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BACnet Protocol Implementation Conformance Statement (PICS)

Date: October 6, 2014
Vendor Name: Lutron Electronics Co., Inc.
Product Name: Quantum® BACnet Integration
Applications Software Version: 2.0
Firmware Revision: 2.7
BACnet Protocol Revision: 4
Vendor ID: 176

Product Description

BACnet IP is embedded in the Quantum® processor. There are two types of BACnet devices available in Quantum®: subsystem devices and area devices. The subsystem devices are main BACnet devices; typically, one main device per floor of the building. The area devices are virtual BACnet devices of the subsystem device, typically one per room of the building. It is normal to have multiple subsystem main devices and area virtual devices in a project.

BACnet Interoperability Building Blocks Supported (Annex K):

K.1.2 BIBB	Data Sharing	ReadProperty-B (DS-RP-B)
K.1.4 BIBB	Data Sharing	ReadPropertyMultiple-B (DS-RPM-B)
K.1.8 BIBB	Data Sharing	WriteProperty-B (DS-WP-B)
K.1.10 BIBB	Data Sharing	WritePropertyMultiple-B (DS-WPM-B)
K.1.12 BIBB	Data Sharing	COV-B (DS-COV-B)
K.5.2 BIBB	Device Management	DynamicDeviceBinding-B (DM-DDB-B)
K.5.4 BIBB	Device Management	DynamicObjectBinding-B (DM-DOB-B)
K.5.6 BIBB	Device Management	DeviceCommunicationControl-B (DM-DCC-B)

BACnet Standardized Device Profile (Annex L):

BACnet Application Specific Controller (B-ASC)

Segmentation Capability:

Segmented requests supported? No. Window Size: n/a
Segmented responses supported? No. Window Size: n/a

Non-Standard Application Services:

Non-standard application services are not supported.

Job Name:	Model Numbers:	
Job Number:		

Standard Object Types Supported:

Device

1. Dynamically creatable using BACnet CreateObject service? No.
2. Dynamically deletable using BACnet DeleteObject service? No.
3. List of optional properties supported: Active_COV_Subscriptions, Description, Location, Profile_Name.
4. List of all properties that are writable where not otherwise required by this standard: None.
5. List of proprietary properties: None.
6. List of any property value range restrictions: None.

Analog Value

1. Dynamically creatable using BACnet CreateObject service? No.
2. Dynamically deletable using BACnet DeleteObject service? No.
3. List of optional properties supported: COV_Increment (See Table for objects that support this property).
4. List of all properties that are writable where not otherwise required by this standard: None.
5. List of proprietary properties: None.
6. List of any property value range restrictions: See Table.

Binary Value

1. Dynamically creatable using BACnet CreateObject service? No.
2. Dynamically deletable using BACnet DeleteObject service? No.
3. List of optional properties supported: Active_Text, Inactive_Text.
4. List of all properties that are writable where not otherwise required by this standard: None.
5. List of proprietary properties: None.
6. List of any property value range restrictions: See Table.

Multi-State Value

1. Dynamically creatable using BACnet CreateObject service? No.
2. Dynamically deletable using BACnet DeleteObject service? No.
3. List of optional properties supported: State_Text.
4. List of all properties that are writable where not otherwise required by this standard: None.
5. List of proprietary properties: None.
6. List of any property value range restrictions: See Table.

Data Link Layer Options:

Other: These devices are virtual devices and are represented by a six octet address equal to the 48-bit device instance of the virtual device.

Device Address Binding:

Is static device binding supported? No.

Networking Options:

BACnet / IP Annex J — non-BBMD functionality; the Quantum® processor is able to register as a foreign device. The Quantum® processor is able to initiate original-broadcast-NPDU.

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

- ANSI X3.4.

BACnet Routing:

The Quantum® processor is a BACnet router. All of the virtual area devices are routed through the main subsystem device.

Job Name:	Model Numbers:	
Job Number:		

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
{AreaName} {Instance}	DEVICE	{Base} + {System} + 1	X	—	—	—	—	—	—	—	—
	Notes: The Area Name is the logical name that typically corresponds to a physical location in a building. The Instance is the same as the unique Device ID assigned to each area.										
Lighting Level	AV	2	X	X	—	%	0	100	—	—	—
	Notes: The intensity level of all lighting fixtures in the area. The lighting level will be an analog value between 0% and 100%. If the lighting fixtures in the area are at different light levels, this value will be set to the level of the highest intensity in that area.										
Lighting State	BV	3	X	X	X	—	0	1	Off	On	—
	Notes: The lighting state will be ON if any of the lighting fixtures in the area are in the On state; if all lighting fixtures are off, the lighting state will be set to OFF.										
Lighting Scene	MSV	4	X	X	—	—	1	Number of scenes defined for this area in Q-Design	—	—	{SceneName}
	Notes: The lighting preset to which the lighting fixtures in that area are currently set. If the value is set to 1, the Off Scene will be selected, which will turn all lights to OFF. All other scenes are defined within the Lutron® Quantum® software suite. If lights are currently not set to a valid lighting scene, then the value will be set to an unknown preset level.										
Daylighting Enabled	BV	5	X	X	—	—	0	1	Disabled	Enabled	—
	Notes: When set to Enabled, any daylight sensors programmed to control that area will limit the light level that the lighting fixtures in the area can produce. When set to Disabled, daylight sensors will not affect the lighting fixtures in that area. When changed from Disabled to Enabled the lights go to 100%.										
Daylighting Level	AV	6	X	X	—	%	0	100	—	—	—
	Notes: When daylighting is Enabled, all light fixtures in the area that are controlled by a daylighting sensor are set to a target value between 0% and 100%. When set to 100%, lights will be at their maximum level. When set to 0%, lights will be at their minimum level. This value should not be used with switching loads.										
Disable Occupancy	BV	7	X	X	—	—	0	1	False	True	—
	Notes: When set to True, the area will go to the Occupied level and the occupancy sensors will no longer affect the lights in the area.										

AV = Analog-Value, BV = Binary-Value, MSV = Multi-State-Value
{AreaName} is a text string defined in the Lutron® Quantum® system configuration software
{Instance} is a number defined in the Lutron® Quantum® system configuration software that is equal to the {Base} number + {System} number +1
{Base} is a 22-bit value set in the Lutron® Quantum® system configuration software (default 1760000)
{System} is an 8-bit value set in the Lutron® Quantum® system configuration software (0 to 127)
{SceneName} is a text string of the name of each scene that is defined in the Lutron® Quantum® system configuration software
PV = Present-Value

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
Occupancy State	MSV	8	X	—	X	—	1	4	—	—	1 = Unoccupied 2 = Occupied 3 = Inactive 4 = Unknown
	A read-only property that indicates the occupancy of the entire area. Occupied means that at least one sensor in the area is indicating occupancy or that Afterhours is enabled and the lights were turned on via a keypad. Unoccupied means that all of the sensors in the area are indicating unoccupied or that Afterhours is enabled and the area is unoccupied because of a timeout. Inactive means that the area is controlled by Afterhours programming, not by occupancy sensors, and that Afterhours mode is not currently active. Unknown means that not all of the sensors in the area have reported their status. When an unkown (state 4) occurs, it is recommended that the BMS system drive the HVAC, for the affected area, to the occupied state.										
Unoccupied Level	AV	9	X	X	—	—	0	216	—	—	—
	Notes: The light level to which the lights in the area will be set when an area transitions to Unoccupied. Values: 0 = Off 1-100 = Light Level Percentage 101 = Unaffected 102 = Daylighting 200 = Off Scene 201-216 = Scene 1 through 16 (0 = default)										
Occupied Level	AV	10	X	X	—	—	0	216	—	—	—
	Notes: The light level to which the lights in the area will be set when an area transitions to Occupied or when Occupancy is disabled. Values: 0 = Off 1-100 = Light Level Percentage 101 = Unaffected 102 = Daylighting 200 = Off Scene 201-216 = Scene 1 through 16 (100 = default)										
Additional Occupied Timeout	AV	11	X	X	—	min	0	300	—	—	—
	Notes: After all sensors in the area indicate Unoccupied, the value displayed will be the number of additional minutes that the system will wait before changing the lights to the Unoccupied level. **Note:** the sensor also has a built-in timeout. To learn how to check the sensor see the Lutron Occupancy Vacancy Sensors on www.Lutron.com or click this link: *Sensor timeout settings*										
Loadshed Allowed	BV	12	X	X	—	—	0	1	No	Yes	—
	Notes: When Loadshed Allowed is set to YES, this area will be affected when Loadshed is enabled. When set to NO, this area will not be affected when Loadshed is enabled.										
Loadshed Goal	AV	13	X	X	—	—	0	90	—	—	—
	Notes: When Loadshed is enabled and Loadshed Allowed is set to YES, the light level will be reduced by the percentage specified. The range is 0% to 90%.										

AV = Analog-Value, BV = Binary-Value, MSV = Multi-State-Value
PV = Present-Value

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
Occupancy Mode	MSV	14	X	X	—	—	1	4	—	—	1 = Inactive 2 = Automatic ON and Automatic OFF 3 = Manual ON and Automatic OFF 4 = Not Applicable
	Determines the way that the occupancy sensors control the lights. When set to Inactive, the Occupancy Mode will not control the lights in the area. When set to Automatic ON and Automatic OFF, the sensors will turn lights to their occupied level when occupied and to their unoccupied level when unoccupied. When set to Manual ON and Automatic OFF, the sensors will set lights to the unoccupied level only when an area changes to Unoccupied. Not Applicable means that the area is not controlled by occupancy.										
Number of Lamp Failures	AV	15	X	—	X	—	0	none	—	—	—
	Notes: For all digitally-controlled EcoSystem® or DALI® fluorescent ballasts and LED drivers controlled by an Energi Savr Node™ or Quantum® Bus supply, the number of ballasts with lamp failures in the area will be displayed. If the value is 0, there are no lamp failures for the area.										
Number of Devices Not Responding	AV	16	X	—	X	—	0	none	—	—	—
	Notes: For any QS device, EcoSystem® or DALI® digital fluorescent ballast or LED drivers controlled by an Energi Savr Node™ or Quantum® Bus Supply, the number of devices that are programmed into the system but are not responding will be displayed. If the value is 0, there are no device failures for the area.										
Hyperion™ Enabled	BV	17	X	X	—	—	0	1	Disabled	Enabled	—
	Notes: When set to Enabled, the Hyperion™ feature of the Quantum® system will control the Lutron® Sivoia® QS roller shades and set their level automatically depending on the position of the sun and the status of the radio window sensor. When set to Disabled, in an area of the subsystem, the shades will not be controlled automatically by the Hyperion™ feature and will not respond to radio window sensors.										
Total Power	AV	18	X	—	X	watts	0	none	—	—	—
	A calculated value that indicates the total instantaneous power consumption for all of the lighting loads in the area.										
Maximum Power	AV	19	X	—	—	watts	0	none	—	—	—
	Notes: The maximum connected lighting load of the area. This value is the maximum value that Total Power can achieve. Maximum Power minus Total Power equals the power being saved. Typically, this value does not change.										

AV = Analog-Value, BV = Binary-Value, MSV = Multi-State-Value
PV = Present-Value

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
Roof-Mount Cloudy Day Sensor: Area Status	BV	20	X	X	—	—	0	1	Dark	Sunny	—
	Notes: A Lutron® roof-mounted, wired Cloudy Day sensor or a BMS system sensor is used to override all Hyperion™ controlled shades in the area. Sunny indicates that the Hyperion™ feature is in control of the shades; Dark indicates that the shades are overridden to open. This feature is independent of the radio window sensor feature.										
Radio Window Sensor Dark Override State	MSV	21	X	X*	X	—	1	3	—	—	1 = Disabled 2 = Enabled 3 = Mixed
	Notes: When set to Disabled, all of the radio window sensors in the area will no longer override any of the shade groups to the Dark override position. When set to Enabled, all of the radio window sensors in the area will override all of the shade groups to the Dark override position. When set to Mixed, some of the radio window sensor Dark overrides in the area are enabled and some are disabled. The Hyperion™ Enabled feature (Instance 17) needs to be enabled for the Hyperion™ feature sensor to take effect.										
Light Level Discrepancy	BV	22	X	—	X	—	0	1	False	True	—
	Notes: This feature uses a photo sensor to determine if the electric light level in the area is at the correct level per the area's timeclock schedule. The value will be True when either the timeclock is programmed to turn lights On and the sensor is reading above the threshold, or the timeclock is programmed to turn lights Off, and the sensor is reading below the threshold. If the sensor reading does not correlate with the timeclock, the value will be False.										
Number of Wireless Input Device Failures	AV	23	X	—	X	—	none	—	—	—	—
	Notes: If a wireless input (occupancy sensor, or light sensor) that is connected to the system is no longer communicating with the Quantum® system, the device output will be greater than 0. The value will be equal to the number of failures in the area. This could be because of battery failure, the device being out of range of the QSM, or device failure. If the value equals 0, all wireless inputs in the area are reporting properly										

* Mixed is a read-only state.

AV = Analog-Value

BV = Binary-Value

MSV = Multi-State-Value

PV = Present-Value

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
Radio Window Sensor Bright Override State	MSV	24	X	X*	X	—	1	3	—	—	1 = Disabled 2 = Enabled 3 = Mixed
	Notes: When set to Disabled, all of the radio window sensors in the area will no longer override any of the shade groups to the Bright override position. When set to Enabled, all of the radio window sensors in the area will override all of the shade groups to the Bright override position. When set to Mixed, some of the radio window sensor Bright overrides in the area are enabled and some are disabled. The Hyperion™ Enabled feature (Instance 17) needs to be enabled for the Hyperion™ feature sensor to take effect.										
Number of Loads with Lamps Nearing End of Life	AV	25	X	—	X	—	0	none	—	—	—
	Notes: Indicates when the load(s) in the area are close to exceeding the life expectantcy hours programmed in the Quantum® software. This is typically used proactively to indicate when re-lamping of an area should occur. When the value is 0, there are no end-of-life lamps in the area. When the value is greater than 0, the number of loads in the area that have end-of-life lamps is displayed. Each load may have more than 1 lamp connected to it.										
{ZoneName} Level	AV	1000 to 1099	X	X	—	%	0	100	—	—	—
	Notes: The light level intensity of a specific zone of lighting within an area. The light level will be an analog value between 0% and 100%. There can be multiple lighting zones defined within each area. Each lighting fixture in the area will be assigned to one, and only one, lighting zone. Each will have a unique instance ID from 1000 to 1999. Changes in the light level, due to daylight harvesting, will not be reflected in this value.										
{ShadeGroupName} Level	AV	2000 to 2999	X	X	—	%	0	100	—	—	—
	Notes: The shade level of a specific shade group of Lutron® Sivoia® QS shades within an area. The shade level will be an analog value between 0% and 100%. 100% equals fully open; 0% equals fully closed. There can be multiple shade groups within each area; each group will have a unique instance ID from 2000 to 2999.										

* Mixed is a read-only state.

AV = Analog-Value, MSV = Multi-State-Value

{ZoneName} is a text string defined in the Lutron® Quantum® system configuration software

{ShadeGroupName} is a text string defined in the Lutron® Quantum® system configuration software

PV = Present-Value

Job Name:	Model Numbers:	
Job Number:		

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
{ShadeGroupName} Preset	MSV	3000 to 3999	X	X	—	—	1	34	—	—	{PresetName}
	Notes: Displays to which shade preset the shade motors of each shade group in an area are currently set. The values correspond to: 1 = Open; 2-30 = User programmable presets; 31 = Closed; 32-33 = Not used 34 = Undefined (Shade levels do not match any presets)										
{ShadeGroupName} Radio Window Sensor Shade Group Status	MSV	4000 to 4099	X	—	—	—	1	3	—	—	1 = Unknown 2 = Sunny 3 = Dark
	Notes: Indicates the current status characterized by the light conditions as seen by the radio window sensor associated with the shade group. The statuses refer to the thresholds defined in the Q-Admin™ software. Assuming that Hyperion™ is Enabled, if the state is Dark, the shades in the area will move automatically to the Cloudy level. If the state is Sunny, the shades will move to the position defined by Hyperion™. If the state is Unknown, the sensor is not communicating properly.										
{3-WireMotorZone Name}	MSV	5000 to 5099	X	X	X	—	1	3	—	—	1 = Stop 2 = Open 3 = Close
	Notes: Displays the current state of a 3-wire motor output within a specific area. If the value is set to 1, the output will be in the Stopped state (both relays open). If the value is set to 2, the output will be Opening (open relay active). If the value is set to 3, the output will be Closing (close relay active).										
Light Sensor Value	AV	6000 to 6999	X	—	X	fc	0	—	—	—	—
	Notes: Displays a real-time foot candle value for each sensor in a specific area. The tolerance of this value is ± 20%, depending on the sensor type.										

AV = Analog-Value, MSV = Multi-State-Value
fc = foot candles
{ShadeGroupName} is a text string defined in the Lutron® Quantum® system configuration software
{3-WireMotorZoneName} is a text string defined in the Lutron® Quantum® system configuration software
{PresetName} is a text string defined in the Lutron® Quantum® system configuration software
PV = Present-Value

Object Name	Type	Instance	Read	Write	COV	Units	Min PV	Max PV	Inactive Text (0)	Active Text (1)	State Text (Multi-State)
{PartitionWall Name} State	MSV	7000 to 7099	X	X	X	—	1	3	—	—	1 = Unknown 2 = Closed 3 = Open
	Notes: The state to which the partition wall is currently set. Unknown means that the wall sensor has not reported its status or that the device to which the sensors are connected is not responding. The Open state indicates that the partition wall is currently open. The Closed state indicates that the partition wall is currently closed. Partition walls are used to divide a space into smaller areas. The lighting control system needs to be aware of each wall's state in order to control the connected lights.										
{KeypadName} State	BV	8000 to 8999	X	X	X	—	0	1	Disabled	Enabled	—
	Notes: When set to Enabled, the keypad selected will work as programmed. When set to Disabled, the keypad selected will have no effect on the system										

BV = Binary-Value, MSV = Multi-State-Value
{PartitionWallName} is a text string defined in the Lutron® Quantum® system configuration software
{KeypadName} is a text string defined in the Lutron® Quantum® system configuration software
PV = Present-Value