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Base Device Behavior PICS Proforma Version 1.0

ZigBee Document 15-0283-04

April 18th, 2015

Sponsored by: ZigBee Alliance

Accepted by This document has been accepted for release by the ZigBee Alliance Board of Directors

Abstract This specification defines the base device behavior specification for devices operating on the ZigBee-PRO stack, ensuring profile interoperability between application profiles.

Keywords Base device, profile interoperability, ZigBee-PRO, PICS

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Revision history

| Revision | Date | Details | Editor |
|----------|-----------------------------------|--|---------------|
| 00 | July 14 th , 2015 | First draft | Phil Jamieson |
| 01 | September 30 th , 2015 | Updates in preparation of the v0.9 ballot. | Phil Jamieson |
| 02 | October 30 th , 2015 | Addressed comments from the v0.9 ballot. | Phil Jamieson |
| 03 | March 8 th , 2016 | Addressed comments from the ZigBee 3.0 SVEs. | Phil Jamieson |
| 04 | April 18 th , 2016 | Changed status to "approved" and version to 1.0. | Phil Jamieson |

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1 Introduction

To evaluate conformance of a particular implementation, it is necessary to have a statement of which capabilities and options have been implemented for a given standard. Such a statement is called a protocol implementation conformance statement (PICS).

1.1 Scope

This document provides the protocol implementation conformance statement (PICS) proforma for the Base Device Behavior specification [R2] in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-7.

1.2 Purpose

The supplier of a protocol implementation claiming to conform to the Base Device Behavior specification shall complete the following PICS proforma and accompany it with the information necessary to identify fully both the supplier and the implementation.

The PICS is in the form of answers to a set of questions in the PICS proforma. The questions in a proforma consist of a systematic list of protocol capabilities and options as well as their implementation requirements. The implementation requirement indicates whether implementation of a capability is mandatory, optional, or conditional depending on options selected. When a protocol implementer answers questions in a PICS proforma, they would indicate whether an item is implemented or not, and provide explanations if an item is not implemented.

1.3 Abbreviations and special symbols

Notations for requirement status:

| Symbol | Description |
|--|--|
| <i><Item Number></i> | PICS item reference composed of an item set abbreviation and a numeric item identifier, e.g. ZLT1. |
| <i><Status></i> | Implementation requirement status for this item (see below). |
| <i><Item Number>: <Status></i> | <i>Status</i> is conditional on support of <i>Item Number</i> . |
| <i><Item number>.<i></i> | <i><i></i> is a sub-item of <i><Item number></i> . |
| x | Specific negative test case item. |
| M | Feature is mandatory. |
| O | Feature is optional. |
| R | Feature is optional but recommended. |
| O.n | Feature is optional, but support of at least one of the group of options labeled O.n is required. |

| Symbol | Description |
|--------|----------------------------|
| N/A | Feature is not applicable. |
| X | Feature is prohibited. |
| ~ | Boolean NOT operator. |
| && | Boolean AND operator. |
| | Boolean OR operator. |

124

125 Unless explicitly stated, items that do not match may be considered optional.

126 For example, FD1: O.1 indicates that the status is optional but at least one of the
 127 features described in FD1 is required to be implemented, if this implementation is to
 128 follow the standard of which this PICS proforma is a part.

129

130 1.4 Instructions for completing the PICS proforma

131 If a given implementation is claimed to conform to this standard, the actual PICS
 132 proforma to be filled in by a supplier shall be technically equivalent to the text of the
 133 PICS proforma in this document, and shall preserve the numbering and naming and
 134 the ordering of the PICS proforma.

135 A PICS which conforms to this document shall be a conforming PICS proforma
 136 completed in accordance with the instructions for completion given in this document.

137 The main part of the PICS is a fixed-format questionnaire. Answers to the
 138 questionnaire are to be provided in the rightmost column, either by simply marking an
 139 answer to indicate a restricted choice (such as Yes or No), or by entering a value, set,
 140 or range of values.

141 If an implementation supports multiple application devices on multiple endpoints, a
 142 separate PICS proforma SHALL be completed for each device.

143 1.5 PICS proforma tables

144 The tables in clauses 4 onwards are composed of the detailed questions to be
 145 answered, which make up the PICS proforma. References are to the Base Device
 146 Behavior Specification [R2] unless otherwise indicated.

147 1.6 Errata

148 Any errata against this specification can be found in [R5].

149

2 References

151 The following standards contain provisions, which, through reference in this
152 document, constitute provisions of this standard. All the standards listed are
153 normative references. At the time of publication, the editions indicated were valid. All
154 standards are subject to revision, and parties to agreements based on this standard are
155 encouraged to investigate the possibility of applying the most recent editions of the
156 standards indicated below.

157 2.1 ZigBee Alliance documents

158 [R1] ZigBee Specification, ZigBee document 05-3474.

159 [R2] Base Device Behavior Specification, ZigBee document 13-0402.

160 [R3] ZigBee Cluster Library, ZigBee document 07-5123.

161 [R4] ZigBee Application Architecture, ZigBee document 13-0589.

162 [R5] Errata for Base Device Behavior PICS, ZigBee document 16-02010.

163

3 Implementation declaration

3.1 Identification of the implementation

Implementation under test (IUT) identification

| | |
|--|--|
| IUT name | LEEDARSON Smart RGBTW Ceiling light (Model: with Speaker 3200LM) |
| IUT software version | 0x02 |
| IUT hardware version | 0x01 |
| Operating system (optional) | |

Product supplier

| | |
|-------------------------------|--|
| Name | LEEDARSON LIGHTING CO., LTD |
| Address | Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China |
| Telephone number | 0596-3699897 |
| Fax number | |
| Email address | cert@leedarson.com |
| Additional information | |

172 **Client**

| | |
|-------------------------------|---|
| Name | LEEDARSON LIGHTING CO., LTD |
| Address | Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China |
| Telephone number | 0596-3699897 |
| Fax number | |
| Email address | cert@leedarson.com |
| Additional information | |

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174 **PICS contact person**

| | |
|-------------------------------|---|
| Name | Wendy Chen |
| Address | Xingda Road, Xingtai Industrial Zone, Changtai County, Zhangzhou, Fujian, China |
| Telephone number | 0596-3699897 |
| Fax number | |
| Email address | cert@leedarson.com |
| Additional information | |

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3.2 Identification of the protocol

This PICS proforma applies to the Base Device Behavior specification [R2].

3.3 Global statement of conformance

The implementation described in this PICS proforma meets all of the mandatory requirements of the referenced standards:

Base Device Behavior specifications [R2]

☒ Yes

☐ No

Note -- Answering 'No' indicates non-conformance to the specified protocol standard. Non-supported mandatory capabilities are to be identified in the following tables, with an explanation by the implementer explaining why the implementation is non-conforming.

The supplier will have fully complied with the requirements for a statement of conformance by completing the statement contained in this sub-clause. That means, by clicking the above, the statement of conformance is complete.

4 Base device PIXIT

4.1 Internal attributes

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------------------|------------|
| IA1 | <i>bdbCommissioningGroupID</i> : What is the list of groups the node is able to use for finding & binding? | 5.3.1 | M | 0xffff |
| IA2 | <i>bdbJoinUsesInstallCodeKey</i> : Does the Trust Center policy require all nodes to join using an install code? | 5.3.6 | ZLT1: M | "N/A" |
| IA3 | <i>bdbPrimaryChannelSet</i> : What is the primary channel set? | 5.3.10 | M | 0x02108800 |
| IA4 | <i>bdbScanDuration</i> : What is the scan duration? | 5.3.11 | M | 0x04 |
| IA5 | <i>bdbSecondaryChannelSet</i> : What is the secondary channel set? | 5.3.12 | M | 0x05ef7000 |
| IA6 | <i>bdbTCLinkKeyExchangeAttemptsMax</i> : What is the maximum number of attempts a node will try to exchange its Trust Center link key? | 5.3.14 | ZLT2: M ZLT3: M | "0x03" |
| IA7 | <i>bdbTCLinkKeyExchangeMethod</i> : What is the Trust Center link key exchange method? | 5.3.15 | ZLT2: M ZLT3: M | "0x00" |
| IA8 | <i>bdbTrustCenterNodeJoinTimeout</i> : What is the Trust Center node join timeout? | 5.3.16 | ZLT1: M | "N/A" |
| IA9 | <i>bdbTrustCenterRequireKeyExchange</i> : Does the Trust Center's policy require a node to exchange its initial link key with a new link key generated by the Trust Center? | 5.3.17 | ZLT1: M | "N/A" |

199 4.2 Commissioning combinations

200 The actions specified in this section serve as a guide for testing the individual
 201 commissioning mechanisms. Verification of commissioning feature support is
 202 covered later in this document.

203 Indicate support of all relevant combinations and add any further combinations
 204 supported by the device.

205

| Item number | Feature | Status | Support |
|-------------|---|--------|---------|
| CC1 | Can the product be stimulated to invoke touchlink commissioning only? | O | No |
| CC2 | Can the product be stimulated to invoke network formation only? | O | No |
| CC3 | Can the product be stimulated to invoke network steering only? | O | No |
| CC4 | Can the product be stimulated to invoke finding & binding only? | O | No |
| CC5 | Can the product be stimulated to invoke touchlink commissioning followed by network steering? | O | No |
| CC6 | Can the product be stimulated to invoke network formation followed by network steering? | O | No |
| CC7 | Can the product be stimulated to invoke network steering followed by network formation? | O | No |
| CC8 | Can the product be stimulated to reset before network formation? | O | No |
| CC9 | Can the product be stimulated to automatically form a network upon startup when factory new? | O | No |
| | ... | | |

206

207 4.3 Miscellaneous

| Item number | Feature | Status | Support |
|-------------|--|--------|---------|
| M1 | Can the node disable network steering via local application trigger? | O | No |
| M2 | Can the node store more than one NWK outgoing frame counters? | O | No |

| Item number | Feature | Status | Support |
|-------------|--|---------|---------|
| M3.1 | If supported, give the identifier of a cluster that has at least one writable attribute. | O | 0x0003 |
| M3.2 | Give the attribute identifier of a writable attribute. | M3.1: M | 0x0000 |

208

5 General requirements

5.1 [ZLT] ZigBee logical device types

| Item number | Feature | Reference | Status | Support |
|-------------|--|----------------|-------------------------------|---------|
| ZLT1 | Is the logical device type specified as a ZigBee coordinator? | [R1]/2.5.4.5.1 | O.1 | No |
| ZLT1.1 | Does the node encompass the role of the Trust Center? | 6.1 | ZLT1: M ZLT2: X ZLT3: X | No |
| ZLT1.2 | Does the node form a centralized security network? | 6.1 | ZLT1: M ZLT2: X ZLT3: X | No |
| ZLT1.3 | Does the node NOT attempt to join another network? | 6.1 | ZLT1: M | No |
| ZLT2 | Is the logical device type specified as a ZigBee router? | [R1]/2.5.4.5.2 | O.1 | Yes |
| ZLT2.1 | Can the router node join another network? | 6.1 | ZLT2: M | Yes |
| ZLT2.2 | Does the node form a distributed network? | 6.1 | ZLT1: X ZLT2: O ZLT3: X | No |
| ZLT3 | Is the logical device type specified as a ZigBee end device? | [R1]/2.5.4.5.5 | O.1 | No |
| ZLT3.1 | Can the end device node join another network? | 6.1 | ZLT3: M | No |
| ZLT3.2 | Is the end device sleepy? | - | ZLT3: O | No |
| ZLT4 | Can the node switch between ZLT1 and ZLT2 types under application control. | 6.1 | O.1 | No |

211 Notes:

212 O.1 A node SHALL support one of ZLT1 or ZLT2 or ZLT3 or (ZLT1 and ZLT2,
213 switchable under application control).

214

215

216 **5.2 [NSM] Network security models**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------------------|---------|
| NSM1 | Can the node join a centralized security network? | 6.2 | ZLT1: X ZLT2: M ZLT3: M | Yes |
| NSM2 | Can the node join a distributed security network? | 6.2 | ZLT1: X ZLT2: M ZLT3: M | Yes |

217

218 **5.3 [LK] Link keys**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------|---------|
| LK1 | Does the node contain the default global Trust Center link key? | 6.3 | M | Yes |
| LK2 | Does the node contain the distributed security global link key? | 6.3 | M | Yes |
| LK3 | Does the node contain an install code derived preconfigured link key? | 6.3 | M | Yes |
| LK4 | Does the node contain the touchlink preconfigured link key? | 6.3 | GRC5: M | Yes |

219

220 **5.4 [UIC] Use of install codes**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------------------|---------|
| UIC1 | Does the node support install codes? | 6.4 | M | Ye |
| UIC2 | Will the node not be available via retail channels and be professionally installed? | 6.4 | O.2 | No |
| UIC3 | Will the node be available via retail channels? | 6.4 | O.2 | Yes |
| UIC4 | Is the node configured to only require the use of install codes on joining? | 6.4 | UIC2: O UIC3: X | No |
| UIC5 | Does the node have a user configuration mechanism? | 6.4 | UIC3: O.3 | No |

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------------------|---------|
| UIC6 | Does the node not have a user configuration mechanism? | 6.4 | UIC3: O.3 | Yes |
| UIC7 | Does the node default to requiring potential networks to use of install codes on joining? | 6.4 | UIC5: O UIC6: X | No |
| UIC8 | Can the node be switched into a mode whereby all networks are considered for joining? | 6.4 | UIC5: M | No |
| UIC9 | Can the node join all types of networks? | 6.4 | UIC6: M | Yes |
| UIC10 | Does the Trust Center require the use of install codes for all joining nodes? | 6.4 | ZLT1: O | No |

221

222 Notes:

223 O.2 One of the items marked O.2 SHALL be supported.

224 O.3 One of the items marked O.3 SHALL be supported.

225

226 **5.5 [GRC] Commissioning**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------------------------|---------|
| GRC1 | Does the node support network steering? | 6.5 | M | Yes |
| GRC2.1 | Is the device implemented as having a simple device class (see [R4])? | 6.5 | O.4 | Yes |
| GRC2.2 | Is the device implemented as having a dynamic device class (see [R4])? | 6.5 | O.4 | No |
| GRC2.3 | Is the device implemented as having a node device class (see [R4])? | 6.5 | O.4 | No |
| GRC4 | Does the device support finding & binding as either an initiator or a target? | 6.5 | GRC2.1: M GRC2.2: O GRC2.3: O | Yes |
| GRC5 | Does the device support touchlink commissioning as either an initiator or a target or both? | 6.5 | O | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|------------------------|---------|
| GRC5.1 | Does the device support touchlink commissioning as an initiator. | 6.5 | GRC5: O.5 | No |
| GRC5.2 | Does the device support touchlink commissioning as a target. | 6.5 | GRC5: O.5 | Yes |
| GRC6 | If touchlink commissioning as an initiator is attempted and is successful does the device not attempt any further commissioning operations? | 6.5 | GRC5.1: M | No |
| GRC7 | If network steering is attempted does the node follow the correct steering procedure dependent on whether the node is joined to a network or not? | 6.5 | M | Yes |
| GRC8 | Does the node only form a network if the node is not yet joined to a network? | 6.5 | ZLT1.2: M ZLT2.2: M | No |
| GRC9 | Can the node form a centralized network? | 6.5 | ZLT1.2: M | No |
| GRC10 | Can the node form a distributed network? | 6.5 | ZLT2.2: M | No |
| GRC11 | Does the node skip network formation? | 6.5 | ZLT3: M | No |
| GRC12 | Does the node attempt finding & binding only if it is joined to a network? | 6.5 | GRC4: M | Yes |
| GRC13 | Does the node instigate finding & binding on one or more endpoints implemented on the node? | 6.5 | GRC4: O | Yes |
| GRC14 | Does the node attempt finding & binding as an initiator endpoint if the endpoint supports a type 1 client or type 2 server cluster? | 6.5 | GRC4:O.6 | No |
| GRC15 | Does the node attempt finding & binding as a target endpoint if the endpoint supports a type 1 server or type 2 client cluster? | 6.5 | GRC4:O.6 | Yes |
| GRC16 | Is the node capable of binding to a group during finding & binding? | | GRC4: O | No |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------|---------|
| GRC17 | Is the device able to transmit groupcast messages? | | O | Yes |

227

228 Notes:

229 O.4 One of the items marked O.4 SHALL be supported.

230 O.5 One of the items marked O.5 SHALL be supported.

231 O.6 At least one of the items marked with O.6 SHALL be supported.

232

233 **5.6 [MRD] Minimum requirements for all devices**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------|---------|
| MRD1 | Can the node process the ZDO <i>Active_EP_req</i> command and respond with the ZDO <i>Active_EP_rsp</i> command? | 6.6 | M | Yes |
| MRD1.1 | Can the node process the ZDO <i>Node_Desc_req</i> command and respond with the ZDO <i>Node_Desc_rsp</i> command? | 6.6 | M | Yes |
| MRD2 | Can the node process the ZDO <i>Simple_Desc_req</i> command and respond with the ZDO <i>Simple_Desc_rsp</i> command? | 6.6 | M | Yes |
| MRD3 | Can the node process the ZDO <i>IEEE_Addr_req</i> command and respond with the ZDO <i>IEEE_Addr_rsp</i> command? | 6.6 | M | Yes |
| MRD4 | Can the node process the ZDO <i>NWK_Addr_req</i> command and respond with the ZDO <i>NWK_Addr_rsp</i> command? | 6.6 | M | Yes |
| MRD5 | Can the node process the ZDO <i>Match_Desc_req</i> command and respond with the ZDO <i>Match_Desc_rsp</i> command? | 6.6 | M | Yes |
| MRD6 | Can the node process the ZDO <i>Mgmt_Bind_req</i> command and respond with the ZDO <i>Mgmt_Bind_rsp</i> command? | 6.6 | M | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|----------|---------|
| MRD7 | Can the node process the ZDO <i>Mgmt_Lqi_req</i> command and respond with the ZDO <i>Mgmt_Lqi_rsp</i> command? | 6.6 | M | Yes |
| MRD8 | Can the node process the ZDO <i>Bind_req</i> command and respond with the ZDO <i>Bind_rsp</i> command? | 6.6 | M | Yes |
| MRD9 | Can the node process the ZDO <i>Unbind_req</i> command and respond with the ZDO <i>Unbind_rsp</i> command? | 6.6 | M | Yes |
| MRD10 | Can the node process the ZDO <i>Mgmt_Leave_req</i> command and respond with the ZDO <i>Mgmt_Leave_rsp</i> command? | 6.6 | M | Yes |
| MRD11 | Can the node process at least one <i>identify</i> cluster, <i>identify query response</i> command after broadcasting an <i>identify</i> cluster, <i>identify query</i> command? | 6.6 | M | Yes |
| MRD12 | Can the node process more than one <i>identify</i> cluster, <i>identify query response</i> command after broadcasting an <i>identify</i> cluster, <i>identify query</i> command? | 6.6 | O | No |
| MRD13 | Does the node implement a binding table whose number of entries is \geq the sum of cluster instances supported on each device? | 6.6 | M | Yes |
| MRD14 | Regardless of the commissioning mechanism, is the binding table consistent such that its contents can be retrieved using the ZDO <i>Mgmt_Bind_req</i> command? | 6.6 | M | Yes |
| MRD15 | Does the node have a default reporting configuration for every implemented attribute that is specified as mandatory and reportable? | 6.6 | DRC1: M | Yes |
| MRD16 | Does the node have a cluster which is the target of an operational transaction? | 6.6 | O | Yes |
| MRD17 | Does the node support group addressing and at least 8 memberships in the group table? | 6.6 | MRD16: M | Yes |

234

235 **5.7 [DRC] Default reporting configuration**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------|---------|
| DRC1 | Does the node have at least one attribute that is specified as reportable? | 6.7 | O | Yes |
| DRC2 | Does the node have a default reporting configuration for every attribute that is specified as reportable? | 6.7 | DRC1: M | Yes |
| DRC3 | Does the node automatically send reports to a node that binds with a cluster containing an attribute that is specified as reportable? | 6.7 | DRC2: M | Yes |
| DRC4 | If any default reporting configuration is overwritten, is the updated reporting configuration used instead? | 6.7 | DRC1: M | Yes |
| DRC5 | If the maximum reporting interval of an attribute is greater than 0x0000, is a report generated when the time that has elapsed since the previous report of the same attribute is equal to the maximum reporting interval for that attribute? | 6.7 | DRC1: M | Yes |
| DRC6 | If the maximum reporting interval of an attribute is equal to 0x0000, is a report generated when the attribute value changes? | 6.7 | DRC1: M | Yes |

236

237 **5.8 [MDP] MAC data polling**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|---------|---------|
| MDP1 | Is the MAC data polling rate dynamic based on the operating state of the node? | 6.8 | ZLT3: R | No |
| MDP2 | Does the node have at least a fast and a slow MAC data polling rate? | 6.8 | ZLT3: R | No |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|---------|---------|
| MDP3 | Does the device poll more frequently than once per 7.5 seconds? | 6.8 | ZLT3: R | No |
| MDP4 | While waiting for an active response message, does the node poll at its fast rate? | 6.8 | MDP2: R | No |
| MDP5 | Is the fast poll rate at least once every 3 seconds? | 6.8 | MDP2: R | No |
| MDP6 | While not actively waiting for messages, does the node poll at its slow rate? | 6.8 | MDP2: O | No |
| MDP7 | Does the node poll at its fast rate during commissioning? | 6.8 | MDP2: R | No |

238

239 **5.9 [ZPD] ZigBee persistent data**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------|---------|
| ZPD1 | Does the node preserve the value of the <i>bdbNodeIsOnANetwork</i> attribute across resets? | 6.9 | M | Yes |

240

6 Initialization

6.1 [INP] Initialization procedure

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------|---------|
| INP1 | Does the node support the initialization procedure? | 7.1 | M | Yes |
| INP2 | Does the node restore its persistent ZigBee data? | 7.1 | M | Yes |
| INP3 | If the node is a ZigBee End Device and was previously on a network, does it attempt to rejoin the network? | 7.1 | ZLT3: M | No |
| INP4 | On successful rejoining, does the node broadcast a <i>device_annce</i> ZDO command? | 7.1 | M | Yes |
| INP5 | If the node is a ZigBee Router and supports touchlink but was not previously on a network, does it switch to a touchlink primary channel? | 7.1 | (ZLT2 && GRC5): M | Yes |

7 [COM] Commissioning

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|---------|---------|
| COM1 | Does the implementation provide a mechanism to invoke network steering? | 8 | M | Yes |
| COM2 | Does the implementation provide a mechanism to invoke finding & binding? | 8 | GRC4: M | Yes |

245

246 7.1 [TLC] Top level commissioning procedure

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------------------|---------|
| TLC1 | If touchlink commissioning is requested, does the node follow the <i>touchlink for initiator</i> procedure? | 8.1 | GRC5.1: M | No |
| TLC2 | If network steering is requested when <i>bdbNodeIsOnANetwork</i> is equal to TRUE, does the node follow the <i>network steering for a node on a network</i> procedure? | 8.1 | M | Yes |
| TLC3 | If network steering is requested when <i>bdbNodeIsOnANetwork</i> is equal to FALSE, does the node follow the <i>network steering for a node not on a network</i> procedure? | 8.1 | M | Yes |
| TLC4 | If network formation is requested when <i>bdbNodeIsOnANetwork</i> is equal to FALSE, does the node follow the <i>network formation</i> procedure? | 8.1 | ZLT1: M ZLT2: M | Yes |
| TLC5* | If network formation is requested when <i>bdbNodeIsOnANetwork</i> is equal to TRUE, does the node follow the <i>network formation</i> procedure? | 8.1 | X | No |
| TLC6 | If finding & binding is requested when <i>bdbNodeIsOnANetwork</i> is equal to TRUE, does the node follow the <i>finding & binding</i> procedure according to cluster class? | 8.1 | GRC4: M | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------|---------|
| TLC7* | If finding & binding is requested when <i>bdbNodeIsOnANetwork</i> is equal to FALSE, does the node follow the <i>finding & binding</i> procedure according to cluster class? | 8.1 | X | No |

247

248 7.2 [NSO] Network steering procedure for a node on a network

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------|---------|
| NSO1 | Is the <i>network steering for a node on a network</i> procedure supported? | 8.2 | M | Yes |
| NSO2 | Does the node first broadcast the <i>Mgmt_Permit_Joining_req</i> ZDO command? | 8.2 | M | Yes |
| NSO3 | If the node is a ZigBee Coordinator or a ZigBee Router, does the node activate its permit joining flag for \geq <i>bdbcMinCommissioningTime</i> ? | 8.2 | (ZLT1 ZLT2): M | Yes |

249

250 7.3 [NSN] Network steering procedure for a node not on a 251 network

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------------------|---------|
| NSN1 | Is the <i>network steering for a node not on a network</i> procedure supported? | 8.3 | ZLT1: X ZLT2: M ZLT3: M | Yes |
| NSN2 | Does the node attempt to discover networks over a set of channels? | 8.3 | NSN1: M | Yes |
| NSN3 | If suitable networks were found, does the node attempt to join one of them using MAC association? | 8.3 | NSN1: M | Yes |
| NSN4 | If the join was not successful and there are more suitable networks to join, does the node attempt to join another network? | 8.3 | NSN1: M | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|-------------------|---------|
| NSN5 | If the join was successful, does the node wait <i>apsSecurityTimeOutPeriod</i> milliseconds to receive the network key? | 8.3 | NSN1: M | Yes |
| NSN6 | If the network key is not received within <i>apsSecurityTimeOutPeriod</i> milliseconds, the network key is received but could not be decrypted or the authentication fails does the node reset its network parameters? | 8.3 | NSN1: M | Yes |
| NSN7 | Does the node broadcast a <i>Device_annce</i> ZDO command? | 8.3 | NSN1: M | Yes |
| NSN9 | If the TC link key exchange is not successful, does the node reset its network parameters and remove itself from the network? | 8.3 | NSN1: M | Yes |
| NSN10 | If the TC link key exchange is successful, does the node broadcast the <i>Mgmt_Permit_Joining_req</i> ZDO command? | 8.3 | NSN1: M | Yes |
| NSN11 | Does the node activate its permit joining flag if new nodes can join this node? | 8.3 | (ZLT1 ZLT2): M | Yes |

252

253 7.4 [NFP] Network formation procedure

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------------------|---------|
| NFP1 | Is the <i>network formation</i> procedure supported? | 8.4 | ZLT1: M ZLT2: O | No |
| NFP2 | Does the node attempt to form a network over a set of channels? | 8.4 | NFP1: M | No |
| NFP3 | If formation is successful and the node is a ZigBee Coordinator, does it initiate its Trust Center functionality? | 8.4 | (NFP1 && ZLT1): M | No |

254

255 **7.5 [FBT] Finding & binding procedure for a target endpoint**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|----------|---------|
| FBT1 | Is the <i>finding & binding for a target endpoint</i> procedure supported? | 8.5 | GRC15: M | Yes |
| FBT2 | Does the target identify itself for at least <i>bdbMinCommissioningTime</i> seconds? | 8.5 | FBT1: M | Yes |
| FBT3 | Does the target respond to <i>Identify</i> cluster <i>Identify Query</i> commands? | 8.5 | FBT1: M | Yes |

256

257 **7.6 [FBI] Finding & binding procedure for an initiator endpoint**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------------------|---------|
| FBI1 | Is the <i>finding & binding for an initiator endpoint</i> procedure supported? | 8.6 | GRC14: M | No |
| FBI2 | Is the <i>Identify</i> cluster <i>Identify Query</i> command broadcast supported? | 8.6 | FBI1: M | No |
| FBI3 | Is the simple descriptor of each respondent obtained with the <i>Simple_Desc_req</i> ZDO command? | 8.6 | FBI1: M | No |
| FBI4 | Does the initiator create a binding table entry for each matching cluster to the respondent? | 8.6 | FBI1: M | No |
| FBI5 | If a group binding is requested, does the initiator add the respondent to an appropriate group? | 8.6 | (FBI1 && GRC16): M | No |

258

259 **7.7 [TLI] Touchlink procedure for an initiator**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|-----------|---------|
| TLI1 | Is the <i>touchlink for an initiator</i> procedure supported? | 8.7 | GRC5.1: M | No |
| TLI2 | Does the initiator broadcast 5 <i>scan request</i> inter-PAN command frames on the first primary touchlink channel and then once for each remaining primary channel? | 8.7 | TLI1: M | No |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|---------|---------|
| TLI3 | Does the initiator broadcast a <i>scan request</i> inter-PAN command frames on each secondary touchlink channel when using touchlink for formation or joining? | 8.7 | TLI1: O | No |
| TLI4 | If the initiator is not on a network, does it ignore any <i>scan request</i> command frames from other factory new initiators? | 8.7 | TLI1: M | No |
| TLI5 | If the initiator is not on a network, does it switch into a target mode if any <i>scan request</i> command frames are received from other non-factory new initiators? | 8.7 | TLI1: O | No |
| TLI6 | If a target is found, does the initiator transmit a <i>device information request</i> inter-PAN command frame to the selected target? | 8.7 | TLI1: O | No |
| TLI7 | If a target is found, does the initiator transmit one or more <i>identify request</i> inter-PAN command frame to the selected target? | 8.7 | TLI1: O | No |
| TLI8 | If a <i>scan request</i> command frame is received from a target on the same network as the initiator with the <i>network update identifier</i> field lower than <i>nwkUpdateId</i> , does the initiator transmit a <i>network update request</i> inter-PAN command frame to the selected target and then terminate the touchlink procedure? | 8.7 | TLI1: M | No |
| TLI9 | If a target is found on a different network to the initiator and the initiator is on a centralized network, does it terminate the touchlink procedure? | 8.7 | TLI1: M | No |
| TLI10 | If the initiator is not on a network and the target is a ZigBee Router, does the initiator transmit a <i>network start request</i> inter-PAN command frame to the selected target? | 8.7 | TLI1: M | No |

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------|---------|
| TLI11 | If the initiator is on a network and the target is a ZigBee Router, does the initiator transmit a <i>network join router request</i> inter-PAN command frame to the selected target? | 8.7 | TLI1: M | No |
| TLI12 | If the initiator is on a network and the target is a ZigBee End Device, does the node transmit a <i>network join end device request</i> inter-PAN command frame to the selected target? | 8.7 | TLI1: M | No |
| TLI13 | If the initiator is an end device and a <i>network start request</i> inter-PAN command frame was sent to the selected target, does the node rejoin the network? | 8.7 | (ZLT3 && TLI1): M | No |

260

261 7.8 [TLT] Touchlink procedure for an target

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|-----------|---------|
| TLT1 | Is the <i>touchlink for a target</i> procedure supported? | 8.8 | GRC5.2: M | Yes |
| TLT2 | Does the target discard any touchlink commissioning command other than a <i>scan request</i> command and terminate the procedure? | 8.8 | TLT1: M | Yes |
| TLT3 | Does the target discard <i>scan request</i> command frames with an RSSI lower than a product specific threshold and terminate the procedure? | 8.8 | TLT1: M | Yes |
| TLT4 | Does the target respond to a <i>scan request</i> command frame with a <i>scan response</i> command frame? | 8.8 | TLT1: M | Yes |
| TLT5 | Does the target respond to a <i>device information request</i> command frame with a <i>device information response</i> command frame? | 8.8 | TLT1: M | Yes |
| TLT6 | Does the target identify itself on receipt of a <i>identify request</i> command frame? | 8.8 | TLT1: M | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|-------------------|---------|
| TLT7 | If the target receives a <i>network start request</i> command frame, is a ZigBee Router and decides to start a network, does it perform a network discovery? | 8.8 | (TLT1 && ZLT2): M | Yes |
| TLT8 | If the target receives a <i>network join router request</i> command frame, is a ZigBee Router and decides to join the network of the initiator, does it respond with a <i>network join router response</i> command frame? | 8.8 | (TLT1 && ZLT2): M | Yes |
| TLT9 | If the target receives a <i>network join end device request</i> command frame, is a ZigBee End Device and decides to join the network of the initiator, does it respond with a <i>network join end device response</i> command frame? | 8.8 | (TLT1 && ZLT3): M | No |
| TLT10 | If target is already part of a network, does it leave its current network? | 8.8 | TLT1: M | Yes |
| TLT11 | If requested by the initiator, does the target start a new network and respond with a <i>network start response</i> command frame? | 8.8 | TLT1: M | Yes |
| TLT12 | After starting a new network, does the target direct join the initiator to its new network? | 8.8 | TLT1: M | Yes |

262

263 Add item for being on a centralized network and ignoring the start or join.

264

265

8 Reset

267 8.1 [RBC] Reset via the basic cluster

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------|---------|
| RBC2 | Does the initiator transmit a <i>reset to factory defaults</i> command frame to a target? | 9.1 | O | No |
| RBC3 | On receipt of a <i>reset to factory defaults</i> command frame, does the target reset all attributes of all clusters to their default values? | 9.1 | O | Yes |
| RBC4 | On receipt of a <i>reset to factory defaults</i> command frame, does the target not reset its network parameters? | 9.1 | M | Yes |

268

269 8.2 [RTL] Reset via the touchlink commissioning cluster

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------|---------|
| RTL2 | Does the initiator transmit a <i>reset to factory new</i> command frame to a target? | 9.2 | GRC5: M | Yes |
| RTL3 | On receipt of a <i>reset to factory new</i> command frame and if the target is on a distributed security network, does it leave the network? | 9.2 | GRC5: M | Yes |
| RTL4 | On receipt of a <i>reset to factory new</i> command frame and if the target is on a centralized security network, does it ignore the command? | 9.2 | GRC5: O | No |
| RTL5 | Does the initiator use an extended channel scan during a reset via the touchlink commissioning cluster? | 9.2 | GRC5: M | Yes |

270

271 **8.3 [RNL] Reset via network leave command**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|--------|---------|
| RNL1 | Does a node transmit a <i>leave</i> NWK command frame to another node to trigger the other node to leave? | 9.4 | O | No |
| RNL2 | On receipt of a <i>leave</i> NWK command frame with the <i>request</i> bit set to 1, does the node leave the network? | 9.4 | M | Yes |

272

273 **8.4 [RLZ] Reset via the Mgmt_Leave_req ZDO command**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------|---------|
| RLZ1 | Does a node transmit an <i>Mgmt_Leave_req</i> ZDO command frame to another node? | 9.5 | O | No |
| RLZ2 | On receipt of an <i>Mgmt_Leave_req</i> ZDO command frame, does the node leave the network? | 9.5 | M | Yes |

274

275 **8.5 [RLA] Reset via local action**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------|---------|
| RLA1 | Does the node provide a local reset mechanism? | 9.6 | O | Yes |
| RLA2 | On activation of the local reset mechanism, does the node reset itself? | 9.6 | RLA1: M | Yes |

9 Security

277 9.1 [RLK] Receiving a new Trust Center link key

| Item number | Feature | Reference | Status | Support |
|-------------|--|----------------|--------------------------------------|---------|
| RLK0 | Does the node exchange its link key during network steering on a centralized security network? | 10.2.5 | ZLT2: M ZLT3: M | Yes |
| RLK1a | Does the node execute the appropriate steps defined by the alternative link key exchange mechanism? | 10.2.5, step 1 | (RLK0 && (IA7!=0x00)): M | No |
| RLK1b | If the alternative mechanism is successful, does the node terminate the node link key exchange procedure? | 10.2.5, step 1 | RLK1a: M | No |
| RLK3 | If the APS Request Key method is used or the alternative mechanism is not successful, does the node transmit the <i>Node_Desc_req</i> ZDO command to the Trust Center? | 10.2.5, step 3 | (RLK0 && (IA7==0x00)): M RLK1a: M | Yes |
| RLK4a | If a <i>Node_Desc_rsp</i> ZDO command is not received within <i>bdbcTCLinkKey-ExchangeTimeout</i> seconds does the node retry up to the maximum attempts permitted? | 10.2.5, step 4 | RLK3: M | Yes |
| RLK4b | If a <i>Node_Desc_rsp</i> ZDO command is not received after the maximum number of attempts permitted, does it terminate the node link key exchange procedure? | 10.2.5, step 4 | RLK3: M | Yes |
| RLK5 | If a <i>Node_Desc_rsp</i> ZDO command is received and the server mask of the node descriptor indicates a core stack of r20 or earlier, does the node terminate the node link key exchange procedure? | 10.2.5, step 5 | RLK3: M | Yes |
| RLK7 | If a <i>Node_Desc_rsp</i> ZDO command is received and the server mask of the node descriptor indicates a core stack of r21 or later, does the node request a new link key using the <i>Request Key</i> APS command frame to the Trust Center, encrypted with its initial link key? | 10.2.5, step 7 | RLK3: M | Yes |

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------------|----------|---------|
| RLK8a | If a <i>Transport Key</i> APS command is not received within <i>bdbcTCLinkKey-ExchangeTimeout</i> seconds does the node retry up to the maximum attempts permitted? | 10.2.5, step 8 | RLK7: M | Yes |
| RLK8b | If a <i>Transport Key</i> APS command is not received after the maximum number of attempts permitted, does it terminate the node link key exchange procedure? | 10.2.5, step 8 | RLK7: M | Yes |
| RLK9 | If a <i>Transport Key</i> APS command frame is received from the Trust Center, containing a new link key, does the node update its Trust Center link key with the new key? | 10.2.5, step 9 | RLK7: M | Yes |
| RLK11 | Does the node verify the new key using the <i>Verify Key</i> APS command frame to the Trust Center? | 10.2.5, step 11 | RLK7: M | Yes |
| RLK12a | If a <i>Confirm Key</i> APS command is not received within <i>bdbcTCLinkKey-ExchangeTimeout</i> seconds does the node retry up to the maximum attempts permitted? | 10.2.5, step 12 | RLK11: M | Yes |
| RLK12b | If a <i>Confirm Key</i> APS command is not received after the maximum number of attempts permitted, does it terminate the node link key exchange procedure? | 10.2.5, step 12 | RLK11: M | Yes |

278

279 9.2 [AIC] Adding an install code

| Item number | Feature | Reference | Status | Support |
|-------------|---|----------------|--------------------------|---------|
| AIC0 | Does the Trust Center allow the input of an install code? | 10.3.1 | ZLT1: O | No |
| AIC2 | On receipt of an installation code, does the Trust Center create an entry in its node/link key mapping table (<i>apsDeviceKeyPairSet</i>) with the installation code derived key? | 10.3.1, step 2 | (AIC0 && (IA2==True)): M | No |

280

281 **9.3 [ANN] Adding a new node into the network**

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------------------------|---------|
| ANN1 | On receipt of an <i>Update Device</i> APS command frame, does the Trust Center follow the procedure for adding a new node into the network? | 10.3.2 | ZLT1: M | No |
| ANN2 | If an install code is required and the new node is not in <i>apsDeviceKeyPairSet</i> , does the Trust Center terminate the Trust Center link key exchange procedure? | 10.3.2 | (ANN1 && (IA2==True)): M | No |
| ANN3 | If an install code is not required and the new node is not in <i>apsDeviceKeyPairSet</i> , does the Trust Center create an entry in its <i>apsDeviceKeyPairSet</i> for the joining node? | 10.3.2 | (ANN1 && (IA2==False)): M | No |
| ANN4 | Does the Trust Center send the network key to the joining node using a <i>Transport Key</i> APS command frame, encrypted with the entry in <i>apsDeviceKeyPairSet</i> corresponding to the joining node? | 10.3.2 | ANN1: M | No |
| ANN5 | If a <i>Request Key</i> APS command frame is not received and the Trust Center requires the new node to exchange its link key, does it request the new node leaves the network? | 10.3.2 | (IA9==TRUE): M | No |
| ANN6 | On receipt of a <i>Request Key</i> APS command frame from the joining node, encrypted with its initial link key, does the Trust Center generate a new link key and transport it to the joining node using a <i>Transport Key</i> APS command frame? | 10.3.2 | ANN5: M | No |
| ANN7 | If a <i>Verify Key</i> APS command frame is not received by the Trust Center from the joining node, does it request the new node leaves the network? | 10.3.2 | ANN6: M | No |

| Item number | Feature | Reference | Status | Support |
|-------------|---|-----------|---------|---------|
| ANN8 | Does the Trust Center receive a <i>Verify Key</i> APS command frame from the joining node, update the entry in <i>apsDeviceKeyPairSet</i> corresponding to the joining node with the new key and respond with a <i>Confirm Key</i> APS command frame? | 10.3.2 | ANN7: M | No |

282

283 **9.4 [BKN] Behavior when a known node joins**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------|--------------------------|---------|
| BKN1 | Does the Trust Center allow a known node to join but in a fresh state? | 10.3.3 | ZLT1: M | No |
| BKN2 | Does the Trust Center store the original install code derived link key for devices that have joined? | 10.3.3 | ZLT1: O | No |
| BKN3 | Does the Trust Center overwrite the link key for a joining node with the original install code derived link key? | 10.3.3 | ((IA2==TRUE) && BKN2): M | No |
| BKN4 | Does the Trust Center overwrite the link key for a joining node with the default global Trust Center link key? | 10.3.3 | (IA2==FALSE): M | No |

284

285 **9.5 [TCP] Trust center policies**

| Item number | Feature | Reference | Status | Support |
|-------------|--|-----------------|-------------|---------|
| TCP1.1 | Does the Trust Center allow any nodes to join (Trust Center policy <i>useWhiteList</i>)? | [R1] Table 4.33 | ZLT1.1: O.7 | No |
| TCP1.2 | Does the Trust Center allow only known nodes to join (Trust Center policy <i>useWhiteList</i>)? | [R1] Table 4.33 | ZLT1.1: O.7 | No |

| Item number | Feature | Reference | Status | Support |
|-------------|---|--------------------|-------------|---------|
| TCP2.1 | Does the Trust Center allow a node on the network that transmits a ZDO Mgmt_Permit_Join with a significance set to 1 to affect the Trust Center policy (Trust Center policy <i>allowRemoteTc-PolicyChange</i>)? | [R1] Table 4.33 | ZLT1.1: O.8 | No |
| TCP2.2 | Does the Trust Center forbid a node on the network that transmits a ZDO Mgmt_Permit_Join with a significance set to 1 to affect the Trust Center policy (Trust Center policy <i>allowRemoteTc-PolicyChange</i>)? | [R1] Table 4.33 | ZLT1.1: O.8 | No |

286

287 Notes:

288 O.7 One or both of the items marked O.7 SHALL be supported.

289 O.8 One or both of the items marked O.8 SHALL be supported.

290

291