

# The BACnetIP Driver



The BACnetIP driver allows North to interface with a wide range of equipment supporting BACnet. The driver provides operator interface functions to display and adjust values from other BACnet devices, and a controller profile to provide values to a BACnet display. Available for Commander and ObSys.

This document relates to BACnetIP driver version 3.1

Please read the *Commander Manual* or *ObSys Manual* alongside this document, available from *www.northbt.com* 

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## Compatibility with the BACnet System

The BACnetIP driver allows North to interface with a wide range of equipment supporting BACnet. The driver conforms to the BACnet Application Specific Controller, and partially conforms to the BACnet Operator Display device profiles.

BACnet is an international, European, and American standard for data communication in building automation and control networks – BS EN ISO 16484-5 and ANSI/ASHRAE 135.

The standard defines object-orientated communications between building automation components; describing input, output and control elements, along with their properties and states. The standard also specifies the services used to read and write these elements.

BACnet uses a client-server model. The BACnetIP driver is capable of both requesting values from server devices (i.e. controllers), and providing values from Essential Data and Extra Data within the North device when requested by a client device (i.e. workstation).

The driver connects to an IP network, and is capable of accessing multiple BACnet/IP devices on this local network (Fig. 1). If BACnet/IP devices are located on another network segment, then BACnet broadcast management devices (BBMD) may be required.

BACnet is available over different physical layers including MS/TP (RS485), Point-to-Point (RS232), Ethernet, ARCNET, and LonTalk. To connect with these devices, a BACnet router is required (Fig. 2).



### Equipment

Many different types of BACnet equipment are compatible with the driver, including: HVAC, thermostat, lighting, fire alarm, security, and access control systems.

Equipment is available from many different manufacturers, including: ABB, Alerton, Automated Logic, Cylon, Daikin, Delta Controls, Honeywell, Schneider, Siemens, Trane, Trend Controls, JCI, plus many more.

#### Values

The BACnetIP driver is capable of both requesting values from a BACnet controller, and providing values when requested by a BACnet workstation.

#### Values available from a BACnet Controller

Depending on the type of equipment, typically values from the following BACnet object types are available:

- Accumulator
- Analog Input
- Analog Output
- Analog Value
- Averaging
- Binary Input
- Binary Lighting Output
- Binary Output
- Binary Value
- Bit String Value
- Calendar
- Channel

- Character String Value
- Command
- Date Pattern Value
- Date Time Pattern
- Date Time Value
- Date Value
- Device
- Large Analog Value
- Lighting Output
- Load Control
- Loop
- Multi-state Input

- Multi-state Output
- Multi-state Value
- Octet String Value
- Positive Integer Value
- Program
- Pulse Counter
- Schedule
- Time Pattern Value
- Time Value
- Timer

To check a BACnet device's compatibility. Read the manufacturers' protocol implementation conformance statement (PICS) for information on the BACnet object types and interoperability building blocks (BIBBs) supported. A controller-type device supports data sharing BIBBs ending 'B'.

#### Values available to a BACnet Workstation

The driver presents values from the North device's Essential Data and Extra Data as BACnet objects, accessible to any device on the BACnet network. Essential Data contains 640 values on Commander, and 1280 values on ObSys. If necessary, start the Extra Data driver (which requires an interface licence) for an additional 1024 values. Access to these values can be controlled by configuring privilege levels within the driver.

**Essential/Extra Data Configuration** Adjustable **BACnet Object Type Object Type Remote Action Analog Input** 0 Num or Float Read No **Analog Output** 1 Num or Float Write Yes **Analog Value** 2 Num or Float None ‡ Any ‡ 3 NoYes or OffOn Read No **Binary Input** 4 **Binary Output** NoYes or OffOn Write Yes 5 NoYes or OffOn **Binary Value** None<sup>‡</sup> Any ‡ **Multi-state Input** 13 **ENum** Read No **Multi-state Output** 14 **ENum** Write Yes **Multi-state Value** 19 **ENum** None ‡ Any ‡

Depending on their configuration, values from Essential Data and Extra Data are presented as the following BACnet object types:

<sup>‡</sup> BACnet Value object types are presented from Essential/Extra Data when the remote action and adjustable settings do not match those of the BACnet Input or Output object types. E.g. a read remote action and adjustable.

Object instance numbers in the range 1...1280 are from Essential Data, and 2001...3024 are from Extra Data.

#### **PIC Statement**

A protocol implementation conformance statement (PICS) is available at the end of this document, describing the BACnet objects and BACnet interoperability building blocks (BIBBs) supported by North devices.

#### Prerequisites

All BACnet devices must be configured with a unique address on the network – set by the BACnet instance number. North devices are configured with a default address in the range 33000, plus the last part of the IP address.

The BACnetIP driver requires Essential Data v3.0 (build 01/09/2015) or later.

#### BACnet and IP Sub-networks

BACnet uses broadcast messages that will not easily travel between different IP sub-networks. If you are connecting devices across different sub-networks, then a BACnet Broadcast Management Device (BBMD) will be required for each sub-network.

The BBMD receives broadcast messages on one sub-network, and then re-sends the message to other BBMDs for broadcast onto their network segment.

The BACnetIP driver can register as a Foreign Device with compatible BBMDs. This allows the driver to sit on its own sub-network and use a BBMD on a remote network to receive broadcast messages.

BBMD functions are often available within some BACnet controllers, or a BACnet router.

#### **BACnet Routers**

The BACnetIP driver connects directly to an IP network, and supports BACnet/IP (Annex J).

BACnet is also available on devices supporting different physical layers. These include MS/TP (RS485), Point-to-Point (RS232), Ethernet, ARCNET, and LonTalk.

To connect with devices supporting a different physical layer, a BACnet router is required.

Two different BACnet routers are available from North – a BACnet/IP to MS/TP router (order code MISC/BACIP/MSTP), and a BACnet router supporting common physical layers (order code MISC/BACROUTER).

## Using the Driver

On ObSys and Commander, the BACnetIP driver is pre-installed. On all of these North devices, you can use the driver to create an interface to a BACnet/IP network. Once started, you will need to set up the driver before it can communicate with the BACnet system.

The BACnetIP driver uses zero licence units.

### Starting the Interface

- □ To start an interface using the BACnetIP driver, follow these steps:
  - → **Start Engineering** your North device using ObSys
  - → Navigate to **Configuration, Interfaces,** and set a unused **Interface** to 'BACnetIP' to start the particular interface
  - → Navigate to the top-level of your North device, then rescan it

The driver setup object (Mc), labelled **BACnet/IP Interface**, should now be available.

#### Setting up the Driver

- To set up the driver, follow these steps:
  - → Navigate to the **BACnet/IP Interface** object (Mc). For example, if you started interface 1 with the driver earlier, then the object reference will be 'M1'
  - → Check the BACnet Device Instance object (BI) value is a unique address on the BACnet internetwork
  - → On multi-homed devices, check the **Current IP Address** object (CIA) is using the correct IP network. If required, set the **Preferred IP Address** object (IA) to a different available IP address

### Checking Communications

You can check the interface is communicating by reading the **BACnet Operational** object (DS). A value of 'yes' indicates the driver has opened a BACnet/IP port at the IP address indicated. If the value is 'no', then check that no other BACnet software is running.

The **Database Objects Available** object (EDC) indicates the maximum values available to a BACnet workstation from Essential and Extra Data.

Scan the **BACnet System** to discover other BACnet devices on the network.

## **Object Specifications**

Once an interface is started, one or more extra objects become available within the top-level object of the device. As with all North objects, each of these extra objects may contain sub-objects, (and each of these may contain sub-objects, and so on) - the whole object structure being a multi-layer hierarchy. It is possible to navigate around the objects using the ObSys Engineering Software.

An example of a reference to an object in a different device: the IP network object contains

Each object is specified below, along with its sub-objects.

### Example Object Reference

An example of a reference to an object in the same device: the BACnet/IP network (S1) contains a BACnet device at instance 150 (D150), which contains a value found in Analog Value 1 (AV1.V). Therefore, the complete object reference is 'S1.D150.AV1.V'.

An example of a reference to an object in a different device: the IP network object (IP) contains Default Commander object (CDIP), which contains the object above (S1.D150.AV1.V) – therefore the complete object reference is 'IP.CDIP.S1.D150.AV1.V'.

### Device Top-Level Objects

When an interface is started using the BACnet/IP driver, the objects below become available within the top-level object of the device. For example, if interface 1 is started, then the object references 'M1' and 'S1' become available.

| Description  | Reference | Туре                                   |
|--|-----------|--|
| BACnet/IP Interface                                    | Мc        | Fixed Container:                       |
| Set up the BACnetIP driver, started on                 |           | On the Commander platform this will be |
| interface <i>c</i> ( <i>c</i> is the interface number) |           | [CDM v20\BACnetIP v31]                 |
|  |           | On the ObSys platform this will be     |
|  |           | [OSM v20\BACnetIP v31]                 |
| BACnet Network   | Sc        | Variable Container:                    |
| Access BACnet system connected to                      |           | [BACnetIP v31]                         |
| interface <i>c</i> ( <i>c</i> is the interface number) |           |  |

### BACnet/IP Interface

Object Type: [OSM v20\BACnetIP v31] Object Type: [CDM v20\BACnetIP v31]

#### The BACnet/IP Interface contains the following objects:

| Description                                  | Reference | Type  |
|--|-----------|---|
| System I abel                                | DI        | Obi\Text: 20chars: Adjustable                             |
| Label displayed when scanning the system     | DL        | obj (rext. zoenars, Aujustable                            |
| BACnet Operational                           | DS        | Obi\NoVos   |
| Indicatos if the BAC not/IP port is open A   | 03        | Obj(Notes   |
| value of 'No' indicates a problem this       |           |   |
| could be caused by another application       |           |   |
| opening the BACnet/IP port a BACnet          |           |   |
| device instance of 0, or an invalid IP       |           |   |
| address                                      |           |   |
| BACnot Dovice Instance                       | Ы         | Obi\Num Adjustable: Dange: 1 4104202                      |
| The address on the PAC not notwork from      | Ы         | Obj/Nulli, Aujustable, Range: 14194303                    |
| which it can be referenced by other          |           | On initialization, set to 55000 + last part of iP address |
| devices. This number must be unique          |           |   |
| across the entire BAC not inter network      |           |   |
| Current ID Addross                           |           |   |
| IP address currently opened by the driver    | CIA       | ODJ\IP  |
| Proferred ID Address                         | 10        | Obili D. Adiustabla                                       |
| If multiple ID potworks are available, set   | IA        | ODJ/IP; Adjustable  |
| which available IP address to use            |           |   |
| BACnot Port Number                           |           | Obi\Num Adjustable: Dange: 0 65525                        |
| BAChet /ID dovices on the same LAN must      | FN        | Sot to 47808 (0xRAC0) by default                          |
| BACHEL/IP devices on the same LAN must       |           | Set to 47808 (0XDACO) by default                          |
| ADDU Segment Timeout (me)                    | CT.       | Obil Nume Adjustable: Dange: 500 - 60000                  |
| APDO Segment Timeout (ms)                    | 51        | Obj\Num; Adjustable; Range: 50060000                      |
| communication, it is recommanded that        |           | Set to 2000ms by default                                  |
| the ADDI timeoute of all interconnecting     |           |   |
| devices should contain the came value        |           |   |
| These values may also be configured by       |           |   |
| devices on the BAC net network               |           |   |
| ADDIL Timoout (ms)                           | ۸T        | Obi\Num: Adjustable: Dange: E00 _ C0000                   |
| It is recommended that an APDII timeout      | AI        | Sot to 2000ms by default                                  |
| loss than 4000ms is specified                |           | Set to sooonis by default                                 |
| See also note for APDII Segment Timeout      |           |   |
| Device Communication                         | DC        | Obi\ENum: Adjustable: Pange: 0 2                          |
| Use to temporarily disable BAC net           | DC        | Values: 0-Enabled 1-Disable all Communication             |
| communication                                |           | 2=Disable client (outbound) requests                      |
| Access Password                              | DS\M      | Obi/Toyt: may 20 chars: Adjustable                        |
| The access password is used to restrict      | F 3VV     | Obj(Text. max 20 chars, Aujustable                        |
| access to the BAC net IP driver from devices |           |   |
| using the BACnet Reinitialize Device and     |           |   |
| DeviceCommunicationControl services          |           |   |
| Devices using these services will need to    |           |   |
| include the password as specified here       |           |   |
| Default Character Encoding                   | CE        | Obi\ENum: Range: 0 5: Adjustable                          |
| When writing a character string property     | CL        | Values: 0=UTE-8 (recommended) 5=ISO 8859-1                |
| to a device, or when a BACnet device reads   |           | On the ObServer platform, character encoding using        |
| a property from the driver, the value is     |           | the following are also supported.                         |
| encoded using the character encoding         |           | 1=IBM/Microsoft DBCS. 4=UCS-2                             |
| specified.                                   |           | .,  |
| Show Unsupported Objects                     | SU        | Obi\NoYes: Adjustable                                     |
| When scanning a device, show                 |           |   |
| unsupported BACnet object types              |           |   |

| Description   | Reference | Туре   |
|---|-----------|--|
| <b>Database Objects Available</b><br>Count of maximum objects available from<br>Essential Data and Extra Data.  | EDC       | Obj\Num  |
| <b>Database Privilege Levels</b><br>Configure privilege levels to control read<br>and adjust access to Essential Data and<br>Extra Data from a BACnet workstation | S         | Fixed Container:<br>On the Commander platform this will be<br>[CDM v20\BACnetIP v31\Security]<br>On the ObSys platform this will be<br>[OSM v20\BACnetIP v31\Security] |
| <b>Foreign Device</b><br>Configure options for driver to register<br>with a BBMD, on multi-network<br>installations   | FD        | Fixed Container:<br>On the Commander platform this will be<br>[CDM v20\BACnetIP v31\Foreign]<br>On the ObSys platform this will be<br>[OSM v20\BACnetIP v31\Foreign]   |
| <b>Static Device List</b><br>If a BACnet device does not support auto-<br>discovery, then its address can be entered<br>here                                      | SD        | Fixed Container:<br>On the Commander platform this will be<br>[CDM v20\BACnetIP v31\Static]<br>On the ObSys platform this will be<br>[OSM v20\BACnetIP v31\Static]     |

#### Database Privilege Levels

Object Type: [CDM v20\BACnetIP v31\Security] Object Type: [OSM v20\BACnetIP v31\Security]

#### Security Areas and Levels

Within the North security model, there are eight security areas. Security areas could be actual areas in a building, but are normally functional areas – for example, 'environmental control' and 'North engineering' areas would allow a user to have different privileges in controlling set points and engineering Commanders.

Typically, a user is assigned a privilege level in each of the eight areas. The level is in the range zero to seven, seven being the most powerful. When a user wishes to pass a door, his/her privilege level in the door's area is checked against the minimum required for that area – and then either allowed to pass, or rejected.

The engineer must decide the use of the eight areas. The engineer must also decide the power of the privilege levels. Most systems use only a few levels per area: 0=None, 1=Guest, 2=User, 7=Administrator.

As an example, imagine a page of values in Essential Data. The page needs a user to have a minimum privilege level of 2 in area 1 before it can be viewed. The page is available in a Web browser that checks users with a security database. User A has privilege level 7 in area 1 – she can view the page. User B has privilege level 5 in area 1 – he can also view the page. User C has privilege level 1 in area 1 – she cannot view the page.

The example continues: within this page of values in Essential Data is a temperature set point object. Users need a minimum privilege level of 6 in area 1 to adjust it – therefore User A can adjust the set point, but User B cannot.

#### Specifying Access Security

Essential Data and Extra Data have Access Security objects to control who can view a page, and who can adjust an adjustable object.

Each Access Security object has a two-digit value. Each controls the access to a particular feature - such as viewing the page, or adjusting the value. The two-digit value is made up of the area digit (1-8), followed by the minimum privilege level (1-7) – for example, if the minimum privilege level is 6 in area 2, then the two digit value is 26. If the value is 00, then no security checks are made.

#### BACnet/IP Driver

The Database Privilege Levels object contains a privilege level for each of the eight security areas, representing a virtual user. The BACnetIP driver uses these to control access to Essential Data and Extra Data when reading or adjusting a value.

| Description                                 | Reference  | Туре                           |
|---|------------|--------------------------------|
| Privilege Level in Area x                   | P <i>x</i> | Obj\Num; Adjustable; Range: 07 |
| The area, <i>x</i> , can be in the range 18 |            |                                |

#### Foreign Device

Object Type: [CDM v20\BACnetIP v31\Foreign] Object Type: [OSM v20\BACnetIP v31\Foreign]

The BACnet/IP protocol uses IP broadcast messages. As most routers do not pass broadcast messages between sub-networks, a BACnet broadcast management device (BBMD) is required on each sub-network to perform this function.

If a BBMD is available on the same sub-network as the North device, then no configuration is required. The BBMD will automatically re-transmit broadcast messages.

If a BBMD is only available on a remote network, then configure that BBMD's IP address here and enable foreign device registration. The driver will then register with the BBMD so that it can communicate across sub-networks.

| Description                        | Reference | Туре                  |
|------------------------------------|-----------|-----------------------|
| Enable foreign device registration | E         | Obj\NoYes; Adjustable |
| BBMD Server IP Address             | SIP       | Obj\IP; Adjustable    |

#### Static Device List

Object Type: [CDM v20\BACnetIP v31\Static] Object Type: [OSM v20\BACnetIP v31\Static]

Certain BACnet devices, such as MS/TP slaves, do not respond to Who-Is device discovery messages. The static device list provides a mechanism to manually enter a BACnet device's address.

| Description                                  | Reference | Туре                                   |
|--|-----------|--|
| Only Scan Static Devices                     | OS        | Obj\NoYes; Adjustable                  |
| Stops device discovery and only lists static |           |  |
| devices when scanning the BACnet             |           |  |
| network object                               |           |  |
| Alias a                                      | Aa        | Fixed Container:                       |
| The alias, a, is in the range 120. Enter     |           | On the Commander platform this will be |
| details for a static device, including       |           | [CDM v20\BACnetIP v31\Static\Alias]    |
| BACnet instance, IP address, and MAC         |           | On the ObSys platform this will be     |
| address                                      |           | [OSM v20\BACnetIP v31\Static\Alias]    |

#### Static Device Alias

Object Type: [CDM v20\BACnetIP v31\Static\Alias] Object Type: [OSM v20\BACnetIP v31\Static\Alias]

A BACnet device's address and basic communication parameters.

| Description  | Reference | Туре   |
|--|-----------|--|
| BACnet Device Instance   | BI        | Obj\Num; Adjustable; Range: 14194303   |
| IP Address<br>IP address of the device, or BACnet router   | IA        | Obj\IP; Adjustable   |
| <b>IP Port Number</b><br>BACnet UDP port number of the device. If<br>set '0', then driver's BACnet Port Number<br>will be used | PN        | Obj\Num; Adjustable; Range: 065535   |
| <b>Network Number</b><br>BACnet network number. Set to '0' if on<br>the same BACnet/IP network                                 | Ν         | Obj\Num: 065534; Adjustable  |
| MAC Address<br>Dependent on the network layer. For<br>MS/TP networks a 1 byte address  | MAC       | Obj\Text (hex value); Adjustable   |
| <b>Maximum APDU Length</b><br>Set to match the value reported in the<br>device Information object                              | AL        | Obj\Num: 50, 128, 206, 480, 1024, 1476 ;Adjustable   |
| <b>Segmentation Supported</b><br>Set to match the value reported in the<br>device Information object                           | SEG       | Obj\Enum; Range: 03; Adjustable<br>Values: 0=None, 1=Transmit only, 2=Receive only,<br>3=Both (transmit/receive) |

#### BACnet Network

#### Object Type: [BACnetIP v31]

The BACnet network is a network of devices supporting the BACnet standard. It includes devices on the connected BACnet/IP network, and devices on different inter-connected networks including BACnet MS/TP, Point-to-Point, Ethernet, ARCNET, etc.

The BACnet network contains the following objects:

| Description                                      | Reference | Туре                       |
|--|-----------|----------------------------|
| Device Name                                      | Dx        | Variable container:        |
| The BACnet device number, <i>x</i> , is in the   |           | [BACnetIP v31\Dev]         |
| range 14194303                                   |           |                            |
| Network a  | Na        | Variable container:        |
| Network of devices available via a BACnet        |           | [BACnetIP v31]             |
| router. The BACnet network number, <i>a</i> , is |           |                            |
| in the range 165534.                             |           |                            |
| This is used to present devices by network.      |           |                            |
| The network reference is optional, and can       |           |                            |
| be omitted from the full object reference.       |           |                            |
| Broadcast Date & Time                            | BT        | Obj\NoYes; Adjustable only |
| Update all devices with the current date         |           |                            |
| and time   |           |                            |

#### **BACnet Device**

#### Object Type: [BACnetIP v31\Dev]

The driver supports the following type of BACnet objects from a device. Scan the device to discover the BACnet objects available.

The object instance number, *x*, for the following objects is dependent upon engineering within the device.

| Description                 | Reference    | Туре                      |
|-----------------------------|--------------|---------------------------|
| Device Information          | I            | Fixed container:          |
|                             |              | [BACnetIP v31\PIC]        |
| Network Port name           | NET <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\NetPort]    |
| Analog Input name           | Alx          | Fixed container:          |
|                             |              | [BACnetIP v31\AnIn]       |
| Analog Output name          | AOx          | Fixed container:          |
| 5                           |              | [BACnetIP v31\AnOut]      |
| Analog Value name           | AVx          | Fixed container:          |
|                             |              | [BACnetIP v31\AnVal]      |
| Binary Input name           | Blx          | Fixed container:          |
|                             |              | [BACnetIP v31\BinIn]      |
| Binary Output name          | BOx          | Fixed container:          |
|                             |              | [BACnetIP v31\BinOut]     |
| Binary Value name           | BV <i>x</i>  | Fixed container:          |
|                             |              | [BACnetIP v31\BinVal]     |
| Calendar name               | CALx         | Fixed container:          |
|                             |              | [BACnetIP v31\Calendar]   |
| Command name                | CMDx         | Fixed container:          |
|                             | -            | [BACnetIP v31\Command]    |
| Event Enrolment name        | EEx          | Fixed container:          |
|                             |              | [BACnetIP v31\EvtEnr]     |
| Loop name                   | LPx          | Fixed container:          |
|                             |              | [BACnetIP v31\Loop]       |
| Multi-State Input name      | Mix          | Fixed container:          |
|                             |              | [BACnetIP v31\MultiIn]    |
| Multi-State Output name     | MOx          | Fixed container:          |
|                             |              | [BACnetIP v31\MultiOut]   |
| Program name                | PRG <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\Program]    |
| Schedule name               | SC <i>x</i>  | Fixed container:          |
|                             |              | [BACnetIP v31\Schedule]   |
| Averaging name              | AVG <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\Avg]        |
| Multi-State Value name      | MV <i>x</i>  | Fixed container:          |
|                             |              | [BACnetIP v31\MultiVal]   |
| Accumulator name            | ACC <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\Acc]        |
| Pulse Converter name        | PCT <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\Pulse]      |
| Load Control name           | LDC <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\Load]       |
| Timer name                  | TMRx         | Fixed container:          |
|                             |              | [BACnetIP v31\Timer]      |
| Bit String Value name       | BSV <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\BitStrVal]  |
| Character String Value name | CSV <i>x</i> | Fixed container:          |
|                             |              | [BACnetIP v31\CharStrVal] |

| Description                  | Reference    | Туре                       |
|------------------------------|--------------|----------------------------|
| Date Pattern name            | DPV <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\DatePat]     |
| Date Value name              | DV <i>x</i>  | Fixed container:           |
|                              |              | [BACnetIP v31\DateVal]     |
| Date Time Pattern Value name | DTP <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\DateTimePat] |
| Date Time Value name         | DTV <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\DateTimeVal] |
| Integer Value name           | IVx          | Fixed container:           |
|                              |              | [BACnetIP v31\IntVal]      |
| Large Analog Value name      | AVLx         | Fixed container:           |
|                              |              | [BACnetIP v31\AnValLg]     |
| Octet String Value name      | OSV <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\OctStrVal]   |
| Positive Integer Value name  | IVP <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\IntValPos]   |
| Time Pattern Value name      | TPV <i>x</i> | Fixed container:           |
|                              |              | [BACnetIP v31\TimePat]     |
| Time Value name              | TV <i>x</i>  | Fixed container:           |
|                              |              | [BACnetIP v31\TimeVal]     |
| Channel name                 | DCx          | Fixed container:           |
|                              |              | [BACnetIP v31\Channel]     |
| Lighting Output name         | LOAx         | Fixed container:           |
|                              |              | [BACnetIP v31\LtgOut]      |
| Binary Lighting Output name  | LOBx         | Fixed container:           |
|                              |              | [BACnetIP v31\LtgOutBin]   |
| Unsupported Object Type      | ух           | Fixed container:           |
|                              |              | [BACnetIP v31\Unknown]     |

### Device Information

Object Type: [BACnetIP v31\PIC]

Device Information contains a summary of the device's BACnet capabilities. Support for some objects is optional.

| Description  | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Location   | R58       | Obj\Text   |
| Description  | D         | Obj\Text; Adjustable   |
| System Status  | S         | Obj\Enum; Range: 05<br>Values: 0=Operational, 1=Operational (read-only),<br>3=Download in progress, 4=Non-operational, 5=Backup<br>in progress   |
| Reinitialize Device  | RST       | Obj\Enum; Range: 01; Adjustable-only<br>Values: 0=Cold start, 1=Warm start, 7=Activate changes<br>Some devices require an optional password. This should<br>be included when adjusting the value in the format<br>' <restart-type> <password>'</password></restart-type> |
| Local Date   | LD        | Obj\Date   |
| Local Time   | LT        | Obj\Time   |
| Date & Time  | TIME      | Obj\DateTime; Adjustable   |
| Use to set the date and time in the device   |           |  |
| Vendor Name  | R121      | Obj\Text   |
| Vendor ID  | R120      | Obj\Num; Range: 065535   |
| A list of BACnet vendor identifiers is   |           |  |
| available from www.bacnet.org  |           |  |
| Model Name   | R70       | Obj\Text   |
| Serial Number  | R372      | Obj\Text   |
| Firmware Version   | R44       | Obj\Text   |
| Software Version   | R12       | Obj\Text   |
| Database Revision  | R155      | Obj\Num; Range: 0255   |
| Total Objects  | R76.E0    | Obj\Num  |
| BACnet Version   | R98       | Obj\Num  |
| BACnet Revision  | R139      | Obj\Num  |
| Segmentation Supported   | R107      | Obj\Enum; Range: 03<br>Values: 0=Both (transmit/receive), 1=Transmit only,<br>2=Receive only, 3=None   |
| Maximum Segments Supported   | R167      | Obj\Num  |
| Maximum APDU Length  | R62       | Obj\Num; Range: 501476   |
| APDU Timeout (ms)<br>In order to achieve reliable<br>communication, it is recommended that<br>the APDU timeouts of all interconnecting | R11.U     | Obj\Num; Adjustable; Range: 300010000  |
| devices should contain the same value  |           |  |
| APDU Segment Timeout (ms)  | R10.U     | Obj\Num; Adjustable; Range: 200010000  |
| In order to achieve reliable   |           |  |
| communication, it is recommended that  |           |  |
| the APDU timeouts of all interconnecting   |           |  |
| devices should contain the same value  |           |  |
| APDU Retries   | R73.U     | Obj\Num; Adjustable; Range: 099  |
| Services Supported<br>Indicates which standard protocol services<br>are executed by this device  | R97       | Fixed container:<br>[BACnetIP v31\PIC\Svc]   |
| Object Types Supported   | R96       | Fixed container:   |
| Indicates which standard object types can<br>be present in this device   | 1.50      | [BACnetIP v31\PIC\Obj]   |

### BACnet Services Supported

#### Object Type: [BACnetIP v31\PIC\Svc]

The BACnet Services Supported indicates which standard protocol services are executed by the remote BACnet device's protocol implementation.

| Description                           | Reference | Туре      |
|---------------------------------------|-----------|-----------|
| Acknowledge Alarm                     | B0        | Obj\NoYes |
| Confirmed COV Notification            | B1        | Obj\NoYes |
| Confirmed COV Notification Multiple   | B42       | Obj\NoYes |
| Confirmed Event Notification          | B2        | Obj\NoYes |
| Get Alarm Summary                     | B3        | Obj\NoYes |
| Get Enrolment Summary                 | B4        | Obj\NoYes |
| Get Event Information                 | B39       | Obj\NoYes |
| Life Safety Operation                 | B37       | Obj\NoYes |
| Subscribe COV                         | B5        | Obj\NoYes |
| Subscribe COV Property                | B38       | Obj\NoYes |
| Subscribe COV Property Multiple       | B41       | Obj\NoYes |
| Atomic Read File                      | B6        | Obj\NoYes |
| Atomic Write File                     | B7        | Obj\NoYes |
| Add List Element                      | B8        | Obj\NoYes |
| Remove List Element                   | B9        | Obj\NoYes |
| Create Object                         | B10       | Obj\NoYes |
| Delete Object                         | B11       | Obj\NoYes |
| Read Property                         | B12       | Obj\NoYes |
| Read Property Multiple                | B14       | Obj\NoYes |
| Read Range                            | B35       | Obj\NoYes |
| Write Group                           | B40       | Obj\NoYes |
| Write Property                        | B15       | Obj\NoYes |
| Write Property Multiple               | B16       | Obj\NoYes |
| Device Communication Control          | B17       | Obj\NoYes |
| Confirmed Private Transfer            | B18       | Obj\NoYes |
| Confirmed Text Message                | B19       | Obj\NoYes |
| Reinitialize Device                   | B20       | Obj\NoYes |
| Virtual Terminal Open                 | B21       | Obj\NoYes |
| Virtual Terminal Close                | B22       | Obj\NoYes |
| Virtual Terminal Data                 | B23       | Obj\NoYes |
| I-Am                                  | B26       | Obj\NoYes |
| I-Have                                | B27       | Obj\NoYes |
| Unconfirmed COV Notification          | B28       | Obj\NoYes |
| Unconfirmed COV Notification Multiple | B43       | Obj\NoYes |
| Unconfirmed Event Notification        | B29       | Obj\NoYes |
| Unconfirmed Private Transfer          | B30       | Obj\NoYes |
| Unconfirmed Text Message              | B31       | Obj\NoYes |
| Time Synchronisation                  | B32       | Obj\NoYes |
| UTC Time Synchronisation              | B36       | Obj\NoYes |
| Who-Has                               | B33       | Obj\NoYes |
| Who-Is                                | B34       | Obj\NoYes |

### BACnet Objects Types Supported

Object Type: [BACnetIP v31\PIC\Obj]

The BACnet Object Types Supported indicates which standard object types can be present in the BACnet device's protocol implementation.

| Description             | Reference | Туре      |
|-------------------------|-----------|-----------|
| Access Credential       | B32       | Obj\NoYes |
| Access Door             | B30       | Obj\NoYes |
| Access Point            | B33       | Obj\NoYes |
| Access Rights           | B34       | Obj\NoYes |
| Access User             | B35       | Obj\NoYes |
| Access Zone             | B36       | Obj\NoYes |
| Accumulator             | B23       | Obj\NoYes |
| Alert Enrolment         | B52       | Obj\NoYes |
| Analog Input            | B0        | Obj\NoYes |
| Analog Output           | B1        | Obj\NoYes |
| Analog Value            | B2        | Obj\NoYes |
| Averaging               | B18       | Obj\NoYes |
| Binary Input            | B3        | Obj\NoYes |
| Binary Output           | B4        | Obj\NoYes |
| Binary Value            | B5        | Obj\NoYes |
| Bit String Value        | B39       | Obj\NoYes |
| Calendar                | B6        | Obj\NoYes |
| Channel                 | B53       | Obj\NoYes |
| Character String Value  | B40       | Obj\NoYes |
| Command                 | B7        | Obj\NoYes |
| Credential Data Input   | B37       | Obj\NoYes |
| Date Pattern Value      | B41       | Obj\NoYes |
| Date Value              | B42       | Obj\NoYes |
| Date Time Pattern Value | B43       | Obj\NoYes |
| Date Time Value         | B44       | Obj\NoYes |
| Device                  | B8        | Obj\NoYes |
| Elevator Group          | B57       | Obj\NoYes |
| Escalator               | B58       | Obj\NoYes |
| Event Enrolment         | B9        | Obj\NoYes |
| Event Log               | B25       | Obj\NoYes |
| File                    | B10       | Obj\NoYes |
| Global Group            | B26       | Obj\NoYes |
| Group                   | B11       | Obj\NoYes |
| Integer Value           | B45       | Obj\NoYes |
| Large Analog Value      | B46       | Obj\NoYes |
| Life Safety Point       | B21       | Obj\NoYes |
| Life Safety Zone        | B22       | Obj\NoYes |
| Lift                    | B59       | Obj\NoYes |
| Lighting Output         | B54       | Obj\NoYes |
| Load Control            | B28       | Obj\NoYes |
| Loop                    | B12       | Obj\NoYes |
| Multi-state Input       | B13       | Obj\NoYes |
| Multi-state Output      | B14       | Obj\NoYes |
| Multi-state Value       | B19       | Obj\NoYes |
| Network Port            | B56       | Obj\NoYes |
| Network Security        | B38       | UDJ\NOYes |
| Notification Class      | B15       | Ubj\NoYes |
| Notification Forwarder  | B51       | Ubj\NoYes |
| Octet String Value      | B47       | Obj\NoYes |

| Description            | Reference | Туре      |
|------------------------|-----------|-----------|
| Positive Integer Value | B48       | Obj\NoYes |
| Program                | B16       | Obj\NoYes |
| Pulse Converter        | B24       | Obj\NoYes |
| Schedule               | B17       | Obj\NoYes |
| Structured View        | B29       | Obj\NoYes |
| Time Pattern Value     | B49       | Obj\NoYes |
| Time Value             | B50       | Obj\NoYes |
| Timer                  | B31       | Obj\NoYes |
| Trend Log              | B20       | Obj\NoYes |
| Trend Log Multiple     | B27       | Obj\NoYes |

### Network Port

Object Type: [BACnetIP v31\NetPort]

Network Port provides access to the configuration and properties of network ports of a device.

| Description   | Reference | Туре   |
|---|-----------|--|
| Name  | Ν         | Obj\Text   |
| Description   | D         | Obj\Text; Adjustable   |
| Device support for this object is optional  |           |  |
| <b>Status Flag</b> <i>b</i><br>Health of the analogue input. Status Flag,<br><i>b</i> , is a number in the range 03, where:<br>0=In Alarm, 1=In Fault, 3=Out of Service | SF.Bb     | Obj\NoYes  |
| <b>Reliability</b><br>Indicates if the network port and<br>connected network are reliable.<br>Device support for this object is optional                                | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 9=Multi-<br>state fault, 10=Config error, 12=Comms fail, 13=Member<br>fault, 14=Monitored object fault, 17= Activation,<br>18=DHCP, 19=FD reg, 20=AutoNeg, 21=Restart |
| Out of Service<br>Indicates if the network port is not in<br>service disabling all communications<br>through it   | US        | Obj\NoYes; Adjustable  |
| <b>Network Type</b><br>Type of network the port object is<br>representing   | R427      | Obj\ENum: 010<br>Values: 0=Ethernet, 1=ARCNET, 2=MSTP, 3=PTP,<br>4=LonTalk, 5=IPv4, 6=ZigBee, 7=Virtual, 9=IPv6,<br>10=Serial  |
| Protocol Level  | R482      | Obj\ENum: 03<br>Values: 0=Physical, 1=Protocol, 2=BACnet App, 3=Non-<br>BACnet App   |
| <b>Reference Port</b><br>Device support for this object is optional   | R483      | Obj\Num  |
| Network Number  | R425      | Obj\Num: 065534  |
| Network Number Quality  | R426      | Obj\ENum: 03<br>Values: 0=Unknown, 1=Learned, 2=Learned-Configured,<br>3=Configured  |
| <b>Changes Pending</b><br>Indicates configuration settings have been<br>changed. A Reinitialize Device is required.   | R416      | Obj\NoYes  |
| <b>Command</b><br>Perform an action on the network port.<br>Device support for this object is optional  | CMD       | Obj\ENum: 07; Adjustable<br>Values: 0=Idle, 1=Discard changes, 2=Renew FD<br>registration, 3=Discover slaves, 4=Renew DHCP, 5=Start<br>Auto Negotiation, 6=Disconnect, 7=Restart port  |
| <b>BACnet MAC Address</b><br>BACnet MAC address used on this network.<br>For IPv4, typically 4-octet IP followed by 2-<br>octet UDP port                                | R423.m    | Obj\Text (hex value)   |
| APDU Length   | R399      | Obj\Num: 01476   |
| Link Speed (bps)  | R420.R    | Obj\Float; Adjustable (if auto-negotiate is 'Off')<br>'0' = unknown  |
| <b>Link Speed Auto-negotiate</b><br>Indicates if device automatically<br>determines link speed. Device support for<br>this object is optional                           | R422.S    | Obj\OffOn; Adjustable  |
| <b>Network Interface Name</b><br>Device support for this object is optional   | R424.C    | Obj\Text; Adjustable   |
| BACnet/IP Mode  | R408.A    | Obj\ENum; Adjustable<br>Values: 0=Normal, 1=Foreign, 2=BBMD  |
| IP Address  | R400.Yi   | Obj\IP; Adjustable   |

| Description                                 | Reference | Туре                                    |
|---|-----------|---|
| BACnet/IP UDP Port                          | R412.U    | Obj\Num; Adjustable                     |
| IP Subnet Mask                              | R411.Yi   | Obj\IP; Adjustable                      |
| IP Default Gateway                          | R401.Yi   | Obj\IP; Adjustable                      |
| BACnet/IP Multicast Address                 | R409.Yi   | Obj\IP; Adjustable                      |
|   |           | '0.0.0.0' indicates not used            |
| DNS Server IP                               | R406.E1i  | Obj\IP                                  |
|   |           | '0.0.0.0' indicates unknown or not used |
| DHCP Enable                                 | R402.S    | Obj\NoYes; Adjustable                   |
| Indicates network is configured via DHCP    |           |   |
| DHCP Lease Time (s)                         | R403      | Obj\Num                                 |
| Device support for this object is optional  |           | '0' indicates unknown                   |
| DHCP Lease Time Remaining (s)               | R404      | Obj\Num                                 |
| Device support for this object is optional  |           |   |
| DHCP Server IP                              | R405.i    | Obj\IP                                  |
| Device support for this object is optional  |           | '0.0.0.0' indicates unknown             |
| BACnet/IP NAT Traversal                     | R410.S    | Obj\NoYes; Adjustable                   |
| Device support for this object is optional  |           |   |
| BACnet/IP Global Address                    | R407      | Obj\Text                                |
| IP address and port. Device support for     |           |   |
| this object is optional                     |           |   |
| BBMD Accept FD Registration                 | R413.S    | Obj\NoYes; Adjustable                   |
| For BBMD devices, indicates foreign device  |           |   |
| registrations are accepted. Device support  |           |   |
| for this object is optional                 |           |   |
| FD BBMD Address                             | R418      | Obj\Text                                |
| IP address and port that FD's can register. |           |   |
| Device support for this object is optional  |           |   |
| FD Subscription Lifetime (s)                | R419.U    | Obj\Num; Adjustable                     |
| lime a foreign device remains registered.   |           |   |
| Device support for this object is optional  | DOALL     |   |
| MSTP Max Master                             | R64.U     | Obj\Num; Adjustable                     |
| Support for this object required by MS/TP   |           |   |
|   | DC2       |   |
| MSIP Max Into Frames                        | R63.U     | Obj\Nulfi: 1255; Adjustable             |
| devices only                                |           |   |
| MSTP Slave Proxy Enable                     | R172.S    | Obi\NoYes: Adjustable                   |
| Support for this object required by MS/TP   |           |   |
| devices only                                |           |   |

## Analog Input

Object Type: [BACnetIP v31\AnIn]

The Analog Input object represents the externally visible characteristics of an analogue input.

| Description                                    | Reference | Type  |
|--|-----------|---|
| Name   | N         | Obi\Text  |
| Unique object name within the device           |           | 0.0](1.0.10   |
| Present Value                                  | V         | Obi\Float: Adjustable (only when the object is 'Out-of- |
| Current value of the analogue input            |           | Service')   |
| Units  | U         | Obi\Text  |
| Description                                    | D         | Obi\Text  |
| Device support for this object is optional     | _         |   |
| Device Type                                    | DT        | Obi\Text  |
| Description of the physical device             |           |   |
| connected to the analogue input.               |           |   |
| Device support for this object is optional     |           |   |
| Status Flag b                                  | SF.Bb     | Obj\NoYes   |
| Health of the analogue input. Status Flag,     |           |   |
| <i>b</i> , is a number in the range 03, where: |           |   |
| 0=In Alarm, 1=In Fault, 2=Value                |           |   |
| Overridden, 3=Out of Service                   |           |   |
| Event State                                    | ES        | Obj\ENum; Range: 05                                     |
| Indicates if the object has an active event    |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,  |
| state associated with it                       |           | 4=Low limit, 5=Life safety                              |
| Reliability                                    | RS        | Obj\ENum; Range: 024                                    |
| Indicates if the Present Value is reliable.    |           | Values: 0=Ok, 1=No Sensor, 2=Over range, 3=Under        |
| Device support for this object is optional     |           | range, 4=Open loop, 5=Short loop, 7=Unreliable,         |
|  |           | 8=Process error, 9=Multi-state fault, 10=Config error,  |
|  |           | 12=Comms fail, 13=Member fault, 14=Monitored object     |
|  |           |   |
| Out of Service                                 | US        | Obj\NoYes; Adjustable                                   |
| Indicates if the input is not in service       |           |   |
| decoupling the Present value from the          |           |   |
| Value Poselution                               |           | ObilEleat   |
| Smallost recognizable change in value          | VK        | ODJ\Float   |
| Device support for this object is optional     |           |   |
| Value High                                     | VH        | Obi\Eloat   |
| Maximum value that can be obtained from        | VII       | 00](11021   |
| Present Value Device support for this          |           |   |
| object is optional                             |           |   |
| Value Low                                      | VL        | Obi\Float   |
| Minimum value that can be obtained from        |           |   |
| Present Value. Device support for this         |           |   |
| object is optional                             |           |   |
| Alarm High                                     | AH        | Obj\Float; Adjustable                                   |
| Device support for this object is optional     |           |   |
| Alarm Low                                      | AL        | Obj\Float; Adjustable                                   |
| Device support for this object is optional     |           | -   |

### Analog Output

Object Type: [BACnetIP v31\AnOut]

The Analog Output object represents the externally visible characteristics of an analogue output.

| Description  | Reference | Туре  |
|--|-----------|---|
| Name   | N         | Obi\Text  |
| Unique object name within the device   |           |   |
| Present Value - Priority p   | V.Pp      | Obi\Float: Adiustable   |
| Within a BACnet device, the present value<br>is stored in a priority array table. Various<br>applications can send a new value to the<br>object, along with a priority. From this<br>table, the value with the highest priority<br>becomes the current value.<br>On adjusting the value a priority, <i>p</i> , is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is ignored and the<br>highest priority value returned. |           | To release or clear a value for a priority, set the value to<br>" or '[NULL]"   |
| See Value Table for more information.  |           |   |
| Value Table<br>Priority array table containing the value<br>for each priority  | VT        | Fixed container:<br>[BACnetIP v31\AnOut\ValTable]   |
| Command Priority   | VP        | Obi\Num: '[NULL]'. 116  |
| Current active value priority. Support for this object is optional   |           |   |
| Default Value  | DV        | Obj\Float; Adjustable   |
| When there are no values in the priority   |           |   |
| array, the default value is used   |           |   |
| Units  | 0         |   |
| Device support for this object is optional   | D         | Obj\Text  |
| <b>Device Type</b><br>Description of the physical device<br>connected to the analogue output.<br>Device support for this object is optional  | DT        | Obj\Text  |
| Status Flag b  | SF.Bb     | Obj\NoYes   |
| Health of the analogue output. Status Flag,<br>b, is a number in the range 03, where:<br>0=In Alarm, 1=In Fault, 2=Value<br>Overridden, 3=Out of Service   |           |   |
| Event State  | ES        | Obj\ENum; Range: 05   |
| Indicates if the object has an active event  |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,  |
| state associated with it   | 50        | 4=Low limit, 5=Life safety  |
| Reliability<br>Indicates if the Present Value is reliable.<br>Device support for this object is optional   | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,<br>7=Unreliable, 8=Process error, 9=Multi-state fault,<br>10=Config error, 12=Comms fail, 13=Member fault,<br>14=Monitored object fault |
| Out of service   | US        | Obj\NoYes; Adjustable   |
| decoupling the Present Value from the physical output  |           |   |
| Value Resolution   | VR        | Obj\Float   |
| Smallest recognizable change in value.<br>Device support for this object is optional   |           |   |

| Description  | Reference | Туре                  |
|--|-----------|-----------------------|
| <b>Value High</b><br>Maximum value that can be obtained from<br>Present Value. Device support for this<br>object is optional | VH        | Obj\Float             |
| Value Low<br>Minimum value that can be obtained from<br>Present Value. Device support for this<br>object is optional         | VL        | Obj\Float             |
| <b>Alarm High</b><br>Device support for this object is optional  | AH        | Obj\Float; Adjustable |
| <b>Alarm Low</b><br>Device support for this object is optional   | AL        | Obj\Float; Adjustable |

### Analog Value

Object Type: [BACnetIP v31\AnVal]

The Analog Value object represents the externally visible characteristics of an analogue value. An analogue value is a control system parameter in the memory of the BACnet device.

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value – Priority p                       | V.Pp      | Obi\Float; Adjustable  |
| Within a BACnet device, the present value        | ,         | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VT        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\AnVal\ValTable]                                |
| for each priority                                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Command Priority                                 | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for       |           |  |
| this object is optional                          |           |  |
| Default Value                                    | DV        | Obj\Float; Adjustable  |
| When there are no values in the priority         |           |  |
| array, the default value is used.                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Units  | U         | Obj\Text   |
| Description                                      | D         | Obj\Text   |
| Device support for this object is optional       |           |  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the analogue value. Status Flag,       |           |  |
| <i>b</i> , is a number in the range 03, where:   |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                  |           |  |
| Overridden, 3=Out of Service                     |           |  |
| Event State                                      | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it                         |           | 4=Low limit, 5=Life safety                                   |
| Reliability                                      | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.      |           | Values: 0=0k, /=Unreliable, 8=Process error, 9=Multi-        |
| Device support for this object is optional       |           | state fault, 10=Config error, 12=Comms fail, 13=Member       |
|  |           | fault, 14=Monitored object fault                             |
| Out of Service                                   | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from         |           |  |
| being modified by software local to the          |           |  |
| device   |           |  |
| Value Resolution                                 | VR        | Obj\Float  |
| Smallest recognizable change in value.           |           |  |
| Device support for this object is optional       |           |  |

| Value High                                 | VH | Obj\Float             |
|--|----|-----------------------|
| Maximum value that can be obtained from    |    |                       |
| Present Value. Device support for this     |    |                       |
| object is optional                         |    |                       |
| Value Low                                  | VL | Obj\Float             |
| Minimum value that can be obtained from    |    |                       |
| Present Value. Device support for this     |    |                       |
| object is optional                         |    |                       |
| Alarm High                                 | AH | Obj\Float; Adjustable |
| Device support for this object is optional |    |                       |
| Alarm Low                                  | AL | Obj\Float; Adjustable |
| Device support for this object is optional |    |                       |

### **Binary Input**

Object Type: [BACnetIP v31\BinIn]

The Binary Input object represents the externally visible characteristics of a binary input. A binary input is a physical device or hardware input that can be in one of two states – 'off' or 'on'. A typical use of a binary input is to indicate whether a particular piece of mechanical equipment, such as a fan or pump, is running or idle. The state 'on' corresponds to the situation when the equipment is on or running, and 'off' corresponds to the situation when the equipment is off or idle.

| Description  | Reference | Туре  |
|--|-----------|---|
| Name   | Ν         | Obj\Text  |
| Unique object name within the device                   |           |   |
| Present Value  | V         | Obj\OffOn; Adjustable (only when the object is 'Out-of- |
| Current value of the binary input                      |           | Service')   |
| Description  | D         | Obj\Text  |
| Device support for this object is optional             |           |   |
| Device Type  | DT        | Obj\Text  |
| Description of the physical device                     |           |   |
| connected to the binary input.                         |           |   |
| Device support for this object is optional             |           |   |
| Status Flag b  | SF.Bb     | Obj\NoYes   |
| Health of the binary input. Status Flag, <i>D</i> , is |           |   |
| a number in the range 03, where:                       |           |   |
| Overridden 3-Out of Service                            |           |   |
| Event State  | FS        | Obi\ENum: Pange: 0 5                                    |
| Indicates if the object has an active event            | LJ        | Values: 0=Normal 1=Fault 2=Off-normal 3=High limit      |
| state associated with it                               |           | 4=1 ow limit, 5=1 ife safety                            |
| Reliability  | RS        | Obi\ENum: Range: 024                                    |
| Indicates if the Present Value is reliable.            |           | Values: 0=Ok, 1=No Sensor, 2=Over range, 3=Under        |
| Device support for this object is optional             |           | range, 4=Open loop, 5=Short loop, 7=Unreliable,         |
|  |           | 8=Process error, 9=Multi-state fault, 10=Config error,  |
|  |           | 12=Comms fail, 13=Member fault, 14=Monitored object     |
|  |           | fault   |
| Out of Service   | US        | Obj\NoYes; Adjustable                                   |
| Indicates if the input is not in service               |           |   |
| decoupling the Present Value from the                  |           |   |
| physical input   |           |   |
| Polarity Reversed                                      | Р         | Obj\NoYes   |
| Off State Text   | FL        | Obj\Text  |
| Device support for this object is optional             |           |   |
| On State Text  | TL        | Obj\Text  |
| Device support for this object is optional             |           |   |

### Binary Output

Object Type: [BACnetIP v31\BinOut]

The Binary Output object represents the externally visible characteristics of a binary output. A binary output is a physical device or hardware input that can be in one of two states – 'off' or 'on'. A typical use of a binary output is to switch a particular piece of mechanical equipment, such as a fan or pump, on or off. The state 'on' corresponds to the situation when the equipment is on or running, and 'off' corresponds to the situation when the equipment is off or idle.

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value – Priority p                       | V.Pp      | Obj\OffOn; Adjustable  |
| Within a BACnet device, the present value        |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VT        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\BinOut\ValTable]                               |
| for each priority                                |           |  |
| Command Priority                                 | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for       |           |  |
| this object is optional                          |           |  |
| Default Value                                    | DV        | Obj\OffOn; Adjustable  |
| When there are no values in the priority         |           |  |
| array, the default value is used                 |           |  |
| Description                                      | D         | Obj\Text   |
| Device support for this object is optional       |           |  |
| Device Type                                      | DT        | Obj\Text   |
| Description of the physical device               |           |  |
| connected to the binary output.                  |           |  |
| Device support for this object is optional       | -         |  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the binary output. Status Flag, b,     |           |  |
| is a number in the range 03, where:              |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                  |           |  |
| Overridden, 3=Out of Service                     | =0        |  |
| Event State                                      | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it                         |           | 4=LOW limit, 5=Life safety                                   |
| Reliability                                      | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present value is reliable.      |           | values: 0=0k, 4=0pen loop, 5=Short loop, 6=No output,        |
| Device support for this object is optional       |           | 7=Onreliable, 8=Process error, 9=Multi-state fault,          |
|  |           | 10-Coming error, 12-Commissian, 13-Member fault,             |
| Out of corvice                                   | 115       |  |
| Indicates if the output is not in service        | 03        | טטן (אטרבא, אטן עזגמאופ                                      |
| decoupling the Present Value from the            |           |  |
| nhysical output                                  |           |  |
| Polarity Reversed                                | P         | Obi\NoYes  |
|  | •         |  |

| Description                                | Reference | Туре     |
|--|-----------|----------|
| Off State Text                             | FL        | Obj\Text |
| Device support for this object is optional |           |          |
| On State Text                              | TL        | Obj\Text |
| Device support for this object is optional |           |          |

### **Binary Value**

Object Type: [BACnetIP v31\BinVal]

The Binary Value object represents the externally visible characteristics of a binary value. A binary value is a control system parameter residing in the memory of the BACnet device. This parameter may assume only one of two distinct states – 'off' or 'on'.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device           |           |  |
| Present Value - Priority p                     | V.Pp      | Obj\OffOn; Adjustable  |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various   |           | '' or '[NULL]'   |
| applications can send a new value to the       |           |  |
| object, along with a priority. From this       |           |  |
| table, the value with the highest priority     |           |  |
| becomes the current value.                     |           |  |
| On adjusting the value a priority, p, is       |           |  |
| required in the range 1 (high) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. Of          |           |  |
| highest priority value returned                |           |  |
| See Value Table for more information           |           |  |
| Value Table                                    | VT        | Fixed container:   |
| Priority array table containing the value      | •         | [BACnetIP v31\BinVal\ValTable]                               |
| for each priority                              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Command Priority                               | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for     |           |  |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\OffOn; Adjustable  |
| When there are no values in the priority       |           |  |
| array, the default value is used.              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Description                                    | D         | Obj\lext   |
| Device support for this object is optional     |           |  |
| Status Flag D                                  | SF.BD     | Obj\noves  |
| Health of the binary value. Status Flag, $D$ , |           |  |
| 0=In Alarm 1=In Fault 2=Value                  |           |  |
| Overridden, 3=Out of Service                   |           |  |
| Event State                                    | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event    |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it                       |           | 4=Low limit, 5=Life safety                                   |
| Reliability                                    | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.    |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 9=Multi-        |
| Device support for this object is optional     |           | state fault, 10=Config error, 12=Comms fail, 13=Member       |
|  |           | fault, 14=Monitored object fault                             |
| Out of Service                                 | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from       |           |  |
| being modified by software local to the        |           |  |
| device   |           |  |
| UII State lext                                 | FL        | Obj\Text   |
| On State Text                                  | TI        |  |
| Device support for this object is optional     | IL        | Obj\Text   |
| Device support for this object is optional     |           |  |

### Calendar

#### Object Type: [BACnetlP v31\Calendar]

The Calendar object is used to describe a list of calendar dates, which might be thought of as holidays, special events, or simply a list of dates.

| Description  | Reference            | Туре   |
|--|----------------------|--|
| Name   | Ν                    | Obj\Text   |
| Unique object name within the device                     |                      |  |
| Present Value  | V                    | Obj\OffOn  |
| Indicates 'on' if the current date is in the             |                      |  |
|  | -                    |  |
| Description  | D                    | Obj\Text   |
| Device support for this object is optional               |                      |  |
| Date List (all)  | R23                  | Obj\Text; Adjustable   |
| List of dates. Each date contains a period               |                      | A list of dates in the format '{ <i>type</i>   <i>period</i> } ' |
| type and period – see below                              |                      |  |
| Date <i>d</i> – Type                                     | R23.V( <i>d*2)-1</i> | Obj\ENum; Adjustable   |
| Period type for date <i>d</i> . <i>d</i> is in the range |                      | Values: 0=Date, 1=Date range, 2=Month-week-day,                  |
| 15   |                      | 4=Delete entry   |
| Date <i>d</i> – Period                                   | R23.V( <i>d*2</i> )  | Type depends on Period Type; Adjustable                          |
| Period for date <i>d</i> . <i>d</i> is in the range 15   |                      | Date   |
|  |                      | Obj\Date: ' <i>dd/mm/yy</i> '                                    |
|  |                      | Date range   |
|  |                      | Obj\Text: <i>'dd/mm/yy- dd/mm/yy</i> ' (see note 1)              |
|  |                      | Month-week-day   |
|  |                      | Obj\Text: 'm,w,d' (see note 2)                                   |

#### Notes

1. Date range specifies a range of dates, or date pattern in the format '*dd/mm/yy-dd/mm/yy*':

| <i>dd</i> – Day-of-month 131, 32=last day, 33=odd days, 34=even days, |  |  |  |
|---|--|--|--|
| 4147=MondaysSundays, 99=any   |  |  |  |
| <i>mm</i> – Month   | 112, 13=odd months, 14=even months, 99=any |  |  |
| <i>yy – Y</i> ear   | 0079=20002079, 99=any.                     |  |  |

#### 2. Month-week-day, specifies a reoccurring date pattern in the format '*m*,*w*,*d*':

| <i>m</i> – Month  | 112, 13=odd months, 14=even months, 255=any  |
|-------------------|--|
| w – Week-of-month | 15=1 <sup>st</sup> -5 <sup>th</sup> week, 6=last 7 days, 79=penultimate 7 days, etc, 255=any |
| d – Day-of-week   | 17=MondaysSundays, 255=any.  |

#### Command

Object Type: [BACnetIP v31\Cmd]

The Command object represents the externally visible characteristics of a multi-action command procedure. A command is used to write a set of values to a group of BACnet object properties, based on the action code written to the Present Value.

| Description                                       | Reference     | Туре   |
|---|---------------|--|
| Name  | Ν             | Obj\Text   |
| Unique object name within the device              |               |  |
| Present Value                                     | V             | Obj\Num: 0maximum actions; Adjustable                  |
| Indicates which action to take or has             |               |  |
| already been taken. Set the value to the          |               |  |
| action number to trigger                          |               |  |
| In Process  | R47           | Obj\NoYes  |
| Indicates that the Command object has             |               |  |
| begun processing a sequence of actions            |               |  |
| All Writes Successful                             | R9            | Obj\NoYes  |
| Once the actions have completed and In            |               |  |
| Process is set to 'no', this value indicates if   |               |  |
| all of the value writes in the action have        |               |  |
| Succeeded   | <b>D</b>      |  |
| Device support for this chiest is optional        | D             | Obj\Text   |
| Status Flag b                                     | SEDP          | ObilNoVac  |
| Health of the command Status Flag h is a          | SF.DD         | ODJ/NOYES  |
| number in the range 0 1 where                     |               |  |
| 0=In Alarm 1=In Fault                             |               |  |
| Event State                                       | ES            | Obi\ENum: Range: 05                                    |
| Indicates if the object has an active event       |               | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, |
| state associated with it                          |               | 4=Low limit, 5=Life safety                             |
| Reliability                                       | RS            | Obj\ENum; Range: 024                                   |
| Indicates whether the object is properly          |               | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config |
| configured and is able to                         |               | error, 12=Comms fail, 23=Faults listed, 24=Referenced  |
| if the Present Value is reliable.                 |               | object fault   |
| Device support for this object is optional        |               |  |
| Maximum Actions                                   | R2.E0         | Obj\Num  |
| Action <i>n</i> Text                              | R3.E <i>n</i> | Obj\Text   |
| Text description of the action. Where <i>n</i> is |               |  |
| in the range 1 to maximum actions.                |               |  |
| Device support for this object is optional        |               |  |

### Event Enrolment

Object Type: [BACnetIP v31\EvtEnr]

The Event Enrolment object represents and contains the information required for algorithmic reporting of events.

Although this object is accessible, note that the BACnetIP driver does not currently support BACnet alarm and event management services.

| Description   | Reference      | Туре   |
|---|----------------|--|
| Name  | N              | Obj\Text   |
| Unique object name within the device  |                | ,  |
| <b>Event Type</b><br>Indicates the type of event algorithm used   | R37            | Obj\ENum<br>Values: 0=Change of bitstring, 1=Change of state,<br>2=Change of value, 3=Cmd failure, 4=Floating limit,<br>5=Out-of-range 8=Change of life safety, 9=Extended,<br>10=Buffer-ready, 11=Unsigned range, 13=Access event,<br>14=Double out-of-range, 15=Signed out-of-range,<br>16=Unsigned out-of-range , 17=Change of character<br>string, 18=Change of status flags, 19=Change of<br>reliability, 20=None, 21=Change of discrete value,<br>22=Change of timer |
| <b>Notify Type</b><br>Indicates whether the notifications<br>generated by the object should be events<br>or alarms  | R72            | Obj\ENum<br>Values: 0=Alarm, 1=Event, 2=Ack Notification   |
| <b>Event Parameters</b><br>Determines the algorithm used to monitor<br>the referenced object and provides the<br>parameter values needed for this event<br>algorithm                            | R83            | Obj\Text   |
| <b>Object Property Reference</b><br>Designates the particular object and<br>property reference by the event enrolment   | R78            | Obj\Text   |
| <b>Description</b><br>Device support for this object is optional  | D              | Obj\Text   |
| <b>Event State</b><br>Indicates if the object has an active event<br>state associated with it   | ES             | Obj\ENum; Range: 05<br>Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety  |
| <b>Event Enable</b> <i>b</i><br>Enable and disable the distribution of <i>b</i><br>notifications. <i>b</i> , is a number in the range<br>02, where:<br>0=To off-normal, 1=To fault, 2=To normal | R35.B <i>b</i> | Obj\OffOn  |
| Acked Transitions <i>b</i><br>Indicates the acknowledgement state for <i>b</i><br>events. <i>b</i> , is a number in the range 02,<br>where:<br>0=To off-normal, 1=To fault, 2=To normal         | R0.B <i>b</i>  | Obj\NoYes  |
| <b>Notification Class</b><br>Instance of the notification class object to<br>use for event-notification distribution  | R17            | Obj\Num  |
| <b>Status Flag </b> <i>b</i><br>Health of the event enrolment. Status Flag,<br><i>b</i> , is a number in the range 01, where:<br>0=In Alarm, 1=In Fault   | SF.Bb          | Obj\NoYes  |

| Description   | Reference | Туре  |
|---|-----------|---|
| <b>Reliability</b><br>Indicates the reliability of the event<br>enrolment object to perform its<br>monitoring function, in addition to the<br>reliability of the monitored object | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail, 14=Monitored object fault |

#### Loop

Object Type: [BACnetIP v31\Loop]

The Loop object represents the externally visible characteristics of any form of feedback control loop.

| Description                                      | Reference   | Туре  |
|--|-------------|---|
| Name   | N           | Obj\Text  |
| Unique object name within the device             |             |   |
| Present Value                                    | V           | Obj\Float; Adjustable   |
| Indicates the current output value from          |             |   |
| the loop algorithm in Output Units               |             |   |
| Output Units                                     | R82.u       | Obj\Text  |
| Engineering units for the output                 |             |   |
| Description                                      | D           | Obj\Text  |
| Device support for this object is optional       |             | -1.0  |
| Status Flag b                                    | SF.Bb       | Obj\NoYes   |
| Health of the loop. Status Flag, <i>D</i> , Is a |             |   |
| number in the range 03, where:                   |             |   |
| Overridden 3=Out of Service                      |             |   |
| Event State                                      | FS          | Obi\ENum: Range: 0 5  |
| Indicates if the object has an active event      | LJ          | Values: 0=Normal 1=Fault 2=Off-normal 3=High limit            |
| state associated with it                         |             | 4=1 ow limit 5=1 ife safety                                   |
| Reliability                                      | RS          | Obi\ENum: Range: 0 24   |
| Indicates if the Present Value is reliable.      | no          | Values: 0=0k, 1=No Sensor, 2=Over range, 3=Under              |
| Device support for this object is optional       |             | range, 4=Open loop, 5=Short loop, 6=No output,                |
|  |             | 7=Unreliable, 8=Process error, 9=Multi-state fault,           |
|  |             | 10=Config error, 12=Comms fail, 13=Member fault,              |
|  |             | 14=Monitored object fault, 15=Tripped, 16=Lamp failure,       |
|  |             | 17=Activation fail, 18=Renew DHCP fail, 19=Renew FD           |
|  |             | registration fail, 20=Restart auto-neg fail, 21=Restart fail, |
|  |             | 22=Proprietary cmd fail, 23=Faults listed, 24=Referenced      |
|  |             | object fault  |
| Out of Service                                   | US          | Obj\NoYes; Adjustable   |
| Indicates if the value is prevented from         |             |   |
| being modified by software local to the          |             |   |
|  | <b>D110</b> |   |
| Update Interval (ms)                             | R118.U      | Obj\num; Adjustable   |
| undates the output (Present Value)               |             |   |
| Device support for this object is optional       |             |   |
| Manipulated Variable Reference                   | R60         | Obi\Text  |
| The output (Present Value) of the control        | 100         | OBJ   |
| loop is written to this BACnet object            |             |   |
| reference, typically an analogue output          |             |   |
| Priority for Writing                             | R88.U       | Obj\Num: 116; Adjustable                                      |
| Priority to use when writing the output          |             |   |
| value to the Manipulated Variable                |             |   |
| Reference  |             |   |
| Controlled Variable Reference                    | R19         | Obj\Text  |
| The BACnet object reference used to set          |             |   |
| the Controlled Variable Value, typically an      |             |   |
| analogue input                                   |             |   |
| Controlled Variable Value                        | R21.R       | Obj\Float   |
| The control loop compares the controlled         |             |   |
| Variable Value with the Setpoint to              |             |   |
| determine the error                              |             |   |
### Multi-State Input

Object Type: [BACnetIP v31\MultiIn]

The Multi-State Input object represents the result of an algorithmic process within the BACnet device. The Present Value is an integer representing the state, with state text describing each state value.

| Description                                  | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device         |           |  |
| Present Value                                | V         | Obj\Num; Range 1…number of states; Adjustable (only    |
| Current value of the multi-state input       |           | when the object is 'Out-of-Service')                   |
| Description                                  | D         | Obj\Text   |
| Device support for this object is optional   |           |  |
| Device Type                                  | DT        | Obj\Text   |
| Description of the physical device           |           |  |
| connected to the multi-state input.          |           |  |
| Device support for this object is optional   |           |  |
| Status Flag D                                | SF.BD     | ODJ\NOYES  |
| Flag $h$ is a number in the range 0 $-3$     |           |  |
| where  |           |  |
| 0=In Alarm, 1=In Fault, 2=Value              |           |  |
| Overridden, 3=Out of Service                 |           |  |
| Event State                                  | ES        | Obj\ENum; Range: 05                                    |
| Indicates if the object has an active event  |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, |
| state associated with it                     |           | 4=Low limit, 5=Life safety                             |
| Reliability                                  | RS        | Obj\ENum; Range: 024                                   |
| Indicates if the Present Value is reliable.  |           | Values: 0=Ok, 1=No Sensor, 2=Over range, 3=Under       |
| Device support for this object is optional   |           | range, 4=Open loop, 5=Short loop, 7=Unreliable,        |
|  |           | 8=Process error, 9=Multi-state fault, 10=Config error, |
| Out of Comico                                |           | 12=Commis fall   |
| Indicates if the input is not in service     | 05        | Obj/noves; Adjustable                                  |
| decoupling the Present Value from the        |           |  |
| physical input                               |           |  |
| Number of States                             | NS        | Obj\Num  |
| State n Text                                 | A.En      | Obj\Text   |
| Text description of the state value.         |           |  |
| The state number, <i>n</i> , is in the range |           |  |
| 1number of states.                           |           |  |
| Device support for this object is optional   |           |  |

### Multi-State Output

### Object Type: [BACnetIP v31\MultiOut]

The Multi-State Output object represents the desired state of one or more physical outputs. The present value is an integer representing the state, with state text describing each state value.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device           |           |  |
| Present Value - Priority p                     | V.Pp      | Obj\Num; Adjustable  |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various   |           | '' or '[NULL]'   |
| applications can send a new value to the       |           |  |
| object, along with a priority. From this       |           |  |
| table, the value with the highest priority     |           |  |
| becomes the current value.                     |           |  |
| On adjusting the value a priority, p, is       |           |  |
| required in the range 1 (high) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. On          |           |  |
| highest priority value returned                |           |  |
| See Value Table for more information           |           |  |
| Value Table                                    | VT        | Fixed container:   |
| Priority array table containing the value      | VI        | [BACnet/P v31\MultiOut\ValTable]                             |
| for each priority                              |           |  |
| Command Priority                               | VP        | Obi\Num: '[NULL]'. 116                                       |
| Current active value priority. Support for     |           | •••••••••••••••••••••••••••••••••••••••                      |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\Num; Adjustable  |
| When there are no values in the priority       |           |  |
| array, the default value is used               |           |  |
| Description                                    | D         | Obj\Text   |
| Device support for this object is optional     |           |  |
| Device Type                                    | DT        | Obj\Text   |
| Description of the physical device             |           |  |
| connected to the multi-state output.           |           |  |
| Device support for this object is optional     | -         |  |
| Status Flag b                                  | SF.Bb     | Obj\NoYes  |
| Health of the multi-state output. Status       |           |  |
| Flag, <i>b</i> , is a number in the range 03,  |           |  |
| where:   |           |  |
| Overridden 3-Out of Service                    |           |  |
| Event State                                    | FS        | Obi\ENum: Pange: 0 5   |
| Indicates if the object has an active event    | LJ        | Values: 0=Normal 1=Fault 2=Off-normal 3=High limit           |
| state associated with it                       |           | 4=Low limit. 5=Life safety                                   |
| Reliability                                    | RS        | Obi\ENum: Range: 024   |
| Indicates if the Present Value is reliable.    |           | Values: 0=0k, 4=0pen loop, 5=Short loop, 6=No output.        |
| Device support for this object is optional     |           | 7=Unreliable, 8=Process error, 9=Multi-state fault,          |
|  |           | 10=Config error, 12=Comms fail, 13=Member fault,             |
|  |           | 14=Monitored object fault, 15=Tripped                        |
| Out of service                                 | US        | Obj\NoYes; Adjustable  |
| Indicates if the output is not in service,     |           |  |
| decoupling the Present Value from the          |           |  |
| physical output                                |           |  |
| Number of States                               | NS        | Obj\Num  |
| Number of states the Present Value may         |           |  |
| nave   |           |  |

| Description                                  | Reference    | Туре     |
|--|--------------|----------|
| State n Text                                 | A.E <i>n</i> | Obj\Text |
| Text description of the state value.         |              |          |
| The state number, <i>n</i> , is in the range |              |          |
| 1number of states.                           |              |          |
| Device support for this object is optional   |              |          |

# Program

Object Type: [BACnetIP v31\Prog]

The Program object represents the externally visible characteristics of an application program.

| Description  | Reference | Туре  |
|--|-----------|---|
| Name   | N         | Obj\Text  |
| Unique object name within the device                             |           |   |
| Program State  | R92       | Obj\ENum: 05  |
| Current logical state of the process                             |           | Values: 0=Idle, 1=Loading, 2=Running, 3=Waiting,              |
| executing the application program                                |           | 4=Halted, 5=Unloading   |
| Program Change   | R90.A     | Obj\ENum: 05; Adjustable                                      |
| Request a change to the operating state                          |           | Values: 0=Ready (for change request), 1=Load, 2=Run,          |
|  |           | 3=Halt, 4=Restart, 5=Unload                                   |
| Reason for Halt  | R100      | Obj\ENum: 04  |
| If the program encounters an error that                          |           | Values: 0=Normal, 1=Load fail, 2=Internal, 3=Program,         |
| causes execution to halt, this property                          |           | 4=Other   |
| indicates the reason why the process was                         |           |   |
| halted. Device support for this object is                        |           |   |
| optional   |           |   |
| Description of Halt  | R29       | Obj\Text  |
| Used to describe why the program has                             |           |   |
| been halted. Device support for this object                      |           |   |
| is optional  |           |   |
| Program Location   | R91       | Obj\Text  |
| Used by the application program to                               |           |   |
| indicate its location within the program                         |           |   |
| code. Device support for this object is                          |           |   |
| optional   | _         |   |
| <b>Description</b><br>Device support for this object is optional | D         | Obj\Text  |
| Instance of  | R48       | Obi\Text  |
| Local name of the application program                            | -         | )(  |
| being executed. Device support for this                          |           |   |
| object is optional   |           |   |
| Status Flag b  | SF.Bb     | Obj\NoYes   |
| Health of the program. Status Flag, <i>b</i> , is a              |           |   |
| number in the range 03, where:                                   |           |   |
| 0=In Alarm, 1=In Fault, 2=Value                                  |           |   |
| Overridden, 3=Out of Service                                     |           |   |
| Reliability  | RS        | Obj\ENum; Range: 024  |
| Indicates if the object properties or the                        |           | Values: 0=Ok, 1=No Sensor, 2=Over range, 3=Under              |
| process executing the application program                        |           | range, 4=Open loop, 5=Short loop, 6=No output,                |
| are reliable. Device support for this object                     |           | 7=Unreliable, 8=Process error, 9=Multi-state fault,           |
| is optional  |           | 10=Config error, 12=Comms fail, 13=Member fault,              |
|  |           | 14=Monitored object fault, 15=Tripped, 16=Lamp failure,       |
|  |           | 17=Activation fail, 18=Renew DHCP fail, 19=Renew FD           |
|  |           | registration fail, 20=Restart auto-neg fail, 21=Restart fail, |
|  |           | 22=Proprietary cmd fail, 23=Faults listed, 24=Referenced      |
|  |           | object fault  |
| Out of Service   | US        | Obj\NoYes; Adjustable   |
| Indicates if the value is prevented from                         |           |   |
| being modified by software local to the                          |           |   |
| device   |           |   |

### Schedule

#### Object Type: [BACnetlP v31\Schedule]

The Schedule object describes a periodic schedule that may occur during a range of dates, with optional exceptions.

Schedules are divided into days, of which there are two types: normal days within a week and exception days. Both types of days can specify scheduling events for either the full day or portions of a day, and a priority mechanism defines which scheduled event is in control at any given time.

The current state of the Schedule object is represented by the Present Value, which is normally calculated using the time-value pairs from the weekly schedule and exception schedule, with a Default Value for use when no schedules are in effect.

A schedule's value could contain any primitive BACnet data type – such as real, boolean, unsigned, integer, enumerated, or null. Consult the BACnet device's documentation for actual data types supported by the schedule. When adjusting the Day Schedule, Exception Schedule, or Schedule Default then specify the data type to use.

| Description   | Reference      | Туре   |
|---|----------------|--|
| Name  | Ν              | Obj\Text   |
| Unique object name within the device  |                |  |
| Present Value   | V              | Obj\Text   |
| Current value of the schedule   |                |  |
| Effective Period  | R32.Dr         | Obj\Text; Adjustable   |
| Range of dates within which the schedule  |                | Format: 'dd/mm/yy-dd/mm/yy'  |
| is active   |                | where:   |
|   |                | $\frac{dd}{da} = \frac{1}{2} $ |
|   |                | 34=even days, 4147=MondaysSundays, 99=any  |
|   |                | $months \ 90-2ny$  |
|   |                | $V_{4}$ Vear = 00 79=2000 2079 99=any  |
| Day n Schedule  | WP Ent         | Obi\Profile: Adjustable  |
| Weekly schedule containing a list of time-  | VII . E//C     | obj (Frome, Adjustable   |
| value pairs, for one day of the week.   |                |  |
| <i>n</i> is the day of week, where: 1=Monday,   |                |  |
| 2=Tuesday, 3=Wednesday, 4=Thursday,   |                |  |
| 5=Friday, 6=Saturday, 7=Sunday  |                |  |
| When adjusting the profile, value data-   |                |  |
| type, <i>t</i> , can be 'R'=Real/float, 'S'=Boolean,  |                |  |
| 'U'=Unsigned, 'I'=Integer, 'A'=Enumerated.  |                |  |
| Schedule Default  | R174. <i>t</i> | Obj\Float; Adjustable  |
| When no scheduled values is in effect, this   |                |  |
| default value is used.  |                |  |
| 'P'-Peal/float 'S'-Boolean 'II'-Unsigned  |                |  |
| 'l'=Integer 'A'=Enumerated  |                |  |
| Description   | D              | Obi\Text   |
| Device support for this object is optional  | 2              |  |
| Status Flag b   | SF.Bb          | Obj\NoYes  |
| Health of the schedule. Status Flag, b, is a  |                |  |
| number in the range 03, where:  |                |  |
| 0=In Alarm, 1=In Fault, 2=Value   |                |  |
| Overridden, 3=Out of Service  |                |  |
| Event State   | ES             | Obj\ENum; Range: 05  |
| Indicates if the object has an active event   |                | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,   |
| state associated with it. Device support for  |                | 4=Low limit, 5=Life safety   |
| Event State<br>Indicates if the object has an active event<br>state associated with it. Device support for<br>this object is optional | ES             | Obj\ENum; Range: 05<br>Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety  |

| Description  | Reference | Туре   |
|--|-----------|--|
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional  | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail, 24=Referenced object fault |
| <b>Out of Service</b><br>Indicates if the value is prevented from<br>being modified by software local to the<br>device   | US        | Obj\NoYes; Adjustable  |
| <b>Exceptions in use</b><br>Device support for this object is optional   | XP.E0     | Obj\Num  |
| <b>Exception Schedules – t value</b><br>Exception events that take precedence<br>over the day's schedule.<br>When adjusting the profile, a value data-<br>type, <i>t</i> , is required: 'R'=Real/float,<br>'S'=Boolean, 'U'=Unsigned, 'I'=Integer,<br>'A'=Enumerated<br>Device support for this object is optional | XP.t      | Fixed container:<br>[BACnetIP v31\Schedule\Exceptions]   |

# Exception Schedules

Object Type: [BACnetIP v31\Schedule\Exceptions]

A list of Exception Schedules that takes precedence over the day's schedule.

| Description                                      | Reference | Туре                              |
|--|-----------|-----------------------------------|
| Exception Schedule <i>n</i>                      | En        | Fixed container:                  |
| List of exception events that takes              |           | [BACnetIP v31\Schedule\Exception] |
| precedence over the day's schedule.              |           |                                   |
| The exception number, <i>n</i> , is in the range |           |                                   |
| 1255.  |           |                                   |

## Exception Schedule

Object Type: [BACnetIP v31\Schedule\Exception]

The Exception Schedule contains an exception profile that takes precedence over the day's schedule.

An exception schedule can be accessed as a single composite value with the format '*type*|*period*|*profile*|*priority*' by excluding the 'Vx' object reference. For example 'S1.D150.SC1.XP.E1'

| Description  | Reference | Туре   |
|--|-----------|--|
| <b>Period Type</b><br>Select the period value used   | V1        | Obj\ENum; Adjustable<br>Values: 0=Date, 1=Date range, 2=Month-week-day,<br>3=BACnet object, 4=Delete entry   |
| <b>Period</b><br>Period this exception is active   | V2        | Type depends on Period Type; Adjustable<br><b>Date</b><br>Obj\Date: ' <i>dd/mm/yy</i> '<br><b>Date range</b><br>Obj\Text: ' <i>dd/mm/yy- dd/mm/yy</i> ' (see note 1)<br><b>Month-week-day</b><br>Obj\Text: 'm,w,d' (see note 2)<br><b>BACnet object</b><br>Obj\Text: 'CALx', referencing calendar object in same<br>device |
| <b>Profile</b><br>A list of date-value pairs for the exception schedule's profile.   | V3t       | Obj\Profile; Adjustable  |
| <b>Priority</b><br>Importance of this exception, relative to<br>others. With priority '1' the highest and<br>'16' the lowest | V4        | Obj\Num: 116; Adjustable   |

Notes

1. Date range specifies a range of dates, or date pattern in the format '*dd/mm/yy-dd/mm/yy*':

 dd - Day-of-month
 1...31, 32=last day, 33=odd days, 34=even days,

 41..47=Mondays...Sundays, 99=any

 mm - Month
 1...12, 13=odd months, 14=even months, 99=any

 yy - Year
 00...79=2000...2079, 99=any.

2. Month-week-day, specifies a reoccurring date pattern in the format '*m*,*w*,*d*':

m - Month1...12, 13=odd months, 14=even months, 255=anyw - Week-of-month1...5=1st-5th week, 6=last 7 days, 7...9=penultimate 7 days, etc, 255=anyd - Day-of-week1..7=Mondays...Sundays, 255=any.

### Averaging

Object Type: [BACnetIP v31\Avg]

The Averaging object represents the externally visible characteristics of a value that is sampled periodically over a specified time interval. The Averaging object records the minimum, maximum and average value over the interval.

The Averaging object shall use a 'sliding window' technique that maintains a buffer of *n* samples distributed over the specified interval. Every (time interval/*n*) seconds a new sample is recorded displacing the oldest sample from the buffer. At this time, the minimum, maximum and average are recalculated. The buffer shall maintain an indication for each sample that permits the average calculation and minimum/maximum algorithm to determine the number of valid samples in the buffer.

| Description                                | Reference | Туре                                 |
|--|-----------|--------------------------------------|
| Name                                       | Ν         | Obj\Text                             |
| Unique object name within the device       |           |                                      |
| Minimum Value                              | R136      | Obj\Float                            |
| Lowest value within the buffer window for  |           |                                      |
| the most recent window samples, or valid   |           |                                      |
| samples                                    |           |                                      |
| Minimum Value Timestamp                    | R150      | Obj\DateTime                         |
| Date and time that the minimum value       |           |                                      |
| was sampled. Device support for this       |           |                                      |
| object is optional                         |           |                                      |
| Average Value                              | R125      | Obj\Float                            |
| Mean average value within the buffer       |           |                                      |
| window for the most recent window          |           |                                      |
| samples, or valid samples                  |           |                                      |
| Variance Value                             | R151      | Obj\Float                            |
| Variance value within the buffer window    |           |                                      |
| for the most recent window samples, or     |           |                                      |
| valid samples                              |           |                                      |
| Device support for this object is optional |           |                                      |
| Maximum Value                              | R135      | Obj\Float                            |
| Highest value within the buffer window for |           |                                      |
| the most recent window samples, or valid   |           |                                      |
| samples                                    |           |                                      |
| Maximum Value Timestamp                    | R149      | Obj\DateTime                         |
| Date and time that the Maximum Value       |           |                                      |
| was sampled. Device support for this       |           |                                      |
| object is optional                         |           |                                      |
| Description                                | D         | Obj\Text                             |
| Device support for this object is optional |           |                                      |
| Attempted Samples                          | R124.U    | Obj\Num; Adjustable (value '0' only) |
| Number of samples that have been           |           |                                      |
| attempted to be collected for the buffer   |           |                                      |
| window                                     |           |                                      |
| Valid Samples                              | R146      | Obj\Num                              |
| Number of samples that have been           |           |                                      |
| successfully collected for the buffer      |           |                                      |
| window                                     |           |                                      |
| Window Interval (s)                        | R147.U    | Obj\Num:03600; Adjustable            |
| Period of time over which the minimum,     |           |                                      |
| maximum and average are calculated         |           |                                      |
| Window Samples                             | R148.U    | Obj\Num: 115; Adjustable             |
| Number of samples to be taken during the   |           |                                      |
| period specified by Window Interval        |           |                                      |

### Multi-State Value

### Object Type: [BACnetIP v31\MultiVal]

The Multi-State Value object represents the externally visible characteristics of a multi-state value. This is a control system parameter residing in the memory of the BACnet device.

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value - Priority p                       | V.Pp      | Obj\Num; Adjustable  |
| Within a BACnet device, the present value        |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VI        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\MultiVal\ValTable]                             |
| for each priority                                |           |  |
| required if present value is adjustable          |           |  |
| Command Priority                                 | VD        | Obi\Num: '[NUU 1]' 1 16                                      |
| Current active value priority. Support for       | VF        |  |
| this object is optional                          |           |  |
| Default Value                                    | DV        | Obi\Num: Adjustable  |
| When there are no values in the priority         | 51        | objinani, najustable   |
| array, this value is used.                       |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Description                                      | D         | Obj\Text   |
| Device support for this object is optional       |           |  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the multi-state value. Status          |           |  |
| Flag, <i>b</i> , is a number in the range 03,    |           |  |
| where:   |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                  |           |  |
| Overridden, 3=Out of Service                     |           |  |
| Event State                                      | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it                         | 50        | 4=Low limit, 5=Life safety                                   |
| Reliability                                      | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.      |           | Values: U=Ok, /=Unreliable, 8=Process error, 9=Multi-        |
| Out of Service                                   |           | State rault, 10-Coning error, 12-Comms fall                  |
| Indicator if the value is provented from         | 05        | Obj\notes; Adjustable  |
| hoing modified by software local to the          |           |  |
| device   |           |  |
| Number of States                                 | NS        | Obi\Num  |
| Number of states the Present Value may           |           |  |
| have   |           |  |

| Description                                  | Reference | Туре     |
|--|-----------|----------|
| State e Text                                 | A.Ee      | Obj\Text |
| Text description of the state value.         |           |          |
| The state number, <i>e</i> , is in the range |           |          |
| 1number of states.                           |           |          |
| Device support for this object is optional   |           |          |

# Accumulator

Object Type: [BACnetIP v31\Acc]

The Accumulator object represents the externally visible characteristics of a device that indicates measurements made by counting pulses.

| Description                                 | Reference    | Туре  |
|---|--------------|---|
| Name  | N            | Obj\Text  |
| Unique object name within the device        |              |   |
| Present Value                               | V            | Obi\Num: 0value high: Adjustable (only when the       |
| Count of the input pulses, prescaled if     |              | object is 'Out-of-Service')                           |
| Prescale is present, acquired since the     |              |   |
| value was last set in Value Set             |              |   |
| Scale (x)                                   | R187.RH0     | Obj\Float   |
| Conversion factor to be multiplied with the |              |   |
| Present Value to provide a value in         |              |   |
| engineering units.                          |              |   |
| Scaling is performed in one of two ways. If |              |   |
| this object has a value then use            |              |   |
| present value x scale                       |              |   |
| Scale (10^)                                 | R187.IH1     | Obj\Num   |
| Conversion factor to be multiplied with the |              |   |
| Present Value to provide a value in         |              |   |
| engineering units                           |              |   |
| Scaling is performed in one of two ways. If |              |   |
| this object has a value then use            |              |   |
| present value x 10 <sup>scale</sup>         |              |   |
| Units                                       | U            | Obj\Text  |
| Engineering units of value when multiplied  |              |   |
| by Scale                                    |              |   |
| Prescale (mult,div)                         | R185         | Obj\Text  |
| Coefficients used for converting pulse      |              | Format: <i>multiplier</i>   <i>modulo-divide</i>      |
| signals into Present Value.                 |              |   |
| Device support for this object is optional  | <b>D1</b> 00 |   |
| Value Change Time                           | R192         | Obj\DateTime  |
| Date and time of the most recent change     |              |   |
| to value Before Change of Value Set.        |              |   |
| Value Refere Change                         | D100 U       | Obi/Num: Adjustable                                   |
| Value of Procent Value just prior to        | R190.0       | Obj\Num, Aujustable                                   |
| changing Value Set                          |              |   |
| Device support for this object is optional  |              |   |
| Value Set                                   | P101         | Obi\Num: Adjustable                                   |
| Value of Present Value just after changing  | R191.0       | Obj (Num, Aujustable                                  |
| Value Set                                   |              |   |
| Device support for this object is optional  |              |   |
| Pulse Rate                                  | R186 U       | Obi\Num: Adjustable (only when the object is 'Out-of- |
| Number of input pulses received during      | 110010       | Service')   |
| the most recent Limit Monitoring Interval.  |              | ,   |
| Device support for this object is optional  |              |   |
| Limit Monitoring Interval (s)               | R182.U       | Obj\Num; Adjustable                                   |
| Monitoring period to determine the Pulse    |              |   |
| Rate.                                       |              |   |
| Device support for this object is optional  |              |   |
| Description                                 | D            | Obj\Text  |
| Device support for this object is optional  |              |   |

| Description  | Reference | Туре  |
|--|-----------|---|
| <b>Device Type</b><br>Description of the physical device<br>represented by the accumulator.<br>Device support for this object is optional  | DT        | Obj\Text  |
| <b>Status Flag </b> <i>b</i><br>Health of the accumulator. Status Flag, <i>b</i> ,<br>is a number in the range 03, where:<br>0=In Alarm, 1=In Fault, 2=Value<br>Overridden, 3=Out of Service | SF.Bb     | Obj\NoYes   |
| <b>Event State</b><br>Indicates if the object has an active event<br>state associated with it  | ES        | Obj\ENum; Range: 05<br>Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety   |
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional  | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 2=Over range, 3=Under range,<br>7=Unreliable, 8=Process error, 10=Config error,<br>12=Comms fail, 14=Monitored object fault |
| Out of Service<br>Indicates if the value is prevented from<br>being modified by software local to the<br>device  | US        | Obj\NoYes; Adjustable   |
| Value High<br>Maximum value that can be obtained from<br>Present Value. Device support for this<br>object is optional  | VH        | Obj\Float   |
| <b>Alarm High</b><br>Device support for this object is optional  | AH        | Obj\Float; Adjustable   |
| <b>Alarm Low</b><br>Device support for this object is optional   | AL        | Obj\Float; Adjustable   |

### Pulse Converter

Object Type: [BACnetIP v31\Pulse]

The BACnet Pulse Converter object represents a process where ongoing measurements represented by pulses or counts, such as electric power or water usage, are monitored over a time interval for applications such as peak load management.

The object might represent a physical input or it might acquire the data from the BACnet Accumulator object, representing an input in the same device as the BACnet Pulse Converter object.

The Present Value can be adjusted at any time by writing to Adjust Value, which causes Count to be adjusted, and the Present Value recalculated from Count.

| Description                                    | Reference | Туре  |
|--|-----------|---|
| Name   | Ν         | Obj\Text  |
| Unique object name within the device           |           |   |
| Present Value                                  | V         | Obj\Float; Adjustable (only when the object is 'Out-of- |
| Accumulated value of input being               |           | Service')   |
| measured. It is calculated by multiplying      |           |   |
| the Count by the Scale Factor                  |           |   |
| Units  | U         | Obj\Text  |
| Engineering units of value when multiplied     |           |   |
| by Scale Factor                                |           |   |
| Input Reference                                | R181      | Obj\Text  |
| BACnet object reference of the actual          |           |   |
| input to be measured.                          |           |   |
| Device support for this object is optional     |           |   |
| Scale Factor                                   | R188.R    | Obj\Float   |
| Conversion factor for calculating the          |           |   |
| Present Value to provide a value in            |           |   |
| engineering units                              |           |   |
| Adjust Value                                   | R176.R    | Obj\Float: -100.00100.00; Adjustable                    |
| Adjust the Present Value (and Count) by        |           |   |
| this amount                                    |           |   |
| Count  | R177      | Obj\Num   |
| Count of input pulses from input               |           |   |
| Update Time                                    | R192      | Obj\DateTime  |
| Date and time of the most recent change        |           |   |
| to Count                                       |           |   |
| Count Change Time                              | R192      | Obj\DateTime  |
| Date and time of the most recent change        |           |   |
| to Adjust Value                                |           |   |
| Count Before Change                            | R190.U    | Obj\Num   |
| Value of count just prior to changing          |           |   |
| Adjust Value                                   |           |   |
| Description                                    | D         | Obj\Text  |
| Device support for this object is optional     |           |   |
| Status Flag b                                  | SF.Bb     | Obj\NoYes   |
| Health of the pulse converter. Status Flag,    |           |   |
| <i>b</i> , is a number in the range 03, where: |           |   |
| U=IN Alarm, 1=IN Fault, 2=Value                |           |   |
| Gverhaden, 3-Out of Service                    | 50        |   |
| Event State                                    | ES        | Voluer On Normal 1-Foult 2-Off normal 2-Uigh live       |
| state associated with it                       |           | values: U=NOrmal, 1=Fault, 2=UTF-normal, 3=High limit,  |
| state associated with It                       |           | 4–Low limit, 5–Life safety                              |

| Description   | Reference | Туре  |
|---|-----------|---|
| <b>Reliability</b><br>Indicates if the Present Value and Count<br>are reliable.<br>Device support for this object is optional | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 2=Over range, 3=Under range,<br>7=Unreliable, 8=Process error, 10=Config error,<br>12=Comms fail, 14=Monitored object fault |
| <b>Out of Service</b><br>Indicates if the value is prevented from<br>being modified by software local to the<br>device        | US        | Obj\NoYes; Adjustable   |
| <b>Alarm High</b><br>Device support for this object is optional   | AH        | Obj\Float; Adjustable   |
| <b>Alarm Low</b><br>Device support for this object is optional  | AL        | Obj\Float; Adjustable   |

## Load Control

Object Type: [BACnetIP v31\Load]

The Load Control object represents the externally visible characteristics of a mechanism for controlling load requirements. A BACnet device can use a Load Control object to allow external control over the shedding of a load that it controls.

| Description                                 | Reference      | Туре   |
|---|----------------|--|
| Name  | Ν              | Obj\Text   |
| Unique object name within the device        |                |  |
| Present Value                               | V              | Obj\ENum   |
| Current load shedding state                 |                | Values: 0=Inactive, 1=Pending, 2=Compliant, 3=Non- |
|   | <b>B</b> 000   | Compliant  |
| State Description                           | R222           | Obj\Text   |
| Additional description of the shed state of |                |  |
| the load control object.                    |                |  |
| Device support for this object is optional  | D210 f         |  |
| Requested Sned Level                        | R218./         | ODJ\FIOAL; AUJUSTADIE                              |
| available in one of three formats fr        |                |  |
| (11H0'=Percentage (%) of Full Duty          |                |  |
| (1)H1'-Shed Level                           |                |  |
| 'RH2'=Amount to reduce nower (kW)           |                |  |
| Start Time                                  | R142 t         | Ohi\DateTime: Adjustable                           |
| Start of the duty window in which the load  | N1-72.1        | obj/baterine,/lajustable                           |
| controlled must be compliant with the       |                |  |
| Requested Shed Level                        |                |  |
| Shed Duration (min)                         | R219.U         | Obi\Num: Adjustable                                |
| Duration of the load shed action, starting  |                |  |
| at Start Time                               |                |  |
| Duty Window (min)                           | R213.U         | Obj\Num; Adjustable                                |
| Time window used for load shed              |                |  |
| accounting                                  |                |  |
| Enable                                      | R133.S         | Obj\NoYes; Adjustable                              |
| Indicates and controls whether the load     |                |  |
| control object is available to provide load |                |  |
| shed requests                               |                |  |
| Full Duty Baseline (kW)                     | R215.R         | Obj\Float; Adjustable                              |
| Baseline power consumption for the          |                |  |
| sheddable load controlled.                  |                |  |
| Device support for this object is optional  |                |  |
| Expected Shed Level                         | R214. <i>f</i> | Obj\Float  |
| Amount of power the load control expects    |                |  |
| to be able to shed. This value is available |                |  |
| in one of three formats, f:                 |                |  |
| 'UH0'=Percentage (%) of Full Duty,          |                |  |
| 'UH1'=Shed Level,                           |                |  |
| 'RH2'=Amount to reduce power (kW)           |                |  |
| Actual Shed Level                           | R212. <i>t</i> | Obj\Float  |
| Actual amount of power being shed in        |                |  |
| response to a load sned request. This       |                |  |
| (1) HO'-Porcontage (%) of Full Duty         |                |  |
| 'IIH1'=Shed Level                           |                |  |
| 'RH2'=Amount to reduce power (kW)           |                |  |
| Description                                 | D              | Obi\Text   |
| Device support for this object is optional  | 5              |  |

| Description   | Reference       | Туре  |
|---|-----------------|---|
| <b>Status Flag </b> <i>b</i><br>Health of the load control. Status Flag, <i>b</i> , is<br>a number in the range 03, where:<br>0=In Alarm, 1=In Fault, 2=Value<br>Overridden, 3=Out of Service | SF.Bb           | Obj\NoYes   |
| <b>Event State</b><br>Indicates if the object has an active event<br>state associated with it   | ES              | Obj\ENum; Range: 05<br>Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety                       |
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional   | RS              | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail, 14=Monitored object fault |
| Number of Shed Levels<br>Number of shed levels available, used<br>when specifying a level for Requested<br>Shed Level, Expected Shed Level, and<br>Actual Shed Level                          | R221.E0         | Obj\Num   |
| <b>Shed Level</b> <i>n</i> <b>Value</b><br>Shed level for shed level choice <i>n</i> . Where <i>n</i> is in the range 1number of shed levels  | R221.UEn        | Obj\Num; Adjustable   |
| <b>Shed Level </b> <i>n</i> <b> Label</b><br>Description of action to take for shed level<br>choice <i>n</i>  | R220.E <i>n</i> | Obj\Text  |

### Timer

Object Type: [BACnetIP v31\Timer]

The Timer object represents the externally visible characteristics of a countdown timer.

| Description                                       | Reference | Туре   |
|---|-----------|--|
| Name  | N         | Obj\Text   |
| Unique object name within the device              |           |  |
| Present Value (ms)                                | V         | Obj\Num: 0, value low…value high; Adjustable           |
| When Timer State is 'Running', this               |           |  |
| indicates the remaining time.                     |           |  |
| Set value to '0' to stop the timer, or a          |           |  |
| timeout value to start the timer running          |           |  |
| Timer State                                       | R398.A    | Obj\ENum; Adjustable                                   |
| Current state of the timer. To clear the          |           | Values: 0=Idle, 1=Running, 2=Expired                   |
| timer, set to 'idle'.                             |           |  |
| Timer Running                                     | R397.S    | Obj\NoYes; Adjustable                                  |
| Indicates the timer is in the 'Running'           |           |  |
| state. Set value to 'yes' to start or 'no' to     |           |  |
| stop the timer                                    | D100      |  |
| Date and time of the last transition of the       | R189      | Obj\DateTime   |
| timer state. Device support for this object       |           |  |
| is optional                                       |           |  |
| Last State Change                                 | R395      | Obi\ENum   |
| Last transition the timer state machine           | 1000      | Values: 0=None_1=Idle to Running_2=Running to Idle     |
| performed. Device support for this object         |           | 3=Running to Running, 4=Running to Expired, 5=Forced   |
| is optional                                       |           | to Expired, 6=Expired to Idle, 7=Expired to Running    |
| Description                                       | D         | Obj\Text   |
| Device support for this object is optional        |           |  |
| Status Flag b                                     | SF.Bb     | Obj\NoYes  |
| Health of the timer. Status Flag, <i>b</i> , is a |           |  |
| number in the range 03, where:                    |           |  |
| 0=In Alarm, 1=In Fault, 3=Out of Service          |           |  |
| Event State                                       | ES        | Obj\ENum; Range: 05                                    |
| Indicates if the object has an active event       |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, |
| state associated with it. Support for this        |           | 4=Low limit, 5=Life safety                             |
| object is optional                                |           |  |
| Reliability                                       | RS        | Obj\ENum; Range: 024                                   |
| Indicates if the Present Value is reliable.       |           | Values: 0=Ok, /=Unreliable, 8=Process error, 10=Config |
| Device support for this object is optional        |           | error, 12=Comms fail                                   |
| Out of Service                                    | US        | Obj\NoYes; Adjustable                                  |
| hoing modified by software local to the           |           |  |
| device. Support for this object is optional       |           |  |
| Expiration Time                                   | R270      | Obi\DateTime   |
| Date and time when the timer will expire          | NZ I U    | Obj\baterime   |
| or has expired. Device support for this           |           |  |
| object is optional                                |           |  |
| Initial Timeout (ms)                              | R394      | Obj\Num  |
| Initial duration to count down when the           |           |  |
| timer last transitioned to 'Running'. Device      |           |  |
| support for this object is optional               |           |  |
| Default Timeout (ms)                              | R393.U    | Obj\Num: value lowvalue high; Adjustable               |
| Default timeout used when setting Timer           |           |  |
| Running. Device support for this object is        |           |  |
| optional  |           |  |
| Value Resolution (ms)                             | VR        | Obj\Num  |

| Description  | Reference       | Туре                          |
|--|-----------------|-------------------------------|
| Resolution of the timer in milliseconds.<br>Device support for this object is optional |                 |                               |
| Value High (ms)  | VH              | Obj\Num                       |
| support for this object is optional  |                 |                               |
| Value Low (ms)   | VL              | Obj\Num                       |
| Minimum initial timeout value. Device  |                 |                               |
| support for this object is optional  |                 |                               |
| State Change Value ( <i>n</i> )  | R396.E <i>n</i> | Fixed container:              |
| Value to be written to the referenced  |                 | [BACnetIP v31\Timer\StateVal] |
| properties when a change of the timer  |                 |                               |
| state occurs.  |                 |                               |
| State change, <i>n</i> , is in the range 17,   |                 |                               |
| where: 1=Idle to Running, 2=Running to   |                 |                               |
| Idle, 3=Running to Running, 4=Running to   |                 |                               |
| Expired, 5=Forced to Expired, 6=Expired to   |                 |                               |
| Idle, 7=Expired to Running   |                 |                               |

# Timer State Change Value

Object Type: [BACnetlP v31\Timer\StateVal]

The State Value Change object contains the value written when the timer changes to a particular state.

The value may contain any <u>one</u> of the following data types:

| Description                               | Reference | Туре                     |
|---|-----------|--------------------------|
| Value – Null                              | Ν         | Obj\Text; Adjustable     |
| Value – Boolean                           | S         | Obj\OffOn; Adjustable    |
| Value – Unsigned                          | U         | Obj\Num; Adjustable      |
| Value – Integer                           | I         | Obj\Float; Adjustable    |
| Value - Real                              | R         | Obj\Float; Adjustable    |
| Value – Double                            | F         | Obj\Text; Adjustable     |
| Value – Octet String                      | Y         | Obj\Text; Adjustable     |
| Value - Char String                       | С         | Obj\Text; Adjustable     |
| Value - Bit String                        | В         | Obj\Text; Adjustable     |
| Value – Enumerated                        | А         | Obj\Num; Adjustable      |
| Value – Date                              | D         | Obj\Date; Adjustable     |
| Value – Time                              | Т         | Obj\Text; Adjustable     |
| Value – Date & Time                       | tH2       | Obj\DateTime; Adjustable |
| Value – No Value                          | NH0       | Obj\Text; Adjustable     |
| No value shall be written when the change |           |                          |
| of timer state occurs                     |           |                          |

## Bit String Value

Object Type: [BACnetIP v31\BitStrVal]

The Bit String Value object represents the externally visible characteristics of a named data value in a BACnet device.

A bit string is a series of '0' and '1' characters. The first character of the variable length string is bit 0, followed by bit 1, etc. For example, '1001010111100010'.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device           |           |  |
| Present Value - Priority p                     | V.Pp      | Obj\Text; Adjustable   |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various   |           | '' or '[NULL]'   |
| applications can send a new value to the       |           |  |
| object, along with a priority. From this       |           |  |
| table, the value with the highest priority     |           |  |
| becomes the current value.                     |           |  |
| On adjusting the value a priority, p, is       |           |  |
| required in the range 1 (nigh) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. On          |           |  |
| highest priority value returned                |           |  |
| See Value Table for more information           |           |  |
| See note 1                                     |           |  |
| Value Table                                    | VT        | Fixed container:   |
| Priority array table containing the value      | ••        | [BACnetIP v31\BitStrVal\ValTable]                            |
| for each priority                              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| See note 1.                                    |           |  |
| Command Priority                               | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for     |           |  |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\Text; Adjustable   |
| When there are no values in the priority       |           |  |
| array, the default value is used.              |           |  |
| Device support for this object is only         |           |  |
| Description                                    |           | Ohi\Text   |
| Device support for this object is optional     | D         | Obj(Text   |
| Status Flag b                                  | SF.Bb     | Obi\NoYes  |
| Health of the bit string value. Status Flag,   |           |  |
| <i>b</i> , is a number in the range 03, where: |           |  |
| 1=In Fault, 2=Value Overridden, 3=Out of       |           |  |
| Service  |           |  |
| Event State                                    | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event    |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it. Support for this     |           | 4=Low limit, 5=Life safety                                   |
| object is optional                             |           |  |
| Reliability                                    | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.    |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config       |
| Device support for this object is optional     |           | error, 12=Comms fail   |
| Out of Service                                 | US        | Obj\NoYes; Adjustable  |
| hours modified by software least to the        |           |  |
| being mounied by software local to the         |           |  |

| Description   | Reference | Туре     |
|---|-----------|----------|
| <b>Bits supported</b><br>Number of bits in string. Device support<br>for this object is optional  | BL.E0     | Obj\Num  |
| <b>Bit <i>n</i> Text</b><br>Description of bit <i>n</i> , where n is in the range<br>064. Device support for this object is<br>optional | BL.En+1   | Obj\Text |

### Notes

1. When reading the value, additional decode options are available. Append the object reference with 'Bx' to read the individual bit x. Append with 'w' to read the first 16-bits as an integer in the range 0..65535

# Character String Value

Object Type: [BACnetlP v31\CharStrVal]

The Character String Value object represents the externally visible characteristics of a named data value in a BACnet device.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obi\Text   |
| Unique object name within the device           |           |  |
| Present Value – Priority p                     | V.Pp      | Obi\Text: Adjustable   |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table Various    |           | " or "[NULL]"  |
| applications can send a new value to the       |           |  |
| object along with a priority. From this        |           |  |
| table the value with the highest priority      |           |  |
| becomes the current value                      |           |  |
| On adjusting the value a priority $p$ is       |           |  |
| required in the range 1 (high) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. On          |           |  |
| reading, the priority is ignored and the       |           |  |
| highest priority value returned.               |           |  |
| See Value Table for more information.          |           |  |
| Value Table                                    | VT        | Fixed container:   |
| Priority array table containing the value      |           | [BACnetIP v31\CharStrVal\ValTable]                           |
| for each priority                              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Command Priority                               | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for     |           |  |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\Text; Adjustable   |
| When there are no values in the priority       |           |  |
| array, the default value is used.              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Description                                    | D         | Obj\Text   |
| Device support for this object is optional     |           |  |
| Status Flag b                                  | SF.Bb     | Obj\NoYes  |
| Health of the char string value. Status Flag,  |           |  |
| <i>b</i> , is a number in the range 03, where: |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                |           |  |
| Overridden, 3=Out of Service                   |           |  |
| Event State                                    | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event    |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it. Support for this     |           | 4=Low limit, 5=Life safety                                   |
| object is optional                             |           |  |
| Reliability                                    | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.    |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config       |
| Device support for this object is optional     |           | error, 12=Comms fail   |
| Out of Service                                 | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from       |           |  |
| being modified by software local to the        |           |  |
| device. Support for this object is optional    |           |  |

### Date Pattern Value

#### Object Type: [BACnetlP v31\DatePat]

The Date Pattern Value object represents the externally visible characteristics of a named data value in a BACnet device.

Date Pattern objects represent multiple recurring dates based on rules defined by the pattern of individual fields of the date, some of which can be special values like 'even months', or 'don't care', which matches any value in that field. Examples of possibilities would be: 'every Thursday in May of any year', or 'every day in May 2009'.

In this object, Date values have the format '*dd/mm/yy*', where:

*dd* Day of month - 1...31, 32=last day, 33=odd days, 34=even days, 41..47=Mondays...Sundays, 99=any *mm* Month - 1...12, 13=odd months, 14=even months, 99=any

*yy* Year – 00...79=2000...2079, 99=any.

| Description                                      | Reference   | Туре   |
|--|-------------|--|
| Name   | Ν           | Obj\Text   |
| Unique object name within the device             |             |  |
| Present Value – Priority <i>p</i>                | V.Pp        | Obj\Date; Adjustable   |
| Within a BACnet device, the present value        |             | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |             | '' or '[NULL]'   |
| applications can send a new value to the         |             |  |
| object, along with a priority. From this         |             |  |
| table, the value with the highest priority       |             |  |
| becomes the current value.                       |             |  |
| On adjusting the value a priority, <i>p</i> , is |             |  |
| required in the range 1 (high) to 16 (low). If   |             |  |
| not specified, 8 (manual) is used. On            |             |  |
| reading, the priority is ignored and the         |             |  |
| highest priority value returned.                 |             |  |
| See Value Table for more information.            |             |  |
| Value Table                                      | VT          | Fixed container:   |
| Priority array table containing the value        |             | [BACnetIP v31\DatePat\ValTable]                              |
| for each priority                                |             |  |
| Device support for this object is only           |             |  |
| required if present value is adjustable          |             |  |
| Command Priority                                 | VP          | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for       |             |  |
| this object is optional                          | <b>B</b> 1( |  |
| Default Value                                    | DV          | Obj\Date; Adjustable   |
| When there are no values in the priority         |             |  |
| array, the default value is used.                |             |  |
| Device support for this object is only           |             |  |
| Required in present value is adjustable          | <b>D</b>    |  |
| Device support for this chiest is optional       | D           | Obj\Text   |
| Status Flag h                                    |             |  |
| Status Flag D                                    | SF.BD       | ODJ\NOYES  |
| Flag $h$ is a number in the range $0$            |             |  |
| Flag, D, is a number in the range 0              |             |  |
| 0-In Alarm 1-In Fault 2-Value                    |             |  |
| Overridden 3=Out of Service                      |             |  |
| Event State                                      | FS          | Obi\ENum: Range: 0 5   |
| Indicates if the object has an active event      | LJ          | Values: A=Normal 1=Fault 2=Aff-normal 2-High limit           |
| state associated with it Support for this        |             | A = 1 ow limit 5=1 if a safety                               |
| object is optional                               |             | T-LOW UITIL, J-LITE SATELY                                   |
| object is optional                               |             |  |

| Description   | Reference | Туре   |
|---|-----------|--|
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional   | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail |
| <b>Out of Service</b><br>Indicates if the value is prevented from<br>being modified by software local to the<br>device. Support for this object is optional | US        | Obj\NoYes; Adjustable  |

## Date Value

#### Object Type: [BACnetIP v31\DateVal]

The Date Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a Date Value object to make any kind of date data value accessible to other BACnet devices.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device           |           |  |
| Present Value – Priority <i>p</i>              | V.Pp      | Obj\Date; Adjustable   |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various   |           | '' or '[NULL]'   |
| applications can send a new value to the       |           |  |
| object, along with a priority. From this       |           |  |
| table, the value with the highest priority     |           |  |
| becomes the current value.                     |           |  |
| On adjusting the value a priority, p, is       |           |  |
| required in the range 1 (high) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. On          |           |  |
| reading, the priority is ignored and the       |           |  |
| Soo Value Table for more information           |           |  |
| Value Table                                    | VT        | Eived container  |
| Priority array table containing the value      | VI        | [BACpet/P v21/Date/al/ValTable]                              |
| for each priority                              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Command Priority                               | VP        | Obi\Num: '[NULL]'. 116                                       |
| Current active value priority. Support for     |           |  |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\Date; Adjustable   |
| When there are no values in the priority       |           |  |
| array, the default value is used.              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Description                                    | D         | Obj\Text   |
| Device support for this object is optional     |           |  |
| Status Flag b                                  | SF.Bb     | Obj\NoYes  |
| Health of the date value. Status Flag, b, is a |           |  |
| number in the range 03, where:                 |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                |           |  |
| Event State                                    | <u>гс</u> | Ohi) ENum: Danga: 0 E  |
| Event State                                    | ES        | Values: 0-Normal 1-Eault 2-Off normal 2-High limit           |
| state associated with it Support for this      |           | 4 = 1 ow limit $5 = 1$ if a safety                           |
| object is optional                             |           | + Low mind, 5 Life survey                                    |
| Reliability                                    | RS        | Obi\ENum: Range: 0 24  |
| Indicates if the Present Value is reliable.    | i i i     | Values: 0=0k, 7=Unreliable, 8=Process error, 10=Config       |
| Device support for this object is optional     |           | error, 12=Comms fail   |
| Out of Service                                 | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from       |           |  |
| being modified by software local to the        |           |  |
| device. Support for this object is optional    |           |  |

### Date Time Pattern Value

Object Type: [BACnetIP v31\DateTimePat]

The Date Time Pattern Value object represents the externally visible characteristics of a named data value in a BACnet device.

Date Time Pattern objects can be used to represent multiple recurring dates and times based on rules defined by the pattern of individual fields of the date and time, some of which can be special values like 'even months', or 'don't care', which matches any value in that field. Examples of possibilities would be: '11:00 every Thursday in any June', or 'every day in May 2009'.

In this object, DateTime values have the format '*dd/mm/yy*|*hh:mm:ss*', where:

dd Day of month - 1...31, 32=last day, 33=odd days, 34=even days, 41..47=Mondays...Sundays, 99=any

- mm Month 1...12, 13=odd months, 14=even months, 99=any
- *yy* Year 00...79=2000...2079, 99=any
- *hh* Hour 00...23, 99=any
- mm Minutes 00...59, 99=any
- ss Seconds 00...59, 99=any

| Description   | Reference | Туре   |
|---|-----------|--|
| Name  | Ν         | Obj\Text   |
| Unique object name within the device  |           |  |
| Present Value - Priority p  | V.Pp      | Obj\DateTime; Adjustable                                     |
| Within a BACnet device, the present value   |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various  |           | '' or '[NULL]'   |
| applications can send a new value to the  |           |  |
| object, along with a priority. From this  |           |  |
| table, the value with the highest priority  |           |  |
| Decomes the current value.  |           |  |
| of adjusting the value a phonty, $p$ , is<br>required in the range 1 (high) to 16 (low). If |           |  |
| not specified 8 (manual) is used On   |           |  |
| reading, the priority is ignored and the  |           |  |
| highest priority value returned.  |           |  |
| See Value Table for more information.   |           |  |
| Value Table   | VT        | Fixed container:   |
| Priority array table containing the value   |           | [BACnetIP v31\DateTimePat\ValTable]                          |
| for each priority   |           |  |
| Device support for this object is only  |           |  |
| required if present value is adjustable   |           |  |
| Command Priority  | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for  |           |  |
| this object is optional   | DV/       |  |
| Default Value   | DV        | Obj\DateTime; Adjustable                                     |
| array, the default value is used  |           |  |
| Device support for this object is only  |           |  |
| required if present value is adjustable   |           |  |
| Is UTC  | R344      | Obi\NoYes  |
| Indicates if Present Value contains a UTC   | -         |  |
| date and time. Support for this object is   |           |  |
| optional  |           |  |
| <b>Reliability Evaluation Inhibit</b>   | R357      | Obj\NoYes  |
| Indicates if reliability-evaluation is  |           |  |
| disabled ('yes'). Support for this object is  |           |  |
| optional  | _         |  |
| Description   | D         | Obj\Text   |
| Device support for this object is optional  |           |  |

| Description   | Reference | Туре  |
|---|-----------|---|
| <b>Status Flag b</b><br>Health of the date time pattern value.<br>Status Flag, b, is a number in the range<br>03, where:<br>0=In Alarm, 1=In Fault, 2=Value<br>Overridden, 3=Out of Service | SF.Bb     | Obj\NoYes   |
| <b>Event State</b><br>Indicates if the object has an active event<br>state associated with it. Support for this<br>object is optional   | ES        | Obj\ENum; Range: 05<br>Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety |
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional   | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail      |
| <b>Out of Service</b><br>Indicates if the value is prevented from<br>being modified by software local to the<br>device. Support for this object is optional                                 | US        | Obj\NoYes; Adjustable   |

### Date Time Value

Object Type: [BACnetIP v31\DateTimeVal]

The Date Time Pattern Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a DateTime Value object to make any kind of datetime data value accessible to other BACnet devices.

| Description                                    | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device           |           |  |
| Present Value – Priority p                     | V.Pp      | Obj\DateTime; Adjustable                                     |
| Within a BACnet device, the present value      |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various   |           | '' or '[NULL]'   |
| applications can send a new value to the       |           |  |
| object, along with a priority. From this       |           |  |
| table, the value with the highest priority     |           |  |
| becomes the current value.                     |           |  |
| On adjusting the value a priority, p, is       |           |  |
| required in the range 1 (high) to 16 (low). If |           |  |
| not specified, 8 (manual) is used. On          |           |  |
| highest priority value returned                |           |  |
| See Value Table for more information           |           |  |
| Value Table                                    | VT        | Fixed container:   |
| Priority array table containing the value      | VI        | [BACnetIP v31\DateTimeVal\ValTable]                          |
| for each priority                              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Command Priority                               | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for     |           | •  |
| this object is optional                        |           |  |
| Default Value                                  | DV        | Obj\DateTime; Adjustable                                     |
| When there are no values in the priority       |           |  |
| array, the default value is used.              |           |  |
| Device support for this object is only         |           |  |
| required if present value is adjustable        |           |  |
| Is UTC   | R344      | Obj\NoYes  |
| Indicates if Present Value contains a UTC      |           |  |
| date and time. Support for this object is      |           |  |
| Optional<br>Deliability Evolution Inhibit      | D257      |  |
| Reliability Evaluation Innibit                 | R357      | Obj\Noves  |
| disabled ('yes') Support for this object is    |           |  |
| ontional                                       |           |  |
| Description                                    | D         | Obi\Text   |
| Device support for this object is optional     | _         |  |
| Status Flag b                                  | SF.Bb     | Obj\NoYes  |
| Health of the date time value. Status Flag,    |           |  |
| <i>b</i> , is a number in the range 03, where: |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                |           |  |
| Overridden, 3=Out of Service                   |           |  |
| Event State                                    | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event    |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it. Support for this     |           | 4=Low limit, 5=Life safety                                   |
| object is optional                             |           |  |
| Reliability                                    | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.    |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config       |
| Device support for this object is optional     |           | error, 12=Comms fail   |

| Reference | Туре                  |
|-----------|-----------------------|
| US        | Obj\NoYes; Adjustable |
|           |                       |
|           |                       |
|           |                       |
|           | Reference<br>US       |

### Integer Value

Object Type: [BACnetlP v31\IntVal]

The Integer Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use an Integer Value object to make any kind of signed integer data value accessible to other BACnet devices.

| Description  | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device                 |           |  |
| Present Value – Priority <i>p</i>                    | V.Pp      | Obj\Float; Adjustable  |
| Within a BACnet device, the present value            |           | To release or clear a value for a priority, set the value to       |
| is stored in a priority array table. Various         |           | '' or '[NULL]'   |
| applications can send a new value to the             |           |  |
| object, along with a priority. From this             |           |  |
| table, the value with the highest priority           |           |  |
| becomes the current value.                           |           |  |
| On adjusting the value a priority, <i>p</i> , is     |           |  |
| required in the range 1 (high) to 16 (low). If       |           |  |
| not specified, 8 (manual) is used. On                |           |  |
| reading, the priority is ignored and the             |           |  |
| highest priority value returned.                     |           |  |
| See Value Table for more information.                |           |  |
| Value Table  | VT        | Fixed container:   |
| Priority array table containing the value            |           | [BACnetIP v31\IntVal\ValTable]                                     |
| for each priority                                    |           |  |
| Device support for this object is only               |           |  |
| required if present value is adjustable              |           |  |
| Command Priority                                     | VP        | Obj\Num: '[NULL]', 116   |
| Current active value priority. Support for           |           |  |
| this object is optional                              |           |  |
| Default Value  | DV        | Obj\Float; Adjustable  |
| When there are no values in the priority             |           |  |
| array, the default value is used.                    |           |  |
| Device support for this object is only               |           |  |
| required if present value is adjustable              | <u></u>   |  |
| Units  | 0         | Obj\lext   |
| Description  | D         | Obj\Text   |
| Device support for this object is optional           |           |  |
| Status Flag b  | SF.Bb     | Obj\NoYes  |
| Health of the integer value. Status Flag, <i>b</i> , |           |  |
| is a number in the range 03, where:                  |           |  |
| 0-in Alarm, 1-in Fault, 2-value                      |           |  |
| Event State  | ГC        | Ohi) ENume Dangas 0 E  |
| Event State  | ES        | Volues: 0-Normal, 1-Eault, 2-Off normal, 2-High limit              |
| state associated with it. Device support for         |           | Values. $0$ -Normal, $1$ -Fault, $2$ -On-normal, $3$ -Fight limit, |
| this object is optional                              |           | 4-LOW IIIIII, 5-LITE Safety  |
| Peliability  | DC        | Obi\ENum: Pango: 0 24  |
| Reliability  | КЭ        | Volues: 0-Ok 7-Uproliphia 9-Drocoss arror 10-Config                |
| Device support for this object is optional           |           | error 12-Comms fail  |
| Out of Service                                       | 115       | Obi/NoVoc: Adjustable  |
| Indicates if the value is prevented from             | 05        | obj (no res, Aujustable  |
| being modified by software local to the              |           |  |
| device Device support for this object is             |           |  |
| optional   |           |  |

| Description   | Reference | Туре                  |
|---|-----------|-----------------------|
| <b>Value Resolution</b><br>Smallest recognizable change in value.   | VR        | Obj\Float             |
| Device support for this object is optional  |           |                       |
| Value High<br>Maximum value that can be obtained from<br>Present Value. Device support for this<br>object is optional       | VH        | Obj\Float             |
| <b>Value Low</b><br>Minimum value that can be obtained from<br>Present Value. Device support for this<br>object is optional | VL        | Obj\Float             |
| <b>Alarm High</b><br>Device support for this object is optional   | AH        | Obj\Float; Adjustable |
| <b>Alarm Low</b><br>Device support for this object is optional  | AL        | Obj\Float; Adjustable |

# Large Analog Value

Object Type: [BACnetIP v31\AnValLg]

The Large Analog Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a Large Analog Value object to make any kind of double-precision data value accessible to other BACnet devices.

| Description                                  | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device         |           |  |
| Present Value - Priority p                   | V.Pp      | Obj\Text; Adjustable   |
| Within a BACnet device, the present value    |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various |           | '' or '[NULL]'   |
| applications can send a new value to the     |           |  |
| object, along with a priority. From this     |           |  |
| table, the value with the highest priority   |           |  |
| becomes the current value.                   |           |  |
| On adjusting the value a priority, $p$ , is  |           |  |
| net specified 8 (manual) is used On          |           |  |
| reading the priority is ignored and the      |           |  |
| highest priority value returned              |           |  |
| See Value Table for more information         |           |  |
| See note 1 regarding 64-bit values           |           |  |
| Value Table                                  | VT        | Fixed container:   |
| Priority array table containing the value    |           | [BACnetIP v31\AnValLg\ValTable]                              |
| for each priority                            |           |  |
| Device support for this object is only       |           |  |
| required if present value is adjustable.     |           |  |
| See note 1 regarding 64-bit values           |           |  |
| Command Priority                             | VP        | Obj\Num: '[NULL]', 116                                       |
| this chiest is optional                      |           |  |
| Default Value                                |           | Obi\Elast: Adjustable  |
| When there are no values in the priority     | DV        | סטן (דוטמנ, העןעזנמטופ                                       |
| array, the default value is used.            |           |  |
| Device support for this object is only       |           |  |
| required if present value is adjustable.     |           |  |
| Units  | U         | Obj\Text   |
| Description                                  | D         | Obj\Text   |
| Device support for this object is optional   |           |  |
| Status Flag b                                | SF.Bb     | Obj\NoYes  |
| Health of the large analogue value. Status   |           |  |
| Flag, b, is a number in the range 03,        |           |  |
| where:                                       |           |  |
| Overridden 3=Out of Service                  |           |  |
| Event State                                  | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event  | -         | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it                     |           | 4=Low limit, 5=Life safety                                   |
| Reliability                                  | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.  |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 9=Multi-        |
| Device support for this object is optional   |           | state fault, 10=Config error, 12=Comms fail, 13=Member       |
|  |           | fault, 14=Monitored object fault                             |
| Out of Service                               | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from     |           |  |
| device                                       |           |  |
| uevice                                       |           |  |

| Description   | Reference | Туре                 |
|---|-----------|----------------------|
| Value Resolution<br>Smallest recognizable change in value.  | VR        | Obj\Text             |
| Device support for this object is optional  |           |                      |
| Value High<br>Maximum value that can be obtained from<br>Present Value. Device support for this<br>object is optional       | VH        | Obj\Text             |
| <b>Value Low</b><br>Minimum value that can be obtained from<br>Present Value. Device support for this<br>object is optional | VL        | Obj\Text             |
| <b>Alarm High</b><br>Device support for this object is optional   | AH        | Obj\Text; Adjustable |
| <b>Alarm Low</b><br>Device support for this object is optional  | AL        | Obj\Text; Adjustable |

### Notes

64-bit values can contain up to 20 significant figures. Numbers this size are ok for displaying to a user, but may be too large to perform accurate maths functions. These values can be read in blocks of six significant figures by appending the object reference with a block number. Block 1 reads the six least significant figures, block 2 the next six significant figures, etc.
 For example, if object 'V' reads the 64-bit value '674407370955.1615', then object 'V.F1' will read the least six significant figures '55.1615', object 'V.F2' the value '073709', and object 'V.F3' the value '6744'.

Floating point numbers are formatted to four decimal places.

### Octet String Value

Object Type: [BACnetlP v31\OctStrVal]

The Octet String Value object represents the externally visible characteristics of a named data value in a BACnet device.

An octet string is a series of hex values, with each two hex characters representing a byte (or 8-bit value). For example, '16A20534' represents the bytes 22, 162, 5, and 52.

| Description   | Reference | Туре   |
|---|-----------|--|
| Name  | Ν         | Obj\Text   |
| Unique object name within the device  |           |  |
| Present Value – Priority p  | V.Pp      | Obj\Text; Adjustable   |
| Within a BACnet device, the present value<br>is stored in a priority array table. Various<br>applications can send a new value to the<br>object, along with a priority. From this<br>table, the value with the highest priority<br>becomes the current value.<br>On adjusting the value a priority, <i>p</i> , is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is ignored and the<br>highest priority value returned.<br>See Value Table for more information. | νμ        | To release or clear a value for a priority, set the value to<br>" or "[NULL]"        |
| See note 1.   |           |  |
| Value Table<br>Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustable<br>See note 1.   | VT        | Fixed container:<br>[BACnetIP v31\OctStrVal\ValTable]                                |
| Command Priority  | VP        | $O_{h}$  |
| Current active value priority. Support for  | vi        |  |
| Default Value   |           | Obi\Toyt: Adjustable   |
| When there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustable  | DV        | ODJ (Text; Adjustable  |
| <b>Description</b>  | D         | Obj\Text   |
| Status Flag b   |           |  |
| Health of the octet string value. Status<br>Flag, <i>b</i> , is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>Service  | SF.BD     | ODJINOTES  |
| Event State   | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event<br>state associated with it. Support for this<br>object is optional   |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,<br>4=Low limit, 5=Life safety |
| Reliability   | RS        | Obi\ENum: Range: 0 24  |
| Indicates if the Present Value is reliable.<br>Device support for this object is optional   | 10        | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail       |
| Out of Service  | US        | Obj\NoYes: Adjustable  |
| Indicates if the value is prevented from<br>being modified by software local to the<br>device. Support for this object is optional  |           |  |

### Notes

1. Additional formatting options are available for an octet string value. Append the object reference with 'i' to format as a decimal dot delimited (.) number for an IP address, e.g. '127.0.0.1'. Append with 'm' to format as a hexadecimal colon delimited (:) number for a MAC address, e.g. 'AB:01:23:45:67'.

# Positive Integer Value

Object Type: [BACnetIP v31\IntValPos]

The Positive Integer Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a Positive Integer Value object to make any kind of unsigned data value accessible to other BACnet devices.

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value – Priority <i>p</i>                | V.Pp      | Obj\Num; Adjustable  |
| Within a BACnet device, the present value        |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VT        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\IntValPos\ValTable]                            |
| for each priority                                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Command Priority                                 | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for       |           |  |
| this object is optional                          |           |  |
| Default Value                                    | DV        | Obj\Num; Adjustable  |
| When there are no values in the priority         |           |  |
| array, the default value is used.                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Units  | U         | Obj\Text   |
| Description                                      | D         | Obj\Text   |
| Device support for this object is optional       |           | •  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the positive integer value. Status     |           |  |
| Flag, b, is a number in the range 03,            |           |  |
| where:   |           |  |
| 0=in Alarm, 1=in Fault, 2=value                  |           |  |
| Overridden, 3-Out of Service                     | 50        |  |
| Event state                                      | ES        | ODJ\ENUM; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Oπ-normal, 3=Hign limit,        |
| this chiest is optional                          |           | 4–Low limit, 5–Life Safety                                   |
|  | DC        | Ohi) ENume Danger 0 - 24                                     |
| Reliability                                      | RS        | Volues 0-Ok 7-Upreliable 9-Drosess error 10-Config           |
| Device support for this object is optional       |           | values. 0-0K, 7-011ellable, 6-Process error, 10-coning       |
| Out of Sorvice                                   | 110       |  |
| Indicator if the value is provented from         | 05        | Obj (NOTES; Aujustable                                       |
| hoing modified by software local to the          |           |  |
| device. Device support for this object is        |           |  |
| optional   |           |  |
| Description   | Reference | Туре                |
|---|-----------|---------------------|
| <b>Value Resolution</b><br>Smallest recognizable change in value.<br>Device support for this object is optional             | VR        | Obj\Num             |
| Value High<br>Maximum value that can be obtained from<br>Present Value. Device support for this<br>object is optional       | VH        | Obj\Num             |
| <b>Value Low</b><br>Minimum value that can be obtained from<br>Present Value. Device support for this<br>object is optional | VL        | Obj\Num             |
| <b>Alarm High</b><br>Device support for this object is optional   | AH        | Obj\Num; Adjustable |
| <b>Alarm Low</b><br>Device support for this object is optional  | AL        | Obj\Num; Adjustable |

# Time Pattern Value

Object Type: [BACnetIP v31\TimePat]

The Time Pattern Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a Time Pattern Value object to make any kind of time data value accessible to other BACnet devices

Time Pattern objects can be used to represent multiple recurring times based on rules defined by the pattern of individual fields of the time, some of which can be special values like 'don't care', which matches any value in that field. Examples of possibilities would be: 'every minute of the 11 o'clock hour of the day', or 'the thirteenth minute of any hour'.

In this object, Time values have the format 'hh:mm:ss', where:

*hh* Hours – 00...23, 99=any

*mm* Minutes – 00...59, 99=any

ss Seconds – 00...59, 99=any

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | Ν         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value - Priority p                       | V.Pp      | Obj\Text; Adjustable   |
| Within a BACnet device, the present value        |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VT        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\TimePat\ValTable]                              |
| for each priority                                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Command Priority                                 | VP        | Obj\Num: '[NULL]', 116                                       |
| Current active value priority. Support for       |           |  |
| this object is optional                          |           |  |
| Default Value                                    | DV        | Obj\Text; Adjustable   |
| When there are no values in the priority         |           |  |
| array, the default value is used.                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Description                                      | D         | Obj\Text   |
| Device support for this object is optional       |           |  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the time pattern value. Status         |           |  |
| Flag, <i>b</i> , is a number in the range 03,    |           |  |
| where:   |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                  |           |  |
| Overridden, 3=Out of Service                     |           |  |
| Event State                                      | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it. Support for this       |           | 4=Low limit, 5=Life safety                                   |
| object is optional                               |           |  |

| Description   | Reference | Туре   |
|---|-----------|--|
| <b>Reliability</b><br>Indicates if the Present Value is reliable.<br>Device support for this object is optional   | RS        | Obj\ENum; Range: 024<br>Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config<br>error, 12=Comms fail |
| <b>Out of Service</b><br>Indicates if the value is prevented from<br>being modified by software local to the<br>device. Support for this object is optional | US        | Obj\NoYes; Adjustable  |

# Time Value

#### Object Type: [BACnetIP v31\TimeVal]

The Time Value object represents the externally visible characteristics of a named data value in a BACnet device. A BACnet device can use a Time Value object to make any kind of time data value accessible to other BACnet devices

| Description                                      | Reference | Туре   |
|--|-----------|--|
| Name   | N         | Obj\Text   |
| Unique object name within the device             |           |  |
| Present Value – Priority <i>p</i>                | V.Pp      | Obj\Text; Adjustable   |
| Within a BACnet device, the present value        |           | To release or clear a value for a priority, set the value to |
| is stored in a priority array table. Various     |           | '' or '[NULL]'   |
| applications can send a new value to the         |           |  |
| object, along with a priority. From this         |           |  |
| table, the value with the highest priority       |           |  |
| becomes the current value.                       |           |  |
| On adjusting the value a priority, <i>p</i> , is |           |  |
| required in the range 1 (high) to 16 (low). If   |           |  |
| not specified, 8 (manual) is used. On            |           |  |
| reading, the priority is ignored and the         |           |  |
| highest priority value returned.                 |           |  |
| See Value Table for more information.            |           |  |
| Value Table                                      | VT        | Fixed container:   |
| Priority array table containing the value        |           | [BACnetIP v31\TimeVal\ValTable]                              |
| for each priority                                |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          | VD        |  |
| Command Priority                                 | VP        | Obj\Num: [NULL], 116   |
| this object is optional                          |           |  |
| Default Value                                    |           | Obi\Toxt: Adjustable   |
| When there are no values in the priority         | DV        | Obj/Text, Adjustable   |
| array the default value is used                  |           |  |
| Device support for this object is only           |           |  |
| required if present value is adjustable          |           |  |
| Description                                      | D         | Obi\Text   |
| Device support for this object is optional       |           |  |
| Status Flag b                                    | SF.Bb     | Obj\NoYes  |
| Health of the time value. Status Flag, b, is a   |           | <i>.</i>   |
| number in the range 03, where:                   |           |  |
| 0=In Alarm, 1=In Fault, 2=Value                  |           |  |
| Overridden, 3=Out of Service                     |           |  |
| Event State                                      | ES        | Obj\ENum; Range: 05  |
| Indicates if the object has an active event      |           | Values: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit,       |
| state associated with it. Support for this       |           | 4=Low limit, 5=Life safety                                   |
| object is optional                               |           |  |
| Reliability                                      | RS        | Obj\ENum; Range: 024   |
| Indicates if the Present Value is reliable.      |           | Values: 0=Ok, 7=Unreliable, 8=Process error, 10=Config       |
| Device support for this object is optional       |           | error, 12=Comms fail   |
| Out of Service                                   | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from         |           |  |
| being modified by software local to the          |           |  |
| device. Support for this object is optional      |           |  |

## Channel

#### Object Type: [BACnetIP v31\Channel]

The Channel object is used to forward a single received value to a collection of object properties. The collection of object properties may include any combination of BACnet object types, as well as properties of different data types.

| Description   | Reference | Туре   |
|---|-----------|--|
| Name  | Ν         | Obj\Text   |
| Unique object name within the device                |           |  |
| Present Value                                       | V         | Obj\Text   |
| Value most recently written. To set value,          |           |  |
| access Present Value by type                        |           |  |
| Present Value (adjust)                              | V.Pp      | Fixed container:   |
| Set value for distribution, specifying the          |           | [BACnetIP v31\Channel\Vals]  |
| data type.  |           |  |
| Within a BACnet device, the present value           |           |  |
| is stored in a priority array table. Various        |           |  |
| applications can send a new value to the            |           |  |
| object, along with a priority. From this            |           |  |
| becomes the current value                           |           |  |
| On adjusting the value a priority $p$ is            |           |  |
| required in the range 1 (high) to 16 (low) If       |           |  |
| not specified, 8 (manual) is used.                  |           |  |
| Last Priority                                       | R369      | Obi\Num: 116   |
| Priority at which the Present Value was             |           |  |
| last set  |           |  |
| Write Status  | R370      | Obj\ENum   |
| Channel object's status to distribute the           |           | Values: 0=None, 1=Idle, 2=In Progress, 3=Successful,               |
| Present Value                                       |           | 4=Failed   |
| Description   | D         | Obj\Text   |
| Device support for this object is optional          |           |  |
| Status Flag b                                       | SF.Bb     | Obj\NoYes  |
| Health of the channel. Status Flag, <i>b</i> , is a |           |  |
| number in the range 03, where:                      |           |  |
| 1=In Fault, 2=Value Overridden, 3=Out of            |           |  |
| Service   | FC        | Ohi) ENume Deman 0 - E   |
| Event state   | ES        | ODJ\ENUM; Range: 05  |
| state associated with it. Support for this          |           | Values. $0$ -Normal, $1$ -rault, $2$ -On-normal, $3$ -right limit, |
| object is optional                                  |           | 4-Low limit, 5-Life safety   |
| Reliability   | RS        | Obi\ENum: Range: 0 24  |
| Indicates if the Present Value is reliable.         | No        | Values: 0=0k. 7=Unreliable. 8=Process error. 10=Config             |
| Device support for this object is optional          |           | error, 12=Comms fail, 13=Member fault, 24=Referenced               |
|   |           | object fault   |
| Out of Service                                      | US        | Obj\NoYes; Adjustable  |
| Indicates if the value is prevented from            |           |  |
| being modified by software local to the             |           |  |
| device. Support for this object is optional         |           |  |

# Channel Value (adjust)

Object Type: [BACnetIP v31\Channel\Vals]

The Present Value is adjusted by specifying a data type with the value.

The value may contain any <u>one</u> of the following data types:

| Description          | Reference | Туре                  |
|----------------------|-----------|-----------------------|
| Value – Null         | Ν         | Obj\Text; Adjustable  |
| Value – Boolean      | S         | Obj\OffOn; Adjustable |
| Value – Unsigned     | U         | Obj\Num; Adjustable   |
| Value – Integer      | I         | Obj\Float; Adjustable |
| Value - Real         | R         | Obj\Float; Adjustable |
| Value – Double       | F         | Obj\Text; Adjustable  |
| Value - Octet String | Y         | Obj\Text; Adjustable  |
| Value - Char String  | С         | Obj\Text; Adjustable  |
| Value - Bit String   | В         | Obj\Text; Adjustable  |
| Value – Enumerated   | А         | Obj\Num; Adjustable   |
| Value – Date         | D         | Obj\Date; Adjustable  |
| Value – Time         | Т         | Obj\Text; Adjustable  |
| Value – Object       | 0         | Obj\Text; Adjustable  |

# Lighting Output

Object Type: [BACnetIP v31\LtgOut]

The Lighting Output object represents the externally visible characteristics of a lighting output. The lighting output is analogue.

| NameNObj\TextUnique object name within the deviceNObj\Float: 0100.0; AdjustablePresent Value (%) - Priority pV.PpObj\Float: 0100.0; AdjustableWithin a BACnet device, the present valueTo release or clear a value for a priority, set the value tois stored in a priority array table. VariousTo release or clear a value for a priority, set the value toobject, along with a priority. From thisValues -0 perform a special function:table, the value with the highest priority-2 = equivalent to the WARN commandbecomes the current value3 = equivalent to the WARN_CELINQUISH commandOn adjusting the value a priority, p, is-3 = equivalent to the WARN_OFF commandrequired in the range 1 (high) to 16 (low). If-3 = equivalent to the WARN_OFF commandore information3 = equivalent to the WARN_OFF commandreading, the priority value returned.See Value Table for more information.See Value Table for more information.R164racking Value and Present Value to differValues: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Notracking Value and Present Value to differValues: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Notracking Value and Present Value to differVITPriority array table containing the valueDVObj\Float; AdjustableVITCurrent active value priority. Support forIsACnetIP v31/LtgOut/ValTable]Periority rary table containing the valueDVObj\Float; AdjustableObj\Float; AdjustableCurrent value is adjustableDVDefaut Value <th>Description</th> <th>Reference</th> <th>Туре</th>   | Description                                   | Reference       | Туре   |
|--|---|-----------------|--|
| Unique object name within the device     V:Pp     Obj/Float: 0100.0; Adjustable       Present Value (%) – Priority p     V.Pp     Obj/Float: 0100.0; Adjustable       Within a BACret device, the present value<br>is stored in a priority array table. Various<br>applications can send a new value to the<br>object, along with a priority. From this     VIE     Values: 40 perform a special function:<br>- 1 = equivalent to the WARN command       table, the value with the highest priority<br>becomes the current value.     - 1 = equivalent to the WARN. RELINQUISH command       on adjusting the value a priority, p, is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is lignored and the<br>highest priority value returned.     R164     Obj/Float: 0100.0       See Value Table for more information.     R164     Obj/Float: 0100.0       Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'idle' Tracking Value shall<br>equal Present Value     R164     Obj/Float: 0100.0       In Progress<br>Tracking Value and Present Value to differ     VT     Fixed container:<br>// Priority array table containing the value<br>for each priority. Support for<br>this object is optional     VT     Fixed container:<br>// BACnetIP v31/LtgOut/VolTable/       Command Priority<br>array, the default value is usual<br>bevice support for this object is only<br>required if present value is adjustable     VD     Obj/Float; Adjustable       Command Priority<br>array, the default value is usual.     D     Obj/Num: '(NULL)', 116       Device support for this object is onl  | Name  | N               | Obi\Text   |
| Present Value (%) - Priority pV.PpObj\Float: 0100.0; AdjustableWithin a BAChet device, the present value<br>is stored in a priority, required to the VARN centranad<br>object, along with a priority. From this<br>table, the value a priority. From this<br>table, the value a priority. p, is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is pointed and the<br>highest priority value returned.<br>See Volue Table for more information.VI.Pp<br>Values <0 perform a special function:<br>-1 = equivalent to the WARN_CELINQUISH command<br>-3 = equivalent to the WARN_CFF commandIndicates the value a priority. p, is<br>reading, the priority is gingend and the<br>highest priority value returned.<br>See Volue Table for more information.R164<br>Values <0 bij\Float: 0100.0  | Unique object name within the device          |                 | 0.0](1.0.10  |
| IncrementationObjectWithin a BACnet device, the present value in provide any any table. Various<br>applications can send a new value to the<br>object, along with a priority. From this<br>table, the value with the highest priority<br>becomes the current value.To release or clear a value for a priority, set the value to<br>"or "INULL]".On adjusting the value a priority, p, is<br>required in the range 1 (high) to 15 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is ignored and the<br>highest priority value returned.<br>See Value 160He for more information1 = equivalent to the WARN_DELINQUISH command<br>-2 = equivalent to the WARN_OFF commandTracking ValueR164Obj/Float: 0100.0Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle 'Tracking Value and Present Value to differObj/Float: 0100.0Indicates processes that may cause<br>Priority array table containing the value to differR164Obj/Float: 0100.0Value TableVTFixed container:<br>(BACnetUP v31/LtgOut[ValTable]Priority array table containing the value<br>to opticat is optionalDVObj/Float; AdjustableDevice support for this object is only<br>required if present value is adjustableDVObj/Float; AdjustableDevice support for this object is only<br>required if present value is adjustableDVObj/Float; AdjustableDevice support for this object is only<br>required if present value is adjustableDVObj/Float; AdjustableDevice support for this object is only<br>required if present value is adjustableDVObj/Float; AdjustableDevice support for this object is only<br>   | Present Value (%) – Priority $p$              | V Pn            | Obi\Eloat: 0 100 0: Adjustable                                     |
| is stored in a priority array table. Various<br>applications can send a new value to the<br>object, along with a priority. From this<br>table, the value with the highest priority<br>becomes the current value.<br>On adjusting the value a priority, p, is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is gnored and the<br>highest priority value returned.<br>See Value Table for more information.<br>Tracking Value<br>In Progress 1 ciller Tracking Value shall<br>equal Present Value<br>for each priority<br>required in there are no values to the table to warm of the table of table of the table of  | Within a BACnet device the present value      | V.1 p           | To release or clear a value for a priority set the value to        |
| A point and priority and your provided and priority of the set of  | is stored in a priority array table Various   |                 | " or '[NULL]"  |
| approximations and a few mater of the order       approximation and a few mater of the order         approximations and a few mater of the order       approximation and the order         becomes the current value.       approximation and the WARN command         on adjusting the value a priority, p, is required in the range 1 (high) to 16 (low). If not specified, 8 (manual) is used. On reading, the priority value returned.       a equivalent to the WARN_OFF command         See Value Table for more information.       Tracking Value       R164       Obj\Float: 0100.0         Indicates the value at which the physical lighting output is being controlled. When In Progress is 'lde' Tracking Value shall equal Present Value       R164       Obj\Float: 0100.0         In Progress is 'lde' Tracking Value and Present Value to differ       Values: 0=ldle, 1=Fade Active, 2=Ramp Active, 3=Not         Controlled, 4=Other       Values: 0=ldle, 1=Fade Active, 2=Ramp Active, 3=Not         Tracking Value and Present Value to differ       VT       Fixed container:         Priority array table containing the value for each priority       VP       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       DV       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable       DV         Description       D       Obj\Nores       Doj\Nores         Heath of the lighting output value. Sta   | applications can send a new value to the      |                 | Values <0 perform a special function:                              |
| Diplecty, burg, Minking Priority       -2 = equivalent to the WARN_RELINQUISH command         Diplecty, burg, Minking Priority       -2 = equivalent to the WARN_OFF command         On adjusting the value a priority, p, is required in the range 1 (high) to 16 (low). If not specified, 8 (manual) is used. On reading, the priority is ignored and the highest priority value returned.       -3 = equivalent to the WARN_RELINQUISH command         See Value Table for more information.       Tracking Value       R164       Obj\Float: 0100.0         Indicates the value at which the physical equal Present Value       R164       Obj\ENum       Values: 0=104, 1=Fade Active, 2=Ramp Active, 3=Not         Indicates the value at which the physical equal Present Value       R164       Obj\ENum       Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not         Value Table       V1       Fixed container:       Controlled, 4=Other       Controlled, 4=Other         Value Table       V1       Fixed container:       [B4CnetIP v31]LtgOut[ValTable]       Eacu Priority         Priority array table containing the value for each priority array table containing the value is adjustable       VP       Obj\Num: '(NULL)', 116         Current active value priority. Support for this object is only required if present value is adjustable       VP       Obj\Float; Adjustable         Description       D       Obj\NorYes       Obj\NorYes         Health of the lighting output value. Status Flag, b,  | object along with a priority. From this       |                 | -1 = aquivalent to the WARN command                                |
| table, the table within a light priority<br>becomes the current value a priority, p, is<br>required in the range 1 (high) to 16 (low). If<br>not specified, 8 (manual) is used. On<br>reading, the priority is ignored and the<br>highest priority value returned.<br>See Value 7able for more information.<br><b>Tracking Value</b><br>Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present Value<br>In Progress is 'Idle' Tracking Value shall<br>equal Present Value<br>UNE Progress<br>In Progress<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=Other<br>Controlled, 4=Other<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=Other<br>Values: 0=Other<br>Values: 0=Other<br>Val   | table the value with the highest priority     |                 | $-2 = equivalent to the WARN_RELINCLUSH command$                   |
| Decomposition of the value a priority, p, is       So equivalent to the WANGON Command         required in the range 1 (high) to 16 (low). If       not specified, 8 (manual) is used. On         reading, the priority is ignored and the       highest priority is ignored and the         highest priority value returned.       R164       Obj\Float: 0100.0         Indicates the value at which the physical       R164       Obj\Float: 0100.0         Indicates the value at which the physical       R378       Obj\Float: 0100.0         Indicates the value at which the physical       R378       Obj\Float: 0100.0         Indicates processes that may cause       R378       Obj\Float: 0100.0         Indicates processes that may cause       Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not         Controlled, 4=Other       Controlled, 4=Other         Value Table       VT       Fixed container:         Priority array table containing the value       [BACnetIP v31/LtgOut]VolTable]         Device support for this object is only       [BACnetIP v31/LtgOut]VolTable]         required if present value is adjustable       DV       Obj\Float; Adjustable         Default Value       D       Obj\Text       Status Flag b         Status Flag b       SF.Bb       Obj\Nores       Obj\Nores         Health of the lighting output value. Status  | becomes the current value                     |                 | -2 - equivalent to the WARN_RELINGUISH command                     |
| Of adjusting up value a priority, p, rs         required in the range 1 (high) to 16 (low). If         not specified, 8 (manual) is used. On         reading, the priority value returned.         See Value Table for more information.         Tracking Value       R164         Indicates the value at which the physical         lighting output is being controlled. When         In Progress       R378         Obj\ENum         Indicates processes that may cause         Tracking Value and Present Value to differ         Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not         Controlled, 4=Other         Value Table       VT         Priority array table containing the value       (BACnetIP v31 \LtgOut\ValTable)         for each priority       VP         Device support for this object is only       (BACnetIP v31 \LtgOut\ValTable)         required if present value is adjustable       VP       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority array, the default value is used.       SF.Bb       Obj\Nores         Device support for this object is only       File Present value is Adjustable       VP         Device support for this object is optional       SF.Bb       Obj\Nores         He  | On adjusting the value a priority $n$ is      |                 |  |
| reading, the priority is is used. On<br>reading, the priority value returned.<br>See Value Zable for more information.R164Obj\Float: 0100.0Maintee and the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present ValueR164Obj\Float: 0100.0Maintee and the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present ValueObj\ENum<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherK378<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherObj\ENumVTFixed container:<br>(BACnetUP v31)LtgOut\ValTable)VTFixed container:<br>(BACnetUP v31)LtgOut\ValTable)VPObj\Num: '[NULL]', 116DVObj\Float; AdjustableDVObj\Float; AdjustableD   | required in the range 1 (high) to 16 (low) If |                 |  |
| Indicates priority is goned and the highest priority array table containing the value for each priority prevince if present value is adjustable       R164       Obj\ENum         Value Table       VT       Fixed container:         Priority array table containing the value for each priority       VT       Fixed container:         Priority array table containing the value for each priority       VP       Obj\Num: '[NULL]', 116         Current active value priority. Support for this object is only required if present value is adjustable       DV       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       DV       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       DV       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       DV       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       SF.Bb       Obj\Neves </td <td>not specified 8 (manual) is used On</td> <td></td> <td></td>   | not specified 8 (manual) is used On           |                 |  |
| Rading, the priority value returned.See Value Table for more information.R164Obj\Float: 0100.0Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present ValueObj\ENumIndicates processes that may cause<br>Tracking Value and Present Value to differS778Obj\ENumValues: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherControlled, 4=OtherValue TableVTFixed container:<br>[BACnet/P v31/LtgOut/ValTable]Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustableVPObj\Num: '[NULL]', 116Current active value priority. Support for<br>this object is optionalDVObj\Float; AdjustableDefault Value<br>weige support for this object is only<br>required if present value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableStatus Flag b<br>Health of the lighting output value. Status<br>Flag b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overriden, 3=Out of<br>ServiceSF.BbObj\NoYesReliability<br>Indicates if the Present Value is reliable.RSObj\ENum; Range: 024   | roading the priority is ignored and the       |                 |  |
| Inglies (plothy value returned.<br>See Value Table for more information.R164Obj\Float: 0100.0Tracking Value<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present ValueR164Obj\Float: 0100.0In Progress<br>Indicates processes that may cause<br>Tracking Value and Present Value to differR378Obj\Float: 0100.0Value Table<br>for each priority<br>Device support for this object is only<br>required if present value is adjustableVTFixed container:<br>[BACnetIP V31]LtgOut\VolTable]Default Value<br>mark and the priority<br>Device support for this object is only<br>required if present value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableDefault Value<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableObj\Float; AdjustableDefault Value<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceSF.BbObj\ENum; Range: 024Obj\ENum; Range: 024Reliability<br>Indicates if the Present Value is reliable.RSObj\ENum; Range: 024Obj <enum; 024<="" range:="" th=""></enum;>  | highest priority value returned               |                 |  |
| See Value Table to Those information:       R164       Obj\Float: 0100.0         Indicates the value at which the physical lighting output is being controlled. When In Progress is 'Idle' Tracking Value shall equal Present Value       Obj\ENum         In Progress       R378       Obj\ENum         Indicates processes that may cause       Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not         Tracking Value and Present Value to differ       Controlled, 4=0ther         Value Table       VT       Fixed container:         Priority array table containing the value for each priority       VP       Obj\ENum: '[NULL]', 116         Current active value priority. Support for this object is only       VP       Obj\Float; Adjustable         Command Priority       VP       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority array, the default value is used.       DV       Obj\Float; Adjustable         Device support for this object is only       P       Obj\Text         Pescription       D       Obj\Text         Device support for this object is optional       D       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       SF.Bb       Obj\NoYes         Health of the lighting output v   | Soo Value Table for more information          |                 |  |
| Tracking ValueR164Obj\Float: 0100.0Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present ValueR378Obj\ENum<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherIndicates processes that may causeR378Obj\ENum<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherValue TableVTFixed container:<br>[BACnet/P v31/LtgOut]ValTable]Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustableVPObj\Num: '[NULL]', 116Current active value priority.<br>Support for<br>this object is optionalDVObj\Float: AdjustableWhen there are no values in the priority<br>array, the default value is adjustableDVObj\Float: AdjustableDevice support for this object is optionalDObj\TextDevice support for this object is optionalDObj\TextDevice support for this object is optionalSF.BbObj\NoYesHealth of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceRSObj\ENum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | Trecking Value                                | D1C4            | Ohil Floots 0 100 0  |
| Indicates the value at which the physical<br>lighting output is being controlled. When<br>In Progress is 'Idle' Tracking Value shall<br>equal Present Value<br>In Progress<br>Indicates processes that may cause<br>Tracking Value and Present Value to differ<br>Value Table<br>Value Ta | Iracking value                                | R164            | ODJ\Float: 0100.0  |
| In Progress i'dle' Tracking Value shall<br>equal Present Value<br>In Progress<br>Indicates processes that may cause<br>Tracking Value and Present Value to differ<br>Values Collel, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=Other<br>Values Colled, 4=Other<br>Value Table<br>VT<br>Fixed container:<br>Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustable<br>Command Priority<br>Device value priority. Support for<br>this object is optional<br>Default Value<br>When there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustable<br>DV<br>Obj\Float; Adjustable<br>DV<br>Obj\Text<br>Device support for this object is optional<br>Description<br>D<br>D<br>D<br>Obj\Text<br>SF.Bb<br>Obj\NVes<br>Health of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>Service<br>Reliability<br>N<br>RS<br>Obj\ENum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | lighting output is being controlled. When     |                 |  |
| In Progress is note Tracking Value shalt equal Present Value In Progress Indicates processes that may cause Indicates processes that may cause Tracking Value and Present Value to differ Values 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not Controlled, 4=Other Value Table VT Fixed container: Priority array table containing the value for each priority Device support for this object is only required if present value is adjustable VP Obj\Num: '[NULL]', 116 Current active value priority. Support for this object is optional Default Value DV Obj\Float; Adjustable VI Obj\Float; Adjustable DV Obj\Float; Adjustable DV Obj\Text Device support for this object is only required if present value is adjustable SF.Bb Obj\NoYes Health of the lighting output value. Status Flag, b, is a number in the range 03, where: 1=In Fault, 2=Value Overridden, 3=Out of Service Reliability RS Obj\Enum; Range: 024 Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok, 4  | In Brogress is (Idle? Tracking Value shall    |                 |  |
| In Progress<br>In Progress<br>Indicates processes that may cause<br>Tracking Value and Present Value to differR378<br>Values: 0=Idle, 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=OtherValue Table<br>Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustableVTFixed container:<br>[BACnetIP v31\LtgOut\ValTable]Command Priority<br>Use support for this object is only<br>required if present value priority. Support for<br>this object is optionalVPObj\Num: '[NULL]', 116Default Value<br>When there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableDescription<br>Lease support for this object is optionalDObj\Float; AdjustableDescription<br>Lease support for this object is optionalDObj\TextDevice support for this object is optionalSF.BbObj\NoYesHealth of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceRSObj\Enum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | In Progress is Tale Tracking value shall      |                 |  |
| In Progress R378 Obj\ENUm<br>Indicates processes that may cause Values of United Alley 1=Fade Active, 2=Ramp Active, 3=Not<br>Controlled, 4=Other<br>Values and Present Value to differ<br>Values and Present Value to differ<br>Priority array table containing the value<br>for each priority<br>Device support for this object is only<br>required if present value is adjustable<br>Command Priority V<br>Device support for this object is only<br>required if present value priority. Support for<br>this object is optional<br>Default Value<br>When there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustable<br>Device support for this object is only<br>required if present value is used.<br>Device support for this object is only<br>required if present value is adjustable<br>Description<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D<br>D   |   | <b>D</b> 270    |  |
| Indicates processes that may cause       Values: U=lote, 1=Pade Active, 2=Ramp Active, 3=Not         Tracking Value and Present Value to differ       Controlled, 4=Other         Value Table       VT         Priority array table containing the value<br>for each priority       IBACnetIP v31\LtgOut\ValTable]         Device support for this object is only<br>required if present value is adjustable       IBACnetIP v31\LtgOut\ValTable]         Command Priority       VP         Obj\Num: '[NULL]', 116         Current active value priority. Support for<br>this object is optional       DV         Default Value       DV         When there are no values in the priority<br>array, the default value is used.       DV         Device support for this object is only<br>required if present value is adjustable       D         Description       D         Description       D         Device support for this object is optional         Status Flag b       SF.Bb       Obj\Neves         Health of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:       SF.Bb       Obj\ENum; Range: 024         1=In Fault, 2=Value Overridden, 3=Out of<br>Service       RS       Obj\ENum; Range: 024         Numer:       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, Values:  | In Progress                                   | R378            | ObjyENum<br>Vieluses O-Idle, 1-Feide Active, 2-Deven Active, 2-Net |
| Tracking value and Present value to differ       Controlled, 4=Other         Value Table       VT       Fixed container:         Priority array table containing the value<br>for each priority       VI       Fixed container:         Device support for this object is only<br>required if present value is adjustable       IBACnetIP v31\LtgOut\ValTable]         Command Priority       VP       Obj\Num: '[NULL]', 116         Current active value priority. Support for<br>this object is optional       DV       Obj\Float; Adjustable         When there are no values in the priority<br>array, the default value is used.       DV       Obj\Float; Adjustable         Device support for this object is only<br>required if present value is adjustable       D       Obj\Float; Adjustable         Device support for this object is only<br>required if present value is adjustable       D       Obj\Text         Device support for this object is optional       D       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Health of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>Service       SF.Bb       Obj\ENum; Range: 024         Reliability       RS       Obj\ENum; Range: 024       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | Indicates processes that may cause            |                 | Values: U=Idle, 1=Fade Active, 2=Ramp Active, 3=Not                |
| Value TableV1Fixed container:<br>[BACnetIP v31/LtgOut\ValTable]Priority array table containing the value<br>for each priority[BACnetIP v31/LtgOut\ValTable]Device support for this object is only<br>required if present value is adjustableVPObj\Num: '[NULL]', 116Command PriorityVPObj\Num: '[NULL]', 116Current active value priority. Support for<br>this object is optionalDVObj\Float; AdjustableDefault ValueDVObj\Float; AdjustableWhen there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableDescription<br>DescriptionDObj\TextDevice support for this object is optionalSF.BbObj\NoYesHealth of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceSF.BbObj\Enum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | Tracking value and Present value to differ    | \/ <del>_</del> | Controlled, 4=Other  |
| Priority array table containing the value       [BACheliP V31[LtgOut(Val1able]]         for each priority       Device support for this object is only         required if present value is adjustable       VP       Obj\Num: '[NULL]', 116         Current active value priority. Support for       VP       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority       DV       Obj\Float; Adjustable         Device support for this object is only       Exercise of this object is only         required if present value is adjustable       DV       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       SF.Bb       Obj\NoYes         I=In Fault, 2=Value Overridden, 3=Out of       Service       RS       Obj\Enum; Range: 024         Indicates if the Present Value is reliable.       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No out   | Value Table                                   | VI              | Fixed container:   |
| Toreach priority       Device support for this object is only         required if present value is adjustable       VP       Obj\Num: '[NULL]', 116         Command Priority       VP       Obj\Float; Adjustable         Current active value priority. Support for       this object is optional       VP         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority array, the default value is used.       DV       Obj\Float; Adjustable         Device support for this object is only required if present value is adjustable       D       Obj\Text         Device support for this object is optional       D       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       SF.Bb       Obj\NoYes         Flag, b, is a number in the range 03, where:       I=In Fault, 2=Value Overridden, 3=Out of Service       RS         Reliability       RS       Obj\ENum; Range: 024       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, Values: 0=Ok, 4=O   | Priority array table containing the value     |                 | [BAChetiP V31\LtgOut\ValTable]                                     |
| Device support for this object is only       VP       Obj\Num: '[NULL]', 116         Cormand Priority       VP       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority<br>array, the default value is used.       DV       Obj\Float; Adjustable         Device support for this object is only<br>required if present value is adjustable       D       Obj\Text         Description       D       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>Service       SF.Bb       Obj\ENum; Range: 024         Indicates if the Present Value is reliable.       RS       Obj\ENum; Range: 024   | for each priority                             |                 |  |
| Command Priority       VP       Obj\Num: '[NULL]', 116         Current active value priority. Support for<br>this object is optional       DV       Obj\Float; Adjustable         Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustable       DV       Obj\Float; Adjustable         Description       D       Obj\Text       DV         Device support for this object is optional       SF.Bb       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>Service       SF.B       Obj\Enum; Range: 024         Reliability       RS       Obj\Enum; Range: 024       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, Value status   | Device support for this object is only        |                 |  |
| Current active value priorityVPObj\Num: [NOLL] , 116Current active value priority. Support for<br>this object is optionalDVObj\Float; AdjustableDefault ValueDVObj\Float; AdjustableWhen there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableDescriptionDObj\TextDevice support for this object is optionalSF.BbObj\NoYesStatus Flag bSF.BbObj\NoYesHealth of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceSSObj\ENum; Range: 024<br>Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | Commond Drievity                              |                 |  |
| this object is optional       DV       Obj\Float; Adjustable         When there are no values in the priority       array, the default value is used.       DV         Device support for this object is only       required if present value is adjustable       V         Description       D       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       Flag, b, is a number in the range 03, where:       Status 2.Value Overridden, 3=Out of Service         Reliability       RS       Obj\ENum; Range: 024       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output, 0   | Command Priority                              | VP              | ODJ\NUM: [NULL], 116   |
| Default ValueDVObj\Float; AdjustableWhen there are no values in the priority<br>array, the default value is used.<br>Device support for this object is only<br>required if present value is adjustableDVObj\Float; AdjustableDescriptionDObj\TextDevice support for this object is optionalSF.BbObj\TextStatus Flag bSF.BbObj\NoYesHealth of the lighting output value. Status<br>Flag, b, is a number in the range 03,<br>where:<br>1=In Fault, 2=Value Overridden, 3=Out of<br>ServiceSSObj\ENum; Range: 024ReliabilityRSObj\ENum; Range: 024Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | this chiest is entional                       |                 |  |
| Default Value       DV       Obj\Float; Adjustable         When there are no values in the priority       array, the default value is used.       Device support for this object is only         pevice support for this object is only       D       Obj\Text         Device support for this object is optional       D       Obj\Text         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       SF.Bb       Obj\NoYes         Flag, b, is a number in the range 03, where:       1=In Fault, 2=Value Overridden, 3=Out of Service       Service         Reliability       RS       Obj\ENum; Range: 024       Values; 0=Ok, 4=Open loop, 5=Short loop, 6=No output, 1   |   |                 | Ohi) Floot, Adjustable   |
| array, the default value is used.         Device support for this object is only         required if present value is adjustable         Description       D         Device support for this object is optional         Status Flag b       SF.Bb         Health of the lighting output value. Status         Flag, b, is a number in the range 03,         where:         1=In Fault, 2=Value Overridden, 3=Out of         Service         Reliability         RS       Obj\ENum; Range: 024         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | When there are no values in the priority      | DV              | ODJ\Float; Adjustable  |
| array, the default value is used.         Device support for this object is only         required if present value is adjustable         Description       D         Device support for this object is optional         Status Flag b       SF.Bb         Health of the lighting output value. Status         Flag, b, is a number in the range 03,         where:         1=In Fault, 2=Value Overridden, 3=Out of         Service         Reliability         RS       Obj\ENum; Range: 024         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | when there are no values in the phonty        |                 |  |
| Device support for this object is only         required if present value is adjustable         Description       D         Device support for this object is optional         Status Flag b       SF.Bb         Health of the lighting output value. Status         Flag, b, is a number in the range 03,         where:         1=In Fault, 2=Value Overridden, 3=Out of         Service         Reliability       RS         Indicates if the Present Value is reliable.   | Array, the default value is used.             |                 |  |
| Description       D       Obj\Text         Device support for this object is optional       SF.Bb       Obj\NoYes         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       Flag, b, is a number in the range 03, where:       Obj\LNum; Range: 024         1=In Fault, 2=Value Overridden, 3=Out of Service       RS       Obj\ENum; Range: 024         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | required if present value is adjustable       |                 |  |
| Device support for this object is optional       Device support for this object is optional         Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       Flag, b, is a number in the range 03, where:       Device Status Plage         1=In Fault, 2=Value Overridden, 3=Out of Service       SF.Sb       Obj\ENum; Range: 024         Reliability       RS       Obj\ENum; Range: 024         Indicates if the Present Value is reliable.       Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | Percerintian                                  |                 | Ohil Tout  |
| Status Flag b       SF.Bb       Obj\NoYes         Health of the lighting output value. Status       Flag, b, is a number in the range 03, where:       Device Support for this object is optional         1=In Fault, 2=Value Overridden, 3=Out of Service       RS       Obj\ENum; Range: 024         Indicates if the Present Value is reliable.       RS       Obj\ENum; Cange: 024   | Device support for this object is optional    | D               | Obj(Text   |
| Status Flag b     SF.Bb     Obj\Noves       Health of the lighting output value. Status     Flag, b, is a number in the range 03, where:     1=In Fault, 2=Value Overridden, 3=Out of Service       Reliability     RS     Obj\ENum; Range: 024       Indicates if the Present Value is reliable.     Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  |   |                 | OhilMaVaa  |
| Flag, b, is a number in the range 03,         where:         1=In Fault, 2=Value Overridden, 3=Out of         Service         Reliability         RS         Indicates if the Present Value is reliable.    Obj\ENum; Range: 024 Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   | Status Flag D                                 | SF.BD           | ODJ/NOYES  |
| Flag, b, is a number in the range 03, where:         1=In Fault, 2=Value Overridden, 3=Out of Service         Reliability       RS         Obj\ENum; Range: 024         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | Flag h is a number in the range 0 - 2         |                 |  |
| where:         1=In Fault, 2=Value Overridden, 3=Out of         Service         Reliability       RS         Indicates if the Present Value is reliable.         Obj\ENum; Range: 024         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | Flag, D, is a number in the range 03,         |                 |  |
| Immatly 2-value Overridden, 3=Out of Service         Service         Reliability       RS         Indicates if the Present Value is reliable.         Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | Wilere:                                       |                 |  |
| Reliability     RS     Obj\ENum; Range: 024       Indicates if the Present Value is reliable.     Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,  | 1-In Fault, 2-Value Overnoden, 3-Out of       |                 |  |
| Reliability KS ODJ\ENUM; Range: 024<br>Indicates if the Present Value is reliable. Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,   |   | DC              | Ohil ENume Denger 0 24   |
| indicates if the Present value is reliable. Values: U=UK, 4=Upen loop, 5=Short loop, 6=No output,  | Kellability                                   | к2              | UDJ\ENUM; Kange: U24   |
| Device summer if for this shipe is antipued of the set  | Indicates If the Present Value Is reliable.   |                 | values: U=UK, 4=Upen loop, 5=Short loop, 6=No output,              |
| Device support for this object is optional /=Unreliable, 8=Process error, 9=Multi-state fault,   | Device support for this object is optional    |                 | r=Unreliable, 8=Process error, 9=Multi-state fault,                |
| 10-Comig error, 12-Comms rail, 13-Member rault,  |   |                 | 14=Monitored object fault 16=Lamp failuro                          |

| Description  | Reference | Туре                                     |
|--|-----------|--|
| Out of Service   | US        | Obj\NoYes; Adjustable                    |
| Indicates if the value is prevented from   |           |  |
| device   |           |  |
| Blink Warn Enable  | R373      | Obj\OffOn                                |
| Indicates if a WARN, WARN_RELINQUISH,  |           |  |
| or WARN_OFF command is executed when   |           |  |
| written  | D077      |  |
| Egress Time (s)  | R377.U    | Obj\Num: 03600; Adjustable               |
| before relinguishing to 0% following a   |           |  |
| WARN_RELINQUISH or WARN_OFF  |           |  |
| command  |           |  |
| Egress Active  | R386      | Obj\NoYes                                |
| Indicates if the egress time is in effect  |           |  |
| following a command  | D27411    |  |
| Default Fade Time (ms)   | R374.U    | Obj\Num: 10086400000 (1 day); Adjustable |
| Present Value are reflected in the Tracking  |           |  |
| Value  |           |  |
| Default Ramp Rate (%/s)  | R375.R    | Obj\Float: 0.1100; Adjustable            |
| Rate at which changes to Present Value are   |           |  |
| reflected in the Tracking Value  |           |  |
| Default Step Increment (%)   | R376.R    | Obj\Float: 0.1100; Adjustable            |
| Amount to be added to the Tracking Value   |           |  |
| increment value  |           |  |
| Transition   | R385.A    | Obj\ENum; Adjustable                     |
| How a change in Present Value transitions  |           | Values: 0=None, 1=Fade, 2=Ramp           |
| from current to target level. Support for  |           |  |
| this object is optional  | 5.40      |  |
| Feedback Value (%)   | R40       | Obj\Float: 0100.0                        |
| output Support for this object is optional   |           |  |
| Power (kW)   | R384      | Obi\Float                                |
| Power consumption of the load when light   |           |  |
| level is 100%. Support for this object is  |           |  |
| optional   |           |  |
| Instantaneous Power (kW)   | R379      | Obj\Float                                |
| Power consumption of the load at this  |           |  |
| ontional   |           |  |
| Minimum Actual Value (%)   | R383.R    | Obi\Float: 1100.0: Adjustable            |
| Physical output level that corresponds to a  | /         | ,  |
| Present Value of 1.0%. Support for this  |           |  |
| object is optional   |           |  |
| Maximum Actual Value (%)   | R382.R    | Obj\Float: 1100.0; Adjustable            |
| Provide the second seco |           |  |
| object is optional   |           |  |
| Lighting Command Default Priority  | R381      | Obj\Num: 016                             |

# Binary Lighting Output

Object Type: [BACnetIP v31\LtgOutBin]

The Binary Lighting Output object represents the externally visible characteristics of a binary lighting output.

| Description                                    | Reference    | Туре  |
|--|--------------|---|
| Name   | N            | Obi\Text  |
| Unique object name within the device           |              |   |
| Present Value – Priority n                     | V Pn         | Obi\ENum: 0 5: Adjustable                                   |
| Within a BACnet device the present value       | v.i <i>p</i> | To release or clear a value for a priority set the value to |
| is stored in a priority array table. Various   |              | " or "[NIII 1]?   |
| applications can cond a new value to the       |              | Values Off On Warn Warn off Warn relinguish Ston            |
| applications can send a new value to the       |              | values. On, On, Walth, Walth-On, Walth-Tellinguish, Stop    |
| table, the value with the highest priority     |              |   |
| table, the value with the highest priority     |              |   |
| Decomes the value a priority prior             |              |   |
| On adjusting the value a priority, $p$ , is    |              |   |
| required in the range 1 (high) to 16 (low). If |              |   |
| not specified, 8 (manual) is used. On          |              |   |
| reading, the priority is ignored and the       |              |   |
| nignest priority value returned.               |              |   |
| See Value Table for more information.          |              |   |
| Value Table                                    | VT           | Fixed container:  |
| Priority array table containing the value      |              | [BACnetIP v31\LtgOutBin\ValTable]                           |
| for each priority                              |              |   |
| Device support for this object is only         |              |   |
| required if present value is adjustable        |              |   |
| Command Priority                               | VP           | Obj\Num: '[NULL]', 116                                      |
| Current active value priority. Support for     |              |   |
| this object is optional                        |              |   |
| Default Value                                  | DV           | Obj\OffOn; Adjustable                                       |
| When there are no values in the priority       |              |   |
| array, the default value is used.              |              |   |
| Device support for this object is only         |              |   |
| required if present value is adjustable        |              |   |
| Description                                    | D            | Obj\Text  |
| Device support for this object is optional     |              |   |
| Status Flag b                                  | SF.Bb        | Obj\NoYes   |
| Health of the lighting output value. Status    |              |   |
| Flag, <i>b</i> , is a number in the range 03,  |              |   |
| where:   |              |   |
| 1=In Fault, 2=Value Overridden, 3=Out of       |              |   |
| Service  |              |   |
| Reliability                                    | RS           | Obj\ENum; Range: 024  |
| Indicates if the Present Value is reliable.    |              | Values: 0=Ok, 4=Open loop, 5=Short loop, 6=No output,       |
| Device support for this object is optional     |              | 7=Unreliable, 8=Process error, 9=Multi-state fault,         |
|  |              | 10=Config error, 12=Comms fail, 13=Member fault,            |
|  |              | 14=Monitored object fault, 16=Lamp failure                  |
| Out of Service                                 | US           | Obj\NoYes; Adjustable                                       |
| Indicates if the value is prevented from       |              |   |
| being modified by software local to the        |              |   |
| device   |              |   |
| Blink Warn Enable                              | R373         | Obj\NoYes   |
| Indicates if a WARN, WARN_RELINQUISH.          |              | -   |
| or WARN_OFF command is executed when           |              |   |
| written  |              |   |

| Description  | Reference | Туре                                    |
|--|-----------|---|
| <b>Egress Time (s)</b><br>Time the lighting is held at its current level<br>before turning off following a<br>WARN_RELINQUISH or WARN_OFF<br>command         | R377.U    | Obj\Num: 03600; Adjustable              |
| <b>Egress Active</b><br>Indicates if the egress time is in effect<br>following a command   | R386      | Obj\NoYes                               |
| <b>Feedback Value</b><br>Actual value of the physical lighting<br>output. Support for this object is optional  | R40       | Obj\OffOn                               |
| <b>Power (kW)</b><br>Power consumption of the load when light<br>level is on. Support for this object is<br>optional   | R384      | Obj\Float                               |
| <b>Polarity Reversed</b><br>Support for this object is optional  | Ρ         | Obj\NoYes; Adjustable                   |
| <b>Elapsed Active Time (s)</b><br>Number of seconds the Present Value has<br>had the value 'on' since the last reset.<br>Support for this object is optional | R33.U     | Obj\Num; Adjustable<br>Set '0' to reset |
| Active Time Last Reset<br>Date & time the Elapsed Active Time was<br>reset. Support for this object is optional  | R114      | Obj\DateTime                            |
| <b>Strike Count</b><br>Number of times the Present Value has<br>transitioned from 'off' to 'on'. Support for<br>this object is optional                      | R391.U    | Obj\Num; Adjustable<br>Set '0' to reset |
| <b>Strike Count Last Reset</b><br>Date & time the Strike Count was reset.<br>Support for this object is optional   | R392      | Obj\DateTime                            |

## Value Table

Object Type: [BACnetIP v31\AnOut\ValTable] Object Type: [BACnetIP v31\AnVal\ValTable] Object Type: [BACnetIP v31\BinOut\ValTable] Object Type: [BACnetIP v31\BinVal\ValTable] Object Type: [BACnetIP v31\MultiOut\ValTable] Object Type: [BACnetIP v31\MultiVal\ValTable] Object Type: [BACnetIP v31\BitStrVal\ValTable] Object Type: [BACnetIP v31\CharStrVal\ValTable] Object Type: [BACnetIP v31\DatePat\ValTable] Object Type: [BACnetIP v31\DateVal\ValTable] Object Type: [BACnetIP v31\DateTimePat\ValTable] Object Type: [BACnetIP v31\DateTimeVal\ValTable] Object Type: [BACnetIP v31\IntVal\ValTable] Object Type: [BACnetIP v31\AnValLq\ValTable] Object Type: [BACnetIP v31\OctStrVal\ValTable] Object Type: [BACnetIP v31\IntValPos\ValTable] Object Type: [BACnetIP v31\TimePat\ValTable] Object Type: [BACnetIP v31\TimeVal\ValTable] Object Type: [BACnetIP v31\LtgOut\ValTable] Object Type: [BACnetIP v31\LtgOutBin\ValTable]

A Value Table is a BACnet priority array, containing a read-only list of prioritized commands.

For BACnet objects that have an adjustable value, values are prioritized based on a fixed number of priorities that are assigned to the application issuing the command. The priority ranges from 1 (highest) to 16 (lowest).

An object stores a priority array containing either a value or a null for each priority. The highest priority value becomes the Present Value for the object.

Applications adjusting an object's value are assigned one of the 16 possible priority levels. The following are standard priorities; however, the assignment of most priorities is site dependent:

| Priority | Application                |
|----------|----------------------------|
| 1        | Manual Life Safety         |
| 2        | Automatic Life Safety      |
| 3        | Available                  |
| 4        | Available                  |
| 5        | Critical Equipment Control |
| 6        | Minimum On/Off             |
| 7        | available                  |
| 8        | Manual Operator            |
| 9        |                            |
|          | available                  |
| 16       |                            |

Other applications that need prioritization include temperature override, demand lighting, optimum stop/start, duty cycling, and scheduling. The relative priorities of these applications may vary from site to site and are not standardized. For interoperability at any particular site, the only requirement is that all devices implement the same priority scheme.

| Description                                       | Reference | Туре   |
|---|-----------|--|
| Value - Priority p                                | Ep        | Depends on BACnet object, will match Present Value |
| The priority, <i>p</i> , is in the range 116. See |           | type   |
| table above                                       |           |  |

# Unsupported Object

Object Type: [BACnetIP v31\Unknown]

## This BACnet object type is unsupported by the driver.

| Description                          | Reference | Туре     |
|--------------------------------------|-----------|----------|
| Name                                 | Ν         | Obj\Text |
| Unique object name within the device |           |          |

# BACnet Protocol Implementation Conformance Statement (PICS)

| Date                            | September 10, 2   | 2019                 |          |                             |    |
|---------------------------------|---|----------------------|----------|-----------------------------|----|
| Vendor Name                     | North Building Technologies Ltd.                          |                      |          |                             |    |
| Product Name                    | ObServer BACnetIP Interface, Commander BACnetIP Interface |                      |          |                             |    |
| Product Model Number            | BACnetIP OSM, I   | BACnetIP CDM         | 1        |                             |    |
| Application Software<br>Version | BACnetIP v3.1   | Firmware<br>Revision | OSM v2.0 | BACnet Protocol<br>Revision | 19 |

## Product Description

ObSys software and Commander controllers can work stand-alone or together, becoming part of a larger control or monitoring solution.

The BACnet/IP interface can retrieve and modify the values of BACnet objects from other devices, in addition to providing and allowing the modification of its own BACnet objects.

The interface can work as a gateway, using the North Essential Data and Extra Data modules to collect values from any of the attached systems and presenting them as BACnet objects.

## BACnet Standardized Device Profile (Annex L)

- BACnet Cross-Domain Advanced Operator Workstation (B-XAWS)
- BACnet Advanced Operator Workstation (B-AWS)
- BACnet Operator Workstation (B-OWS)
- □ BACnet Operator Display (B-OD)
- BACnet Advanced Life Safety Workstation (B-ALSWS)
- □ BACnet Life Safety Workstation (B-LSWS)
- BACnet Life Safety Annunciator Panel (B-LSAP)
- BACnet Advanced Access Control Workstation (B-AACWS)
- BACnet Access Control Workstation (B-ACWS)
- BACnet Access Control Security Display (B-ACSD)
- □ BACnet Building Controller (B-BC)
- □ BACnet Advanced Application Controller (B-AAC)
- ☑ BACnet Application Specific Controller (B-ASC)
- BACnet Smart Actuator (B-SA)
- □ BACnet Smart Sensor (B-SS)
- □ BACnet Advanced Life Safety Controller (B-ALSC)
- BACnet Life Safety Controller (B-LSC)
- BACnet Advanced Access Control Controller (B-AACC)
- BACnet Access Control Controller (B-ACC)
- BACnet Router (B-RTR)
- ☑ BACnet Gateway (B-GW)
- □ BACnet Broadcast Management Device (B-BBMD)
- BACnet Access Control Door Controller (B-ACDC)
- BACnet Access Control Credential Reader (B-ACCR)

## BACnet Interoperability Building Blocks Supported (Annex K)

BACnet Interoperability Building Blocks (BIBBs) are collections of one or more BACnet services. The services are described in terms of an 'A' and a 'B' device. Both of these devices are nodes on a BACnet inter-network. In most cases 'A' will act as the user of data (like an operator display) and the 'B' device will be the provider of this data (like a controller).

| BIBB Name  | Designation |
|--|-------------|
| Data Sharing – ReadProperty – A                      | DS-RP-A     |
| Data Sharing – ReadProperty – B                      | DS-RP-B     |
| Data Sharing – ReadPropertyMultiple – A              | DS-RPM-A    |
| Data Sharing – WriteProperty – A                     | DS-WP-A     |
| Data Sharing – WriteProperty – B                     | DS-WP-B     |
| Data Sharing – View – A                              | DS-V-A      |
| Data Sharing – Modify – A                            | DS-M-A      |
| Scheduling – View and Modify – A                     | SCHED-VM-A  |
| Scheduling – Weekly Schedule – A                     | SCHED-WS-A  |
| Device Management – Dynamic Device Binding – A       | DM-DDB-A    |
| Device Management – Dynamic Device Binding – B       | DM-DDB-B    |
| Device Management – Dynamic Object Binding – B       | DM-DOB-B    |
| Device Management – DeviceCommunicationControl – B   | DM-DCC-B    |
| Device Management – Time Synchronization – A         | DM-TS-A     |
| Device Management – Time Synchronization – B         | DM-TS-B     |
| Device Management – ReinitializeDevice – A           | DM-RD-A     |
| Device Management – ReinitializeDevice – B           | DM-RD-B     |
| Device Management – Automatic Network Mapping – A    | DM-ANM-A    |
| Device Management – Automatic Device Mapping – A     | DM-ADM-A    |
| Network Management – Foreign Device Registration – A | NM-FDR-A    |
| Gateway – Embedded Objects – B                       | GW-EO-B     |

## Segmentation Capability

| 🗹 Able to transmit segmented messages | Window Size: 1 |
|---------------------------------------|----------------|
| ☑ Able to receive segmented messages  | Window Size: 1 |

## Standard Object Types Supported

| Object Type        | Optional Properties Supported   | Writable Properties<br>Supported                   |
|--------------------|---|--|
| Analog Input       | Description, Reliability, Min Pres Value, Max Pres Value,<br>Resolution |  |
| Analog Output      | Description, Reliability, Min Pres Value, Max Pres Value,<br>Resolution | Present Value                                      |
| Analog Value       | Description, Reliability, Min Pres Value, Max Pres Value,<br>Resolution | Present Value                                      |
| Binary Input       | Description, Reliability, Inactive Text, Active Text                    |  |
| Binary Output      | Description, Reliability, Inactive Text, Active Text                    | Present Value                                      |
| Binary Value       | Description, Reliability, Inactive Text, Active Text                    | Present Value                                      |
| Device             | Description, Serial Number  | APDU Segment Timeout,<br>APDU Timeout, Description |
| Multi-state Input  | Description, Reliability, State Text                                    |  |
| Multi-state Output | Description, Reliability, State Text                                    | Present Value                                      |
| Multi-state Value  | Description, Reliability, State Text                                    | Present Value                                      |
| Network Port       | Description   |  |

This device does not support the dynamic creation or deletion of objects via BACnet.

#### Data Link Layer Options

□ ARCNET (ATA 878.1), 2.5 Mb. (Clause 8)
□ ARCNET (ATA 878.1), EIA-485 (Clause 8)
☑ BACnet IP, (Annex J)
□ BACnet IP, (Annex J), BACnet Broadcast Management Device (BBMD)
□ BACnet IP, (Annex J), Network Address Translation (NAT Traversal)
□ BACnet IPv6, (Annex U)
□ BACnet IPv6, (Annex U), BACnet Broadcast Management Device (BBMD)
□ BACnet/ZigBee (Annex O)
□ Ethernet, ISO 8802-3 (Clause 7)
□ LonTalk, ISO/IEC 14908.1 (Clause 11)
□ MS/TP master (Clause 9)
□ Point-To-Point, EIA 232 (Clause 10)
□ Point-To-Point, modem, (Clause 10)
□ Other:

#### Device Address Binding

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

#### Networking Options

Router, Clause 6Annex H, BACnet Tunneling Router over IP

### 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)    |              |

\* Character set supported on the ObServer platform only.

#### Gateway Options

This device collects values from non-BACnet systems and maps them as BACnet objects in a single device.

North Interface Technology supports thousands of different third-party systems. Visit *www.northbt.com/go/drivers* for the latest driver list.

#### Network Security Options

☑ Non-secure Device – is capable of operating without BACnet Network Security

# Driver Versions

| Version | Build Date | Details   |
|---------|------------|---|
| 1.0     | 14/08/2006 | Driver released based on BACnet v12   |
| 2.0     | 01/03/2009 | Changes in IP address driver uses now detected, link to Essential Data added for    |
|         |            | client device support, UTF-8 encoding added, and reworked internal driver           |
|         |            | operation   |
| 2.1     | 01/07/2011 | Driver released on Commander platform   |
| 2.1     | 25/04/2012 | Multistate values are now base 1 as per the BACnet standard, and not 0. Essential   |
|         |            | Data ENum values translated to this range.  |
| 2.1     | 18/01/2013 | Commander support for ISO 8859-1 added, "?" now returned if character set not       |
|         |            | supported   |
| 2.1     | 24/01/2014 | On Commander platform, BVLC_FORWARD messages from BBMD replied to wrong IP address. |
|         |            | Objects now include Essential Data object label in addition to 'Px.Ox' reference.   |
|         |            | Enforce Essential Data write inhibit field when writing from BACnet.                |
|         |            | Clear BACnet device address table on restart.                                       |
| 3.0     | 01/09/2015 | Updated to support Essential Data v3.0 and Extra Data driver.                       |
| 3.1     | 31/05/2018 | Updated to be compliant with revision 19 of the BACnet standard.                    |
|         |            | Expanded the capabilities of the BACnet client. Adding support for more BACnet      |
|         |            | object types, including schedule and calendars, etc (see BIBBs DS-V-A and MS-M-     |
|         |            | A).   |
|         |            | Added new objects for decoding parsing values.                                      |
|         |            | Added learnhealt to read least device chiests                                       |
| 2.1     | 20/07/2010 | Added toopback, to read tocal device objects.                                       |
| 5.1     | 50/07/2018 | hiprovements to scanning large bachet networks. Including reduced global            |
| 3.1     | 19/10/2018 | Added support for driver to reply to devices that use a different LIDP port number  |
| 5.1     | 15/10/2010 | Static Device List will wipe on updating to this version.                           |
| 3.1     | 24/01/2019 | Resolve issue when reading very long Description on a BACnet object.                |
|         |            | On Commander platform, added scanning of own device.                                |
| 3.1     | 01/10/2020 | Increased checking of corrupt incoming messages.                                    |
|         |            | Server operation: Corrected reading the priority array for multi-state object types |
|         |            | (Enum values start at 1, not 0).  |
|         |            | Server operation: Fixed device identifier returning 16-bit value when reading the   |
|         |            | driver device object's object identifier.   |
|         |            | Increased cache of BAChet device addresses.   |
|         |            | Scanning the interface sends whois on first rather than last object, whoisRouter    |
| 2.1     | 26/01/2021 | Sent on last object.  |
| 3.1     | 26/01/2021 | Added support for more string character sets.                                       |
|         |            | Aujusting Foreign Device univer objects now resets iP, causing re-registration with |
| 2.1     | 22/10/2024 | Devolved issue when convergesives on ADODT or SEC. ACK with no motobing             |
| 3.1     | 23/10/2024 | Resolved issue when server receives an ABURT or SEG_ACK with no matching            |
|         |            | previous PDD caused receive queue to become full and reject requests.               |

## Next Steps...

If you require help, contact support on 01273 694422 or visit www.northbt.com/support



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Document issued 12/11/2024.