

ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)

(This annex is part of this Standard and is required for its use.)

BACnet Protocol Implementation Conformance Statement

Date: May 1, 2018

Vendor Name: Baseline, Inc.

Product Name: BACnet Manager for BaseManager

Product Model Number: BL-BM2-BACNET

Application Software Version: 1.8

Firmware Revision: n/a

BACnet Protocol Revision: 135-2012

Product Description:

Baseline's BACnet Manager is a Linux-based application server which acts as a gateway between a Baseline BaseManager central control server and any BACnet/IP compatible Building Management System.

BACnet Standardized Device Profile (Annex L):

- BACnet Operator Workstation (B-OWS)
- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Operator Display (B-OD)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Sensor (B-SS)
- BACnet Smart Actuator (B-SA)

List all BACnet Interoperability Building Blocks Supported (Annex K):

Currently supported: DS-RP-B, DS-RPM-B

Segmentation Capability:

- Able to transmit segmented messages
- Able to receive segmented messages

Standard Object Types Supported:

Currently Supported Object Types:

Analog Input
Binary Input
Device
Multi-State Input

Note: All objects are created or deleted by changing the irrigation controller configuration. Object Types are published to reflect the irrigation controller's current state and objects attached to the controller. Device object is the controller.

Data Link Layer Options:

- BACnet IP, (Annex J)
- BACnet IP, (Annex J), Foreign Device
- ISO 8802-3, Ethernet (Clause 7)
- ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____
- MS/TP master (Clause 9), baud rate(s): _____
- MS/TP slave (Clause 9), baud rate(s): _____
- Point-To-Point, EIA 232 (Clause 10), baud rate(s): _____
- Point-To-Point, modem, (Clause 10), baud rate(s): _____
- LonTalk, (Clause 11), medium: _____
- BACnet/ZigBee (ANNEX O)
- Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) Yes No

Note: Bindings are static and stored in configuration files on the BACnet Manager server. Remove these files and the bindings are removed. See BACnet documentation for files.

Networking Options:

- Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
 - Multiple BACnet/IP
 - Multiple BACnet/IP ports
- Annex H, BACnet Tunneling Router over IP
- BACnet/IP Broadcast Management Device (BBMD)
 - Does the BBMD support registrations by Foreign Devices? Yes No
 - Does the BBMD support network address translation? Yes No

Network Security Options:

- Non-secure Device - is capable of operating without BACnet Network Security
- Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
 - Multiple Application-Specific Keys:
 - Supports encryption (NS-ED BIBB)
 - Key Server (NS-KS BIBB)

Character Sets Supported:

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

- ISO 10646 (UTF-8)
- IBM™/Microsoft™ DBCS
- ISO 8859-1
- ISO 10646 (UCS-2)
- ISO 10646 (UCS-4)
- JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:

BACnet Manager communicates with a Baseline BaseManager central control server. The BaseManager server is a Linux-based web server that manages multiple BaseStation 3200 and/or BaseStation 1000 irrigation controllers. The irrigation controllers each manage a set of discrete accessories such as valves, moisture sensors, temperature sensors, etc., and support programming and scheduling constructs such as “programs.”

The irrigation controllers communicate with the BaseManager server over the secure WebSocket protocol (TCP/IP based). The irrigation controllers are responsible for maintaining their connection to the server.

BaseManager users connect to the server using a web browser based client (desktop or mobile), which uses HTML5 and the secure WebSocket Protocol. On mobile devices, HTML5 compatibility supports access to the mobile device’s GPS system (if there is one), which allows for geo-location of the user, and geo-marking of irrigation accessories.

A map-based user interface is included as a part of the web client, which enables users to interact with irrigation accessories superimposed on a satellite map. Satellite map data is provided from an external Internet source (Microsoft Bing™ maps).

BACnet Manager interfaces with the BaseManager server by connecting to the BaseManager server as a special client. BACnet Manager uses the proprietary BaseManager protocols to present real-time information and control via the BACnet/IP standard.

Each controller is considered a BACnet "Device," and the controller's discrete accessories (valves, moisture sensors, temperature sensors, programs, zones) are BACnet "Objects."

BACnet Device ID Numbering Scheme

Every irrigation controller that is visible to BACnet Manager has a unique "point" number that is automatically assigned and permanent. This number is known as the Device ID.

Device IDs for Baseline controllers range from 444000 to 444999. Device IDs are assigned in increments of 10.

For example, if the first controller's Device ID is 444000 (the default), then the Device ID assignments are as shown below:

- Controller #1 = Device ID 444000
- Controller #2 = Device ID 444010
- Controller #3 = Device ID 444020
- Controller #4 = Device ID 444030
- Etc.

BACnet Object ID Numbering Scheme

Each controller has programs, zones, sensors and other irrigation accessories that are identified with an Object ID.

The Object ID is an integer of up to 5 digits. The first three digits represent the Object instance, such as a sequential zone number or three digits of an accessory's serial number. The last two digits identify the type of Object and indicate what the Object represents (zone status, moisture sensor moisture percent, etc).

The following list shows the standardized definition of the last two digits of the Object ID. The first digit denotes an Object's type and the second denotes an Object's property. Example: zone, moisture sensor, etc.:

Controller

- 07 – (multi-state input) controller status

Program

- 10 – (multi-state input) program status
 - Present-Value: Writable with 0 or 7
 - Description: Writable with 25 characters of text

Zone

- 20 – (binary input) whether the zone is running (no errors) or not
 - Present-Value: Writable with 1 or 0
 - Description: Writable with 25 characters of text
- 21 – (multi-state input) the zone's current status

Moisture Sensor

- 30 – (analog input OR binary input) current moisture value (in %) or binary input (0) if there is no moisture reading
- 31 – (analog input OR binary input) current temperature (in degrees F) or binary input (0) if there is no temperature reading
- 32 – (multi-state input) moisture sensor status

Temperature Sensor

- 40 – (analog input OR binary input) current temperature (in degrees F) or binary input (0) if there is no temperature reading
- 41 – (multi-state input) air temperature sensor status

Pause Device (Event Switch)

- 50 – (binary input) whether the pause device is closed (1) or open (0)
- 51 – (multi-state input) pause device status

Flow Meter

- 60 – (analog input) flow rate
- 61 – (analog input) flow odometer
- 64 – (multi-state input) flow meter status

Alarms

- 70 – (binary input) alarm output
 - Present value writable with a 0 (clear alarm)

Master Valve

- 80 – (binary input) Master valve output
 - Present-Value: Writable with 1 or 0
 - Description: Writable with 25 characters of text
- 81 – (multi-state input) Master valve status

Examples

A zone (Object #23) would report zone status at the following property address:

(023)(21) -> 2321

A flow meter (Object #93) would report current flow status at the following property address:

(093)(64) -> 9364

Multi-State List

The following states are valid for Objects:

Multi-State Status ID Number	BACnet Status Description
1	Done
2	Disabled
3	Error
4	Off
5	Okay
6	Paused
7	Running
8	Soaking
9	Waiting
10	Watering
11	Offline
12	Manual run
13	Learn flow
14	Rain delay

	Done	Disabled	Error	Off	Okay	Paused	Running	Soaking	Waiting	Watering	Offline	Manual Run	Learn Flow	Rain Delay
	DN	DS	ER	OF	OK	PA	RN	SO	WA	WT	OF	MR	LF	RD
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Controller			✓	✓	✓	✓	✓				✓	✓	✓	✓
Event Switch		✓	✓		✓									
Flow Meter		✓	✓		✓									
Master Valve	✓	✓	✓						✓			✓		
Moisture Sensor		✓	✓		✓									
Program	✓	✓	✓			✓	✓		✓			✓	✓	
Temperature Sensor		✓	✓		✓									
Zone	✓	✓	✓			✓		✓	✓	✓		✓	✓	
Control Point		✓	✓	✓	✓		✓				✓			
Mainline			✓	✓	✓		✓				✓			
Rain Bucket		✓	✓		✓									
FlowStation		✓	✓		✓		✓							

Alarm Objects

The list below shows the supported alarm classes and their associated Object numbers. The Objects are provided as Binary Input Objects. The Description field of the alarm will be updated when the alarm is active to reflect the detail of this alarm. For example, if the Alarm 00470 (No reply from device) is active, the Description field will include additional information about which two-wire irrigation accessory is causing the alarm.

- 170 Alarm – High flow switch triggered
- 270 Alarm – Rain delay switch triggered
- 370 Alarm – Current reading too high on two-wire
- 470 Alarm – No reply from device
- 570 Reserved for future use
- 670 Alarm – Unable to write upper limit (only for NOMV decoder)
- 770 Alarm – Solenoid shorted
- 870 Alarm – POC empty shutdown
- 970 Alarm – POC detected unscheduled flow
- 1070 Alarm – Flow station triggered a high flow shutdown
- 1170 Alarm – Zone shutdown due to high flow
- 1270 Alarm – Flow station triggered a low flow shutdown
- 1370 Reserved for future use
- 1470 Alarm – High flow detected on POC
- 1570 Alarm – Water source shutdown due to unscheduled flow
- 1670 Alarm – Water source shutdown due to high flow
- 1770 Reserved for future use
- 1870 Alarm – Solenoid reading no voltage
- 1970 Alarm – Zone Exceeds Flow
- 2070 Unknown Alarm

Writing to BACnet Properties

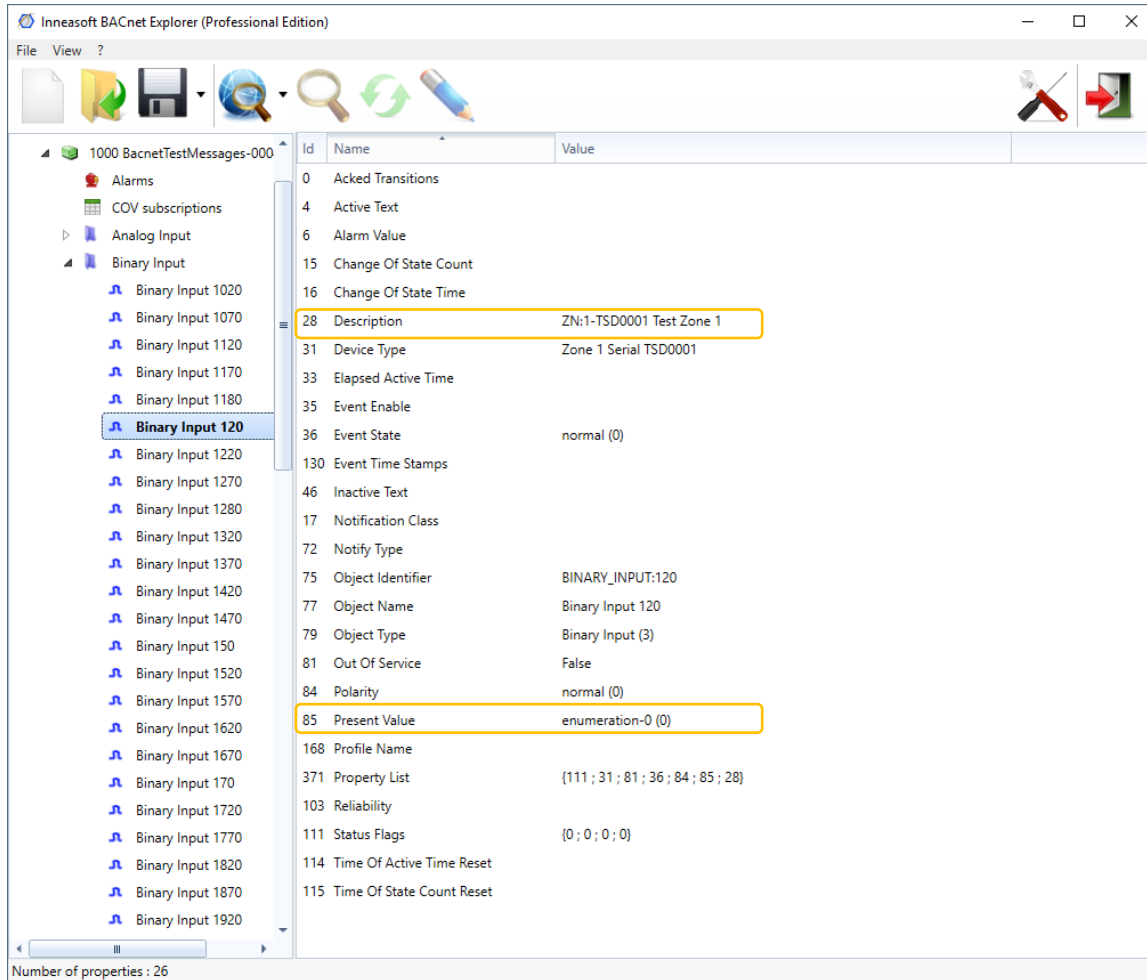
Each BACnet Object has multiple properties. Device, binary, analog, and multi-state properties have their specific list of properties. Baseline exposes the Description property and the Present Value property to be changed or written.

Binary Input Properties

Description – Object ID for Baseline contains the two-letter indicator and description. The user can write back only the description, and the system inserts the two-letter indicator.

Present Value – This property shows if a zone is running or not. The only acceptable values are 1 and 0.

An example of the Description and the Present Value properties for Binary Input are shown in the illustration below.



Multi-State Input Properties

Baseline provides property writing only on the Program objects, which are the Objects that end in 10. The Description property and the Present Value property can be written.

Description – The Object ID for Baseline contains the two-letter indicator and description. The user can write back only the description, and the system inserts the two-letter indicator.

Present Value – This property shows program state. There are 14 states. The Baseline BACnet implementation allows the user to set the property to Running (7) or Done (0).

An example of the Description and the Present Value properties for Multi-State Input are shown in the illustration below.

