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

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38   Revision history

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

98   3   PICS

99   All references are for the ZigBee Cluster Library specification [R1] unless otherwise indicated.
100   An XML version of these PICS is also available in [R3].

101

102   3.1 Usage

Item number	Feature	Reference	Status	Support
TC.S	Does the device implement the *touchlink commissioning* cluster as a server?	13.3.2	O	Yes
TC.C	Does the device implement the *touchlink commissioning* cluster as a client?	13.3.3	O	No

103

104   3.2 Server

105   3.2.1 Attributes

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

106

107   3.2.2 Commands received

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

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

108

3.2.3 Commands generated

109

Item number	Feature	Reference	Status	Support
TC.S.C01.Tx	Does the device implement sending the *scan response* command?	Table 13.15, 13.3.2.3.1	TC.S: M	Yes
TC.S.C03.Tx	Does the device implement sending the *device information response* command?	Table 13.15, 13.3.2.3.2	TC.S: M	Yes
TC.S.C11.Tx	Does the device implement sending the *network start response* command?	Table 13.15, 13.3.2.3.3	TC.S: M	Yes
TC.S.C13.Tx	Does the device implement sending the *network join router response* command?	Table 13.15, 13.3.2.3.4	TC.S: M	Yes
TC.S.C15.Tx	Does the device implement sending the *network join end device response* command?	Table 13.15, 13.3.2.3.5	TC.S: M	Yes
TC.S.C40.Tx	Does the device implement sending the *endpoint information* command?	Table 13.15, 13.3.2.3.6	TC.S: M	Yes
TC.S.C41.Tx	Does the device implement sending the *get group identifiers response* 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 *get endpoint list response* command?	Table 13.15, 13.3.2.3.8	TC.S: M	Yes

110

3.3 Client

3.3.1 Attributes

Item number	Feature	Reference	Status	Support
TC.C.Afffd	Does the device implement the *ClusterRevision* global attribute?	Table 2-1, 2.3.5.1.1	TC.C: M	N/A

113

3.3.2 Commands received

Item number	Feature	Reference	Status	Support
TC.C.C01.Rsp	Does the device implement receiving the *scan response* command?	Table 13.19, 13.3.2.3.1	TC.C: M	N/A
TC.C.C03.Rsp	Does the device implement receiving the *device information response* command?	Table 13.19, 13.3.2.3.2	TC.C: M	N/A
TC.C.C11.Rsp	Does the device implement receiving the *network start response* command?	Table 13.19, 13.3.2.3.3	TC.C: M	N/A
TC.C.C13.Rsp	Does the device implement receiving the *network join router response* command?	Table 13.19, 13.3.2.3.4	TC.C: M	N/A
TC.C.C15.Rsp	Does the device implement receiving the *network join end device response* command?	Table 13.19, 13.3.2.3.5	TC.C: M	N/A
TC.C.C40.Rsp	Does the device implement receiving the *endpoint information* command?	Table 13.19, 13.3.2.3.6	TC.C: O	N/A
TC.C.C41.Rsp	Does the device implement receiving the *get group identifiers response* command?	Table 13.19, 13.3.2.3.7	TC.C.C41.Tx: M	N/A
TC.C.C42.Rsp	Does the device implement receiving the *get endpoint list response* command?	Table 13.19, 13.3.2.3.8	TC.C.C42.Tx: M	N/A

115

116   ### 3.3.3 Commands generated

Item number	Feature	Reference	Status	Support
TC.C.C00.Tx	Does the device implement sending the *scan request* command?	Table 13.20, 13.3.2.2.1	TC.C: M	N/A
TC.C.C02.Tx	Does the device implement sending the *device information request* command?	Table 13.20, 13.3.2.2.2	TC.C: M	N/A
TC.C.C06.Tx	Does the device implement sending the *identify request* command?	Table 13.20, 13.3.2.2.3	TC.C: M	N/A
TC.C.C07.Tx	Does the device implement sending the *reset to factory new request* command?	Table 13.20, 13.3.2.2.4	TC.C: M	N/A
TC.C.C10.Tx	Does the device implement sending the *network start request* command?	Table 13.20, 13.3.2.2.5	TC.C: M	N/A
TC.C.C12.Tx	Does the device implement sending the *network join router request* command?	Table 13.20, 13.3.2.2.6	TC.C: M	N/A
TC.C.C14.Tx	Does the device implement sending the *network join end device request* command?	Table 13.20, 13.3.2.2.7	TC.C: M	N/A
TC.C.C16.Tx	Does the device implement sending the *network update request* command?	Table 13.20, 13.3.2.2.8	TC.C: M	N/A
TC.C.C41.Tx	Does the device implement sending the *get group identifiers request* command?	Table 13.20, 13.3.2.2.9	TC.C: O	N/A
TC.C.C42.Tx	Does the device implement sending the *get endpoint list request* command?	Table 13.20, 13.3.2.2.10	TC.C: O	N/A

117

118 # 4 Test specification

119 ## 4.1 Introduction

120 ### 4.1.1 Test case overview

121 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

122

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

126 ### 4.1.2 Testing tolerances

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

132 ### 4.1.3 Client DUTs

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

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

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

140 ### 4.1.4 Test steps manipulating attributes

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

146   ## 4.2 Generic test cases

147   ### 4.2.1 TC-TC-01G: Global attributes

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

150   In this test, the PICS notation TC.S.A*gm* and TC.C.A*gm* represents the list of global attributes
151   that are specified as being mandatory for either the server or client, respectively. Similarly, the
152   PICS notation TC.S.A*go* and TC.C.A*go* represents the list of global attributes that are specified
153   as being optional for either the server or client, respectively.

154   #### 4.2.1.1 Scope

155   General:

156   - *Read attributes* command (0x00)
157   - *Read attributes response* command (0x01)
158   - *Write attributes* command (0x02)
159   - *Write attributes response* command (0x04)

160   *Touchlink commissioning* cluster (0x1000):

161   - All global attributes

162   PICS:

163   - TC.S, TC.C
164   - TC.S.A*gm*, TC.C.A*gm*, TC.S.A*go*, TC.C.A*go*

165   #### 4.2.1.2 Required devices

Designation	Symbol	Description
DUT	DUT	Device under test implementing: • The *touchlink commissioning* cluster server or client.
TH	TH	Test harness implementing: • The *touchlink commissioning* cluster client or server, i.e. the opposite cluster instantiation as implemented on the DUT.

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167   ### 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.

168

169   ### 4.2.1.4 Test preparation

Link TH CLIENT with DUT SERVER

Before   *After*
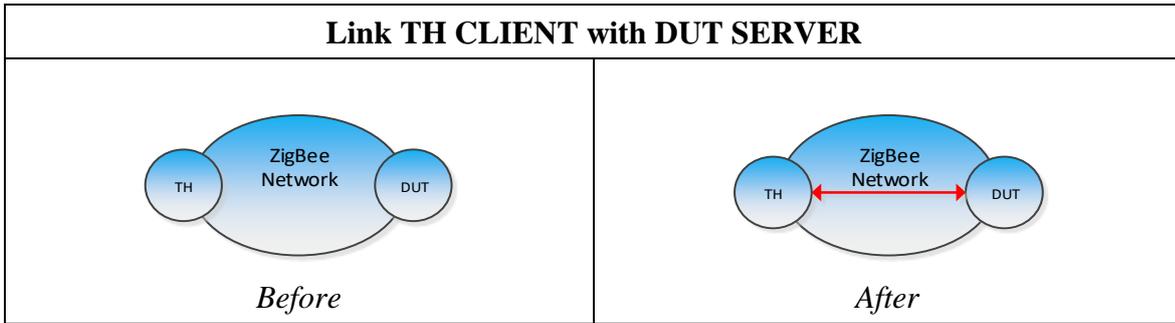
170

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 ---

171

172 **4.2.1.5 Test procedure**

<table>
<tr><td colspan="4" align="center">TC-TC-01G: Global attributes</td></tr>
<tr><td>Item</td><td>PICS</td><td>Test Harness Step</td><td>DUT pass Verification</td></tr>
<tr><td>1</td><td>TC.S.A<i>gm</i>, TC.C.A<i>gm</i></td><td>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.</td><td>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).</td></tr>
<tr><td>2a</td><td>TC.S.A<i>gm</i>, TC.C.A<i>gm</i></td><td>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.</td><td>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.</td></tr>
<tr><td>2b</td><td>TC.S.A<i>gm</i>, TC.C.A<i>gm</i></td><td>TH unicasts a ZCL <i>read attributes</i> command frame to DUT to read back each attribute written in step 2a.</td><td>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.</td></tr>
</table>

Continued…

TC-TC-01G: Global attributes			
Item	**PICS**	**Test Harness Step**	**DUT pass Verification**
3	TC.S.A*go*, TC.C.A*go*	TH unicasts a ZCL *read attributes* command frame to DUT to read each optional global attribute of this cluster one at a time.	DUT unicasts a ZCL *read attributes response* command frame to TH containing each attribute. If the DUT implements the attribute, the *Status* field will be equal to SUCCESS and the command will contain the requested attribute. If the DUT does not implement the attribute, the *Status* 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.A*go*, TC.C.A*go*	TH unicasts a ZCL *write attributes* 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 *write attributes response* 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.A*go*, TC.C.A*go*	TH unicasts a ZCL *read attributes* command frame to DUT to read back each attribute written in step 4a.	DUT unicasts a ZCL *read attributes response* command frame to TH containing the requested attribute. If the *Status* field of the *write attributes response* command frame was equal to SUCCESS, the updated value is read back. If the *Status* field of the *write attributes response* command frame was not equal to SUCCESS the value is not updated when read back.

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

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174 ## 4.3 Server test cases

175 ### 4.3.1 TC-TC-01S: Secondary functionality with server as DUT

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

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

179 #### 4.3.1.1 Scope

180 General:

181 - *Default response* command (0x0b)

182 *Touchlink commissioning* cluster (0x1000):

183 - *Endpoint information* command (0x40)
184 - *Get group identifiers request* command (0x41)
185 - *Get group identifiers response* command (0x41)
186 - *Get endpoint list request* command (0x42)
187 - *Get endpoint list response* command (0x42)

188 PICS:

189 - TC.S
190 - TC.S.C41.Rsp, TC.S.C42.Rsp
191 - TC.S.C40.Tx – TC.S.C42.Tx

192 #### 4.3.1.2 Required devices

Designation	Symbol	Description
TH SERVER	TH CLIENT	Test harness server implementing: • The *touchlink commissioning* cluster client.
DUT CLIENT	DUT SERVER	Device under test client implementing: • The *touchlink commissioning* cluster server.
THr1	THr1	Test harness capable of forming a distributed network.

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194 #### 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.

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196 **4.3.1.4 Test preparation**

Link TH CLIENT with DUT SERVER

Before	After
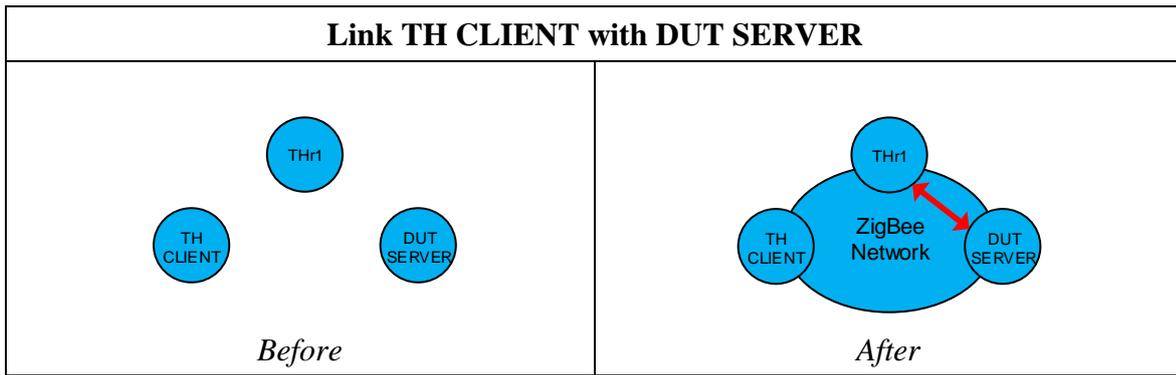
197

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 *endpoint information* command to announce one of the endpoints bound with THr1.	DUT SERVER unicasts a ZCL *endpoint information* command frame to TH CLIENT with the *IEEE address* field set to the IEEE address of DUT SERVER, the *network address* 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 *default response* command frame to DUT SERVER with the *status* field set to 0x00 (SUCCESS).	None.
2	TC.S.C41.Rsp, TC.S.C41.Tx	TH CLIENT unicasts a ZCL *get group identifiers request* command frame to DUT SERVER with the *start index* field set to 0x00.	DUT SERVER unicasts a ZCL *get group identifiers response* command frame to TH CLIENT with the *total* field set to at least 0x01, the *start index* field set to 0x00, the *count* field set to at least 0x01 and *count* group information records, each containing *group identifier*/*group type* field pairs appropriate for the device.
3	TC.S.C42.Rsp, TC.S.C42.Tx	TH CLIENT unicasts a ZLL *get endpoint list request* command frame to DUT SERVER with the *start index* field set to 0x00.	DUT SERVER unicasts a ZLL *get endpoint list response* command frame to TH CLIENT with the *total* field set to 0x01, the *start index* field set to 0x00, the *count* field set to 0x01 and a single *endpoint information record* 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.C*d*Tx 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	DUT CLIENT	Device under test client implementing: • The *touchlink commissioning* cluster client.
SERVER	SERVER	Suitable server device implementing: • The *touchlink commissioning* 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.

226 **4.4.1.4 Test preparation**

Link DUT CLIENT with SERVER

| *Before* | *After* |
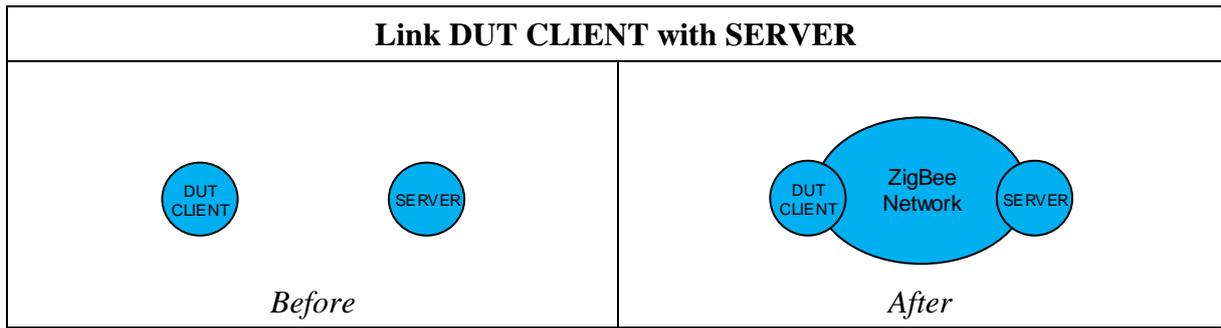
227

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 ---

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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.C*d*.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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233 5 Annex A: PICS to test case cross reference

234 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

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236 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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