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Project	ZigBee Alliance
Title	**ZigBee CBA Profile: Protocol Implementation Conformance (PICS) Proforma**
Date Submitted	[May 27, 2011]
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Re:	ZigBee PICS for the ZBA Profile
Abstract	As a part of formal conformance testing, manufacturers will be asked to submit a statement of protocol conformance with respect to the appropriate ZigBee devices required by the application profile under test. This document is intended to provide the form of that statement of conformance for the ZBA profile.
Purpose	This document, after review by the relevant working groups, should provide a form whereby developers can proffer a statement of protocol conformance to be tested under profile testing.
Notice	This document has been prepared to assist the ZigBee Alliance. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.
Release	The contributor acknowledges and accepts that this contribution will be posted in the member area of the ZigBee web site.

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Change history

The following table shows the change history for this specification.

Table 1 – Revision change history

Revision	Who	Description
R00	R00	Bob Old: Initial draft
R01	Cam	Cam: Removed AMI references
R02	Cam	Cam: Added Tunnel PICS
R03	Cam	Cam: Added Sleeping, TC, and Commissioning PICS
R04	Cam	Cam: Highlighted changes and modified from various comments
R05	Cam	Cam: Addressed comments from Tokyo ZBA meeting
R06	Cam	Cam: Updated from layer PICS document
R07	Cam	Cam: Updated from ZBA working task group meeting
R08	Cam	Modify/Reference Layer PICS instead of new ZBA PICS
R09	Cam	From ZBA meeting 9-25-08
R10	Cam	Fixed tracking and change bars for review of R09
R11	Cam	Prepared for Vancouver meeting
R12	Cam	From Vancouver meeting
R13	Cam	From ZBA meeting 10/30 and reference changes
R14	Cam	New items from errata doc 085148
R15	Cam	Cleaned up and put in references for ZBA v0.9
R16	Chuck Lehn	Added Commissioning cluster StartupControl attribute PICS and Generic Tunnel cluster PICS
R17	Chuck Lehn	Removed ZBAG 18 and changed ZBAG19 to be optional.
R18	Chuck Lehn	Changed number of supported groups to be 5 or more.
R19	Cam Williams	Rearranged some items from Ryan Maley comments
R20	Cam Williams	Minor editorial changes.
R21	Cam Williams	Minor editorial changes.

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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 ZigBee specifications cited in Reference [R4] in compliance with the relevant requirements, and in accordance with the relevant guidance, given in ISO/IEC 9646-7.

This document addresses the ZigBee Building Automation (ZBA) Application Profile.

1.2   Purpose

The supplier of a protocol implementation claiming to conform to the ZigBee ZBA Application Profile 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.

2 References

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

2.1 ZigBee Alliance documents

[R1]   ZigBee document 053474r18: ZigBee Specification

[R2]   ZigBee document 064321r08, ZigBee Stack Profile

[R3]   ZigBee document 074855r08, ZigBee PRO Stack Profile

[R4]   ZigBee document 053516r11: ZigBee ZBA Application Profile Specification

[R5]   ZigBee document 075123r03, ZigBee Cluster Library Specification

[R6]   ZigBee document 08006r03: Layer PICS and Stack Profiles

[R7]   ZigBee document 064113r07: ZigBee Cluster Library PICS

2.2 IEEE documents

[R8]   IEEE Standard for Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) specifications for Low Rate Wireless Personal Area Networks (LR-WPANs), 2003.

2.3 ISO documents

[R9]   ISO/IEC 9646-1:1991, Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts.

[R10]   ISO/IEC 9646-7:1995, Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7. Implementation conformance statements.

2.4 ASHRAE documents

[R11]   ASHRAE 135-2004 standard, Data Communication Protocol for Building Automation and Control Networks

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3   Abbreviations and special symbols

Notations for requirement status:

M	Mandatory
O	Optional
O.n	Optional, but support of at least one of the group of options labeled O.n is required.
N/A	Not applicable
X	Prohibited
Item Number:Status	Status is conditional on support of item number

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

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4   Instructions for completing the PICS proforma

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

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

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

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5   Identification of the implementation

Device Under Test

Name: Schneider Electric next generation iBMS Enterprise Server

Version: 0.52

Software Version: EmberZNet 3.5.0

Hardware Version: EM250

Operating System (optional): XP Version 2002 SP 3

Device Supplier

Name: Schneider Electric

Address: 1 High Street, North Andover, MA 01845

Telephone number: +1 978 975 9600

Facsimile number: +1 978 975 9782

Email address: Cam.Williams@schneider-electric.com

Additional information:

PICS Contact Person

Name: Cam Williams

Same as Device Supplier

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6   Identification of the protocol

This PICS proforma applies to ZigBee ZBA Application Profile, cited in Reference [R4].

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7   Global statement of conformance

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

Application Profile: ZigBee ZBA – 053516r12 – Version 1.0

☑ 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.

8   PICS proforma tables

The following tables are composed of the detailed questions to be answered, which make up the PICS proforma.

8.1   ZigBee Device Types

Table 2 - Functional device types

Item number	Item description	Reference	Status	Support
FDT1	Is this device capable of acting as a ZigBee coordinator?	[R1]/2.5.5.5.1	O.1	Y
FDT2	Is this device capable of acting as a ZigBee router?	[R1]/2.5.5.5.2	O.1	Y
FDT3	Is this a ZigBee end device?	[R1]/2.5.5.5.3	O.1	N
SLP1	Is the device a sleeping device? RXOnWhenIdle = FALSE	[R4]/2.3.2.4	FDT1:X FDT2:X FDT3:O	N
SR1	Is this device capable of acting in the role of a Trust Center?	[R1]//1.4, 4.6.2	FDT1:M FDT2:O FDT3:X	Y

8.2   Stack Profile

Table 3 –Stack Profile

Item number	Item description	Reference	Status	Support
ZSP2	Is the device built on a ZigBee PRO Compliant Platform certified for the ZigBee PRO stack profile?	[R3] [R4]/5.1 [R6]	M	Y

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8.3 ZBA Modifications to the Layer PICS

The Layer PICS restrictions/requirements in the table below are obtained from [R6].

Table 4 – Layer PICS restrictions/requirements

Layer PICS Item number [R6]	Status	Additional Reference	Additional Constraints	Support
ASLS6	M	[R1]4.2.1.3, 4.4.1, 4.4.10	Manage Application Link Keys	Y
ASLS20	M	[R1]4.4.3.1, 4.4.9.8	Does the device support receipt of tunnel commands?	Y
ALS13	SR1:M	[R1]4.6.3.5, 4.6.3.5.2	Trust center supports sending application link keys.	Y
ALS15	M	[R1]4.6.3.5, 4.6.3.5.1, 4.6.3.5.1.1	Support receiving application link key from trust center.	Y
ALS21	SR1: M	[R1] 4.6.3.8, 4.6.3.8.1	Is this device capable of following the "command tunneling procedure" in the role of a trust center device?	Y
ALS22	FDT1: M FDT2: M FDT3: X	[R1] 4.6.3.8, 4.6.3.8.2	Is this device capable of following the "command tunneling procedure" in the role of a router?	Y
ALF100-ALF102	M	[R1]2.2.4.5.1-6	Support APS GROUP requests/confirms	Y
ADF3	M	[R1]2.2.5.1, 2.2.5.2.1, 2.2.8.4.1, 4.4.1.1	Does the device support the origination of application data frames with the auxiliary APS security header?	Y
ADF4	M	[R1] 2.2.5.1 2.2.5.2.1, 2.2.8.3.2, 2.2.8.3.3, 4.4.1.2	Does the device support the receipt of application data frames with the auxiliary APS security header?	Y
ADF5	BTD1:M	[R1] 2.2.5.1, 2.2.5.2.1, 2.2.8.4.1, 2.2.5.1.8, 2.2.8.4.5.1	Does the device support the origination of application data frames with the extended APS fragmentation/reassembly header?	Y

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Layer PICS Item number [R6]	Status	Additional Reference	Additional Constraints	Support
ADF6	BTD1:M	[R1] 2.2.5.1 2.2.5.2.1, 2.2.8.3.2, 2.2.8.3.3, 2.2.5.1.8, 2.2.8.4.5.2	Does the device support the receipt of application data frames with the extended APS fragmentation/reassembly header?	Y
ACF500	M	[R1] 2.2.5.1 2.2.5.2.2, 2.2.6, 4.4.1.1	Does the device support the origination of command frames with the auxiliary APS security header?	Y
ACF501	M	[R1] 2.2.5.1 2.2.5.2.1, 2.2.6, 2.2.8.3.3, 4.4.1.2	Does the device support the receipt of command frames with the auxiliary APS security header?	Y
ACF303	M	[R1] 4.4.9.5	Does the device support the origination of Request Key application command frames from a non-Trust Center device?	Y
NLF221	M	[R1]3.6.6.1	Does the network layer maintain a multicast group ID table?	Y

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8.4   Stack Profile extensions for ZBA

Table 5 – Stack profile extensions for ZBA

Item number	Item description	Reference	Status	Support
SPE2	Does the device support fragmentation with the following parameters? apscMaxWindowSize = 3 (CCB to make interoperable with other profiles) apsInterFameDelay = 12ms	[R1]/ 2.2.5.1, 2.2.5.2.1, 2.2.8.4.1, 2.2.5.1.8, 2.2.8.4.5.1 [R4]/5.2 [R6]/ADF5, ADF6	BTD1:M	Y
SPE3	Does the device adhere to the ZBA polling rate specifications?	[R4]/5.1	FDT3:M	*n/a*
SPE4	Does the device support source binding?	[R4]/5.1	M	Y
SPE5	Does the device support at least one source binding entry for every cluster (client or server), across all endpoints, that generates an unsolicited command?	[R4]/5.1	M	Y
SPE6	Does the device support routing and reception of network layer multicasts?	[R1]/3.6.6.1 [R6]/NLF221	M	Y

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8.5 Security

Table 6 –Security

Item number	Item description	Reference	Status	Support
SEC1	Does the device support Standard Security?	[R3] [R4]/5.1	M	Y
SEC2	Does the device support High Security?	[R3] [R4]/5.1	X	N
SEC4	Does the device support joining with pre-loaded link keys?	[R4]/7	M	Y
SEC5	Does the device support joining using the security cluster?	[R4]/7	O	N
SEC6	Does the device support the security policies for the ZBA profile	[R4]/7	M	Y
SEC7	Does the device accept unicast key transport messages from the Trust Center, encrypted with its TC Link Key, and not accept unicast key transport messages in the clear?	[R4]/7	M	Y
SEC8	Does the device accept broadcast key transport messages from the Trust Center, encrypted with the Network Key, and not accept broadcast key transport messages in the clear?	[R4]/7	M	Y
SEC9	Does the Trust Center send unicast key transport messages to a device encrypted with the device's TC Link Key?	[R4]/7	SR1:M	Y
SEC10	Does the Trust Center send broadcast key transport messages encrypted with the Network Key?	[R4]/7	SR1:M	Y
SEC11	Does the device accept an unsolicited TC Link Key from the Trust Center?	[R4]/7	M	Y
SEC12	Does the Trust Center allow a request for a new TC Link Key?	[R4]/7	SR1:O	N

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Item number	Item description	Reference	Status	Support
SEC13	When a device has a Network Key and rejoins the network, does it attempt a secure rejoin, and if secure rejoin fails, initiate an unsecured rejoin?	[R4]/7	M	Y
SEC14	When a device does an unsecured rejoin, does the Trust Center tunnel the Network Key encrypted with the device's TC Link Key?	[R4]/7	SR1:M	Y
SEC15	Does the device set its Network Key to the ZBA Fall Back Network Key, when it does not have a Network Key and there is no Trust Center?	[R4]/7	O	N
SEC16	Will the device form a network and choose an EPID, if there is no Coordinator present?	[R4]/7	O	N

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8.6 ZBA general requirements support

Table 7 – ZBA general requirements support

Item number	Item description	Reference	Status	Support
ZBAG1	Does the device support the ZigBee Cluster Library as defined in the ZBA profile specification?	[R4]/5.3 [R5]	M	Y
ZBAG2	Does the device support the ZigBee Cluster Library List specified for ZBA including the mandatory/optional clusters detailed in the ZCL PICS? (Basic/Identify/Groups)?	[R4]/5.4 [R7]	M	Y
ZBAG5	Does the device support the ZBA Start-up Attribute Set (SAS) and ZBA Life Cycle transitions?	[R4]/8.2	M	Y
ZBAG12	How many groups across all endpoints does the device support?	[R4]/6	M *(5 or greater)*	5
ZBAG13	Does the device support decommissioning so that the device then uses the ZBA Default settings as its stack settings and its Commissioning Cluster SAS is set to the ZBA default SAS?	[R4]/7,8	M	Y
ZBAG14	Does the device support the Commissioning Cluster as a server?	[R4]/8,10	M	Y
ZBAG15	Does the device support the Commissioning Cluster as a client?	[R4]/8,10	O	N
ZBAG16	Does the device forbid Commissioning Cluster access if it is joined to an operational network?	[R4]/8,10	M	Y
ZBAG17	Does the device support the Commissioning cluster StartupControl attribute values of 0x01 and 0x03?	[R4]/8.10 [R5]/3.15	M	Y
ZBAG19	Does the device support the Commissioning cluster StartupControl attribute values of 0x00 and 0x02?	[R4]/8.10 [R5]/3.15	O	N

8.7 ZBA common clusters

The common cluster ZCL PICS restrictions/requirements in Table 3 are obtained from [R4]/5.4.

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Table 8 – Common cluster ZCL PICS restrictions/requirements

ZCL PICS Item number [R7]	Status	Additional Constraints	Support
BCC1	O	Does the device support the Basic Cluster as a client?	N
GCC1	O	Does the device support the Groups Cluster as a client?	N
ICC1	O	Does the device support the Identify Cluster as a client?	N
PCS1	O	Does the device support the Power Configuration as a server?	N
TCS1	O	Does the device support the Device Temperature Configuration as a server?	N
ACS1	O	Does the device support the Alarms Cluster as a server?	N
LCS1	O	Does the device support the RSSI Location Cluster as a server?	N
LCC1	O	Does the device support the RSSI Location Cluster as a client?	N
TCS1	O	Does the device support the Time Cluster as a server?	N

8.8 ZigBee ZBA device description support

Listed below are items each corresponding to a ZigBee Device Type. By convention the prefix (e.g. BDT) will be repeated for more detailed items under the PICS for the device. Every item below shall be the first enumeration of the prefix (e.g. BTD1).

Table 9 – ZBA device description support

Item number	Item description	Reference	Status	Support
BTD1	Is the product a BACnet Tunnel device?	[R4]/7.4.11	O	Y

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8.9 ZigBee ZBA Device Description Capabilities

Tables in the following sub-clauses detail the capabilities specific to a device description.

8.9.1 Generic Tunnel device functions

Table 10 – Generic Tunnel Cluster

Item number	Item description	Reference	Status	Support
GTC1	Does the device support the Generic Tunnel Cluster as a server?	[R5]9.2	BTD1:M	Y
GTC2	What is the Generic Tunnel Cluster Attribute Maximum Incoming Transfer Size?	[R5]9.2.2A.3.3.2.2	BTD1:M *(DUT transfer size in bytes)*	512
GTC3	What is the Generic Tunnel Cluster Attribute Maximum Outgoing Transfer Size?	[R5]9.2.2A.3.3.2.2	BTD1:M *(DUT transfer size in bytes)*	512
GTC5	Is the Generic Tunnel Cluster Protocol Address attribute writeable?	[R5] 9.2.2.2.3	O	N

8.9.2 BACnet Tunnel device functions

Table 11 – BACnet Tunnel Cluster

Item number	Item description	Reference	Status	Support
BTD4	Does the device support the BACnet Protocol Tunnel Cluster as both client and server?	[R5]9.3A.3.4	BTD1:M	Y

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