device request</i> command?	Table 13.20, 13.3.2.2.7	TC.C: M	No
TC.C.C16.Tx	Does the device implement sending the <i>network update request</i> command?	Table 13.20, 13.3.2.2.8	TC.C: M	No
TC.C.C41.Tx	Does the device implement sending the <i>get group identifiers request</i> command?	Table 13.20, 13.3.2.2.9	TC.C: O	No
TC.C.C42.Tx	Does the device implement sending the <i>get endpoint list request</i> command?	Table 13.20, 13.3.2.2.10	TC.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 *touchlink commissioning* cluster:

Test ID	Description	Reference
Global tests		
TC-TC-01G	Global attributes	4.2.1
Server side tests		
TC-TC-01S	Secondary functionality with server as DUT	4.3.1
Client side tests		
TC-TC-01C	Functionality with client as DUT	4.4.1

NOTE: Implementations of the *touchlink commissioning* cluster SHALL also satisfy the touchlink commissioning test cases specified in the Base Device Behavior Test Specification [R4].

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 TC-TC-01G: Global attributes

This test case verifies the behavior of the global attributes of the *touchlink commissioning* cluster client and server.

In this test, the PICS notation TC.S.Agm and TC.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 TC.S.Ago and TC.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)



Touchlink commissioning cluster (0x1000):

- All global attributes

PICS:

- TC.S, TC.C
- TC.S.Agm, TC.C.Agm, TC.S.Ago, TC.C.Ago

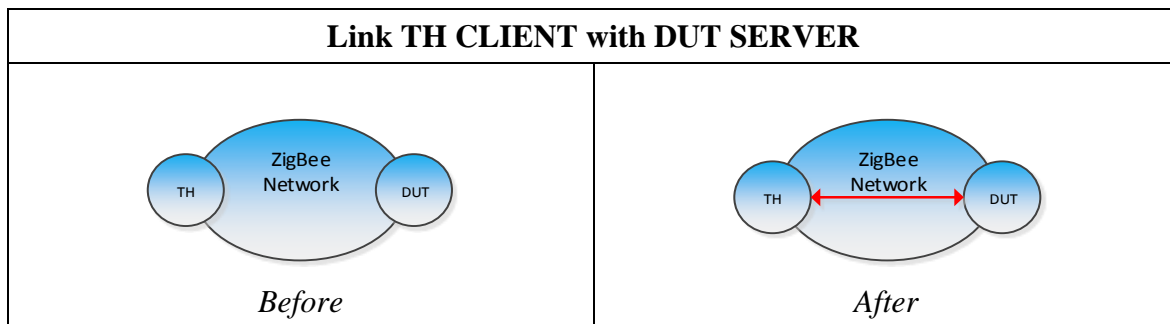
4.2.1.2 Required devices

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

4.2.1.4 Test preparation



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

172 **4.2.1.5 Test procedure**

TC-TC-01G: Global attributes			
Item	PICS	Test Harness Step	DUT pass Verification
1	TC.S.Agm, TC.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	TC.S.Agm, TC.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	TC.S.Agm, TC.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...

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

4.3 Server test cases

4.3.1 TC-TC-01S: Secondary functionality with server as DUT

This test verifies the secondary functionality of the *touchlink commissioning* cluster.

It is assumed that DUT SERVER has a least one group identifier that it can use to control other devices.

4.3.1.1 Scope

General:

- *Default response* command (0x0b)




Touchlink commissioning cluster (0x1000):

- *Endpoint information* command (0x40)
- *Get group identifiers request* command (0x41)
- *Get group identifiers response* command (0x41)
- *Get endpoint list request* command (0x42)
- *Get endpoint list response* command (0x42)

PICS:

- TC.S
- TC.S.C41.Rsp, TC.S.C42.Rsp
- TC.S.C40.Tx – TC.S.C42.Tx

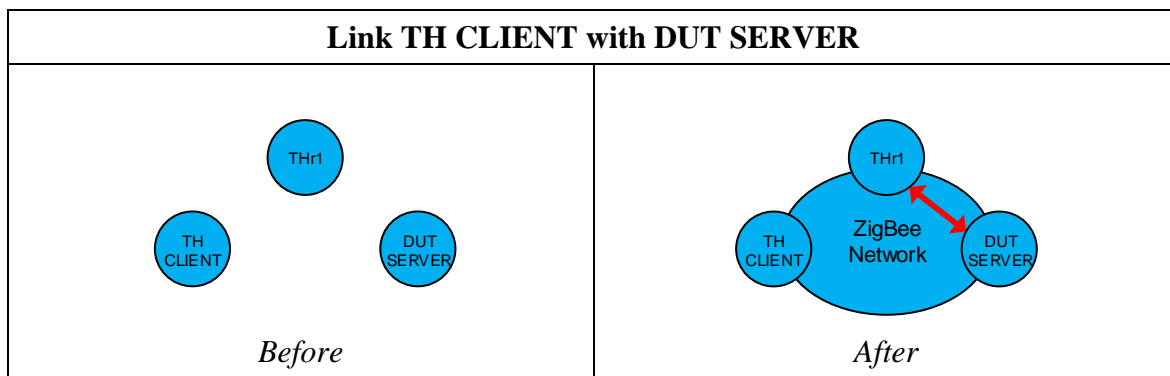
4.3.1.2 Required devices

Designation	Symbol	Description
TH SERVER		Test harness server implementing: <ul style="list-style-type: none"> • The <i>touchlink commissioning</i> cluster client.
DUT CLIENT		Device under test client implementing: <ul style="list-style-type: none"> • The <i>touchlink commissioning</i> cluster server.
THr1		Test harness capable of forming a distributed network.

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.

196 4.3.1.4 Test preparation



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TC-TC-01S: Secondary functionality with server as DUT		
Item	Preparation Step	Observation
P1	Form a ZigBee distributed network with THr1.	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	Touchlink TH CLIENT with THr1. Touchlink DUT SERVER with THr1.	Observe appropriate communication between TH CLIENT, DUT SERVER and THr1.

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

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200 **4.3.1.5 Test procedure**

TC-TC-01S: Secondary functionality with server as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
1a	TC.S.C40.Tx	If supported, user instigates DUT SERVER to send a ZCL <i>endpoint information</i> command to announce one of the endpoints bound with THr1.	DUT SERVER unicasts a ZCL <i>endpoint information</i> command frame to TH CLIENT with the <i>IEEE address</i> field set to the IEEE address of DUT SERVER, the <i>network address</i> field set to the network address of DUT SERVER and the remaining fields set to information about an endpoint on DUT SERVER that was bound with THr1.
1b	-	TH CLIENT unicasts a ZCL <i>default response</i> command frame to DUT SERVER with the <i>status</i> field set to 0x00 (SUCCESS).	None.
2	TC.S.C41.Rsp, TC.S.C41.Tx	TH CLIENT unicasts a ZCL <i>get group identifiers request</i> command frame to DUT SERVER with the <i>start index</i> field set to 0x00.	DUT SERVER unicasts a ZCL <i>get group identifiers response</i> command frame to TH CLIENT with the <i>total</i> field set to at least 0x01, the <i>start index</i> field set to 0x00, the <i>count</i> field set to at least 0x01 and <i>count</i> group information records, each containing <i>group identifier/group type</i> field pairs appropriate for the device.
3	TC.S.C42.Rsp, TC.S.C42.Tx	TH CLIENT unicasts a ZLL <i>get endpoint list request</i> command frame to DUT SERVER with the <i>start index</i> field set to 0x00.	DUT SERVER unicasts a ZLL <i>get endpoint list response</i> command frame to TH CLIENT with the <i>total</i> field set to 0x01, the <i>start index</i> field set to 0x00, the <i>count</i> field set to 0x01 and a single <i>endpoint information record</i> entry containing the information from the binding with THr1.

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

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4.4 Client test cases

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

This case test verifies the functionality of the *touchlink commissioning* 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 TC.C.CdTx represents the list of commands that are declared as being transmitted by the DUT.

4.4.1.1 Scope



Touchlink commissioning cluster (0x1000):

- *Get group identifiers request* command (0x41)
- *Get endpoint list request* command (0x42)

PICS:

- TC.C
- TC.C.C41.Tx – TC.C.C42.Tx

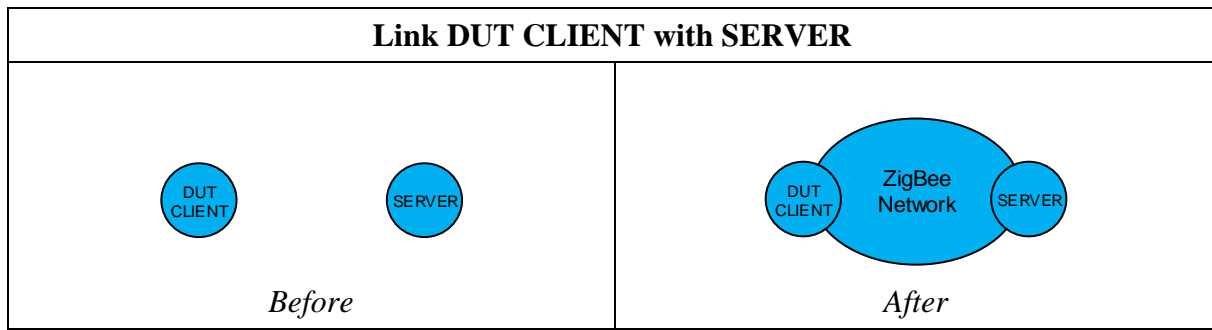
4.4.1.2 Required devices

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

4.4.1.3 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.

4.4.1.4 Test preparation



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

230 4.4.1.5 Test procedure

TC-TC-01C: Functionality with client as DUT			
Item	PICS	Test Harness Step	DUT Pass Verification
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	TC.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 TC-TC-01C ---

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5 Annex A: PICS to test case cross reference

5.1 Server

PICS	Test case		
	BDB	TC-TC-01G	TC-TC-01S
TC.S	X	X	X
TC.S.Afffd	X		
TC.S.C00.Rsp	X		
TC.S.C02.Rsp	X		
TC.S.C06.Rsp	X		
TC.S.C07.Rsp	X		
TC.S.C10.Rsp	X		
TC.S.C12.Rsp	X		
TC.S.C14.Rsp	X		
TC.S.C16.Rsp	X		
TC.S.C41.Rsp			X
TC.S.C42.Tx			X
TC.S.C01.Tx	X		
TC.S.C03.Tx	X		
TC.S.C11.Tx	X		
TC.S.C13.Tx	X		
TC.S.C15.Tx	X		
TC.S.C40.Tx			X
TC.S.C41.Tx			X
TC.S.C42.Tx			X

5.2 Client

PICS	Test case		
	BDB	TC-TC-01G	TC-TC-01C
TC.C	X	X	X
TC.C.Afffd		X	
TC.C.C01.Rsp	X		
TC.C.C03.Rsp	X		
TC.C.C11.Rsp	X		
TC.C.C13.Rsp	X		
TC.C.C15.Rsp	X		

PICS	Test case		
	BDB	TC-TC-01G	TC-TC-01C
TC.C.C40.Rsp			X
TC.C.C41.Rsp			X
TC.C.C42.Rsp			X
TC.C.C00.Tx	X		
TC.C.C02.Tx	X		
TC.C.C06.Tx	X		
TC.C.C07.Tx	X		
TC.C.C10.Tx	X		
TC.C.C12.Tx	X		
TC.C.C14.Tx	X		
TC.C.C16.Tx	X		
TC.C.C41.Tx			X
TC.C.C42.Tx			X

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