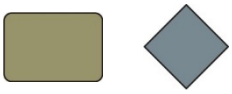
The BACnet Driver



The BACnet driver allows North to interface with a wide range of equipment supporting BACnet, via a Point-to-Point (RS232) connection. The driver provides operator interface functions to display and adjust values from other BACnet devices. Available for ObSys and Commanders.

This document relates to BACnet driver version 1.2

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

Contents

Compatibility with the BACnet System

The BACnet driver allows North to interface with a wide range of equipment supporting BACnet, via a Point-to-Point (RS232) connection.

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 BACnet driver is only capable of requesting values from server devices (i.e. controllers).

The driver connects to an RS232 point-to-point connection, and is capable of accessing the connected device. If this device supports BACnet router functions, then any other connected BACnet networked devices are also available (Fig. 1).

For BACnet/IP installations, the North BACnetIP driver is available, connecting directly to BACnet/IP networks, supporting a wider range of objects, and providing gateway functions.

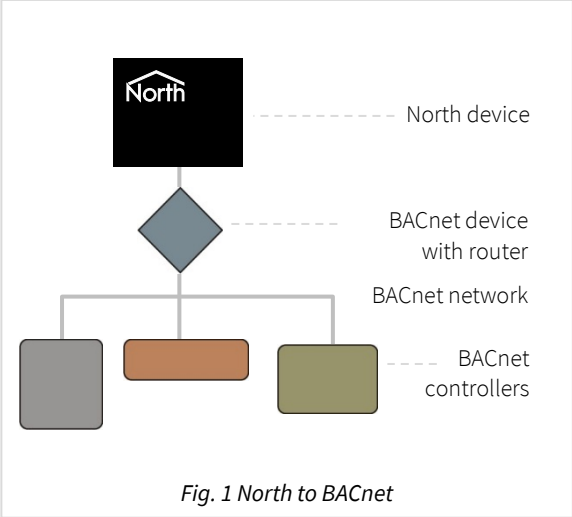


Fig. 1 North to BACnet

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 BACnet driver is capable of requesting values from a BACnet controller. Depending on the type of equipment, typically values from the following BACnet object types are available:

- Analog Input
- Analog Output
- Analog Value
- Binary Input
- Binary Output
- Binary Value
- Device
- Multi-state Input
- Multi-state Output

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'.

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.

Using the Driver

On ObSys, the BACnet driver is pre-installed. On Commander, the driver is available to download in the file 'Bank4 BACnet.cdm'. On all of these North devices, you can use the driver to create an interface to BACnet. Once started, you will need to set up the driver before it can communicate with the BACnet system.

The BACnet driver uses zero licence units.

Making the Cable

Using the RS232 cable specification (Fig. 2), connect the North Device's COM port to the BACnet device's RS232 port.

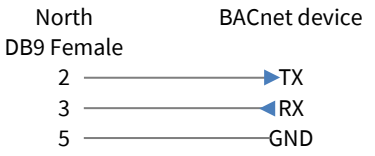


Fig. 2 North to BACnet cable

The maximum RS232 cable length is 15m and should be as short possible.

Starting the Interface

To start an interface using the BACnet driver, follow these steps:

- **Start Engineering** your North device using ObSys
- Navigate to **Configuration, Interfaces,** and set a unused **Interface** to 'BACnet' to start the particular interface
- Navigate to the top-level of your North device, then rescan it.

The driver setup object (Mc), labelled **BACnet Setup**, should now be available. If this object is not available, check an interface licence is available and the driver is installed.

Setting up the Driver

To set up the driver, follow these steps:

- Navigate to the **BACnet Setup** object (Mc). For example, if you started interface 1 with the driver earlier, then the object reference will be 'M1'
- Set the **RS232 Com Port** (RS.COM) to select which serial port on the North Device is connected to the BACnet controller
- Set the **Baud Rate** (RS.BR) to match that of the connected BACnet router device
- Set **BACnet Device Number** (B.BN) to a unique device instance address on the BACnet inter-network
- Set **BACnet Network Number** (B.NN) to be a unique network on the BACnet inter-network, this will be different to the connected router device.

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 Engineer.

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 System (S1) contains Device 1 (D1), which contains a Binary Input 1 (BI1) with a Present Value (V). Therefore, the complete object reference is 'S1.D1.BI1.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.D1.BI1.V) – therefore the complete object reference is 'IP.CDIP.S1.D1.BI1.V'.

Device Top-Level Objects

When an interface is started using the BACnet 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	Type
BACnet Setup Set up the BACnet driver, started on interface *c* (*c* is the interface number)	M*c*	Fixed container: On the Commander platform this will be *[CDM v20\BACnet v12]* On the ObSys platform this will be *[OSM v20\BACnet v12]*
BACnet System Access BACnet system connected to interface *c* (*c* is the interface number)	S*c*	Variable container: *[BACnet v12]*

BACnet Driver Setup

Object Type: *[OSM v20\BACnet v12]*
Object Type: *[CDM v20\BACnet v12]*

The BACnet driver contains the following objects:

Description	Reference	Type
RS232 COM Port	RS.COM	Obj\Num: 0…8; Adjustable
Baud Rate	RS.BR	Obj\Num; Adjustable Values: 1200, 2400, 9600, 19200 and 38400.
BACnet Device Number The device instance on the BACnet network, unique to the BACnet inter-network. This number can be in the range 1…4194303.	B.DN	Obj\Num; Range: 1…4194303; Adjustable Default: 33000
BACnet Network Number The network number on the BACnet network, unique to the BACnet inter-network. This should differ from the connected BACnet device's network number.	B.NN	Obj\Num; Range: 1…65535; Adjustable Default: 33
Device Label The device label is used as the device object name when requested by other BACnet devices.	DL	Obj\Text: 20 chars; Adjustable
Remote Password The password is optional and should match any password configured within the physically connected point-to-point device	PSW	Obj\Text: 16 chars; Adjustable
APDU Segment Timeout (milliseconds) In order to achieve reliable communication, it is recommended that the timeouts of all interconnecting devices should contain the same value	ST	Obj\Num; 500…60000; Adjustable Default: 2000
APDU Timeout (milliseconds) In order to achieve reliable communication, it is recommended that the timeouts of all interconnecting devices should contain the same value	AT	Obj\Num; 500…60000; Adjustable Default: 3000
Device State Connection state of the Point-To-Point link.	DS	Obj\ENum; 0..2 Where: 0=Disconnected, 1=Connected, 2=Disconnecting.
Scan Start Device Number The Scan Start and End numbers give the range of BACnet device numbers to scan when scanning the BACnet System object.	SS	Obj\Num: 1…4194303; Adjustable
Scan End Device Number The Scan Start and End numbers give the range of BACnet device numbers to scan when scanning the BACnet inter-network	SE	Obj\Num: 1…4194303; Adjustable

BACnet System

Object Type: *[BACnet v12]*

A BACnet system is a network of devices supporting the BACnet standard. It includes the connected point-to-point device, and devices on different inter-connected networks.

The BACnet system contains the following objects:

Description	Reference	Type
Device *x* The BACnet device number, *x*, is in the range 1…4194303	D*x*	Variable Container: *[BACnet v12\Dev]*
Network *y* MS/TP address *z* The BACnet MAC address may be used to access MS/TP devices that do not respond to scanning. The network number, *y*, is in the range 1…65535. The MAC Address, *z*, is a number in the range 0…254.	N*y*A*z*	Variable Container: *[BACnet v12\Dev]*

BACnet Device

Object Type: *[BACnet v12\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	Type
Device Information	V	Fixed container: *[BACnet v12\PIC]*
Analogue Input x	AI*x*	Fixed container: *[BACnet v12\AnIn]*
Analogue Output x	AO*x*	Fixed container: *[BACnet v12\AnOut]*
Analogue Value x	AV*x*	Fixed container: *[BACnet v12\AnVal]*
Binary Input x	BI*x*	Fixed container: *[BACnet v12\BinIN]*
Binary Output x	BO*x*	Fixed container: *[BACnet v12\BinOut]*
Binary Value x	BV*x*	Fixed container: *[BACnet v12\BinVal]*
Multi-State Input x	MI*x*	Fixed container: *[BACnet v12\MultiIn]*
Multi-State Output x	MO*x*	Fixed container: *[BACnet v12\MultiOut]*

Device Information

Object Type: *[BACnet v12\PIC]*

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

Description	Reference	Type
Name	N	Obj\Text
Location	L	Obj\Text
Description	D	Obj\Text
System Status	S	Obj\ENum; 0…4: Where: 0=Operational, 1=Operational (read-only), 2=Download required, 3=Download in progress, 4=Non-operational
Reinitialise Device	RST	Obj\ENum; Adjustable-only Values: 0=Cold start, 1=Warm start Some devices require an optional password. This should be included when adjusting the value in the format '<restart-type>|<password>'
Date & Time Use to set the date and time in the device	TIME	Obj\DateTime; Adjustable-only
Local Time	LT	Obj\Time
Local Date	LD	Obj\Date
Vendor Name	VN	Obj\Text
Vendor ID A list of BACnet vendors ID's is available from ***www.bacnet.org***	VI	Obj\Num: 0…65535
Model Name	MN	Obj\Text
Firmware Version	FV	Obj\Text
Software Version	SV	Obj\Text
BACnet Version	PV	Obj\Num:0…99
BACnet Revision	PR	Obj\Num:0…99
Segmentation Supported	SS	Obj\ENum; 0…3: Where: 0=Segmentation (both), 1=Segmentation (transmit), 2=Segmentation (receive), 3=No Segmentation.
Maximum APDU Length	AL	Obj\Num
APDU Timeout (ms)	AT	Obj\Num: 0…10000
APDU Segment Timeout (ms)	ST	Obj\Num: 0…10000
APDU Retries	AR	Obj\Num: 0…999
Services Supported Indicates which standard protocol services are executed by this device	PS	Fixed container: *[BACnet v12\PIC\Svc]*
Object Types Supported Indicates which standard object types can be present in this device	PO	Fixed container: *[BACnet v12\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	Type
Acknowledge Alarm	B0	Obj\NoYes
Confirmed COV Notification	B1	Obj\NoYes
Confirmed Event Notification	B2	Obj\NoYes
Get Alarm Summary	B3	Obj\NoYes
Get Enrolment Summary	B4	Obj\NoYes
Subscribe COV	B5	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
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 Event Notification	B29	Obj\NoYes
Unconfirmed Private Transfer	B30	Obj\NoYes
Unconfirmed Text Message	B31	Obj\NoYes
Time Synchronisation	B32	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	Type
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
Calendar	B6	Obj\NoYes
Command	B7	Obj\NoYes
Device	B8	Obj\NoYes
Event Enrolment	B9	Obj\NoYes
File	B10	Obj\NoYes
Group	B11	Obj\NoYes
Life Safety Point	B21	Obj\NoYes
Life Safety Zone	B22	Obj\NoYes
Loop	B12	Obj\NoYes
Multi-state Input	B13	Obj\NoYes
Multi-state Output	B14	Obj\NoYes
Multi-state Value	B19	Obj\NoYes
Notification Class	B15	Obj\NoYes
Program	B16	Obj\NoYes
Schedule	B17	Obj\NoYes
Trend Log	B20	Obj\NoYes

Analog Input

Object Type: *[BACnet v12\AnIn]*

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

Description	Reference	Type
Name Unique object name within the device	N	Obj\Text
Present Value Current value of the analogue input	V	Obj\Float; Adjustable (only when the object is 'Out-of-service')
Units Code	U	Obj\Num; 0…141 See *Appendix A*
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the analogue input. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the analogue input. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out-Of-Service Indicates if the input is not in service decoupling the Present Value from the physical input	US	Obj\NoYes
Value High Maximum value that can be obtained from Present Value. Device support for this object is optional	VH	Obj\Float; Adjustable
Value Low Minimum value that can be obtained from Present Value. Device support for this object is optional	VL	Obj\Text; Adjustable

Analog Output

Object Type: *[BACnet v12\AnOut]*

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

Description	Reference	Type
Name Unique object name within the device	N	Obj\Text
Present Value – Priority *p* 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 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, 16 is used. On reading, the priority is ignored and the highest priority value returned. See *Value Table* for more information.	V.P*p*	Obj\Float; Adjustable To release or clear a value for a priority, set the value to '' (blank)
Value Table Priority array table containing the value for each priority	VT	Fixed container: *[BACnet v12\AnOut\ValTable]*
Default Value When there are no values in the priority array, the default value is used .	DV	Obj\Float; Adjustable
Units Code	U	Obj\Num; 0…141 See *Appendix A*
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the analogue output. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the analogue output. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the output is not in service, decoupling the Present Value from the physical output	US	Obj\NoYes
Value High	VH	Obj\Float; Adjustable
Value Low	VL	Obj\Text; Adjustable

Analog Value

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value – Priority *p* 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 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, 16 is used. On reading, the priority is ignored and the highest priority value returned. See *Value Table* for more information.	V.P*p*	Obj\Float; Adjustable To release or clear a value for a priority, set the value to '' (blank)
Value Table Priority array table containing the value for each priority Device support for this object is only required if present value is adjustable	VT	Fixed container: *[BACnet v12\AnVal\ValTable]*
Default Value 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	DV	Obj\Float; Adjustable
Units Code	U	Obj\Num; 0…141 See *Appendix A*
Description Device support for this object is optional	D	Obj\Text
Status Flag *b* Health of the analogue value. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the value is prevented from being modified by software local to the device	US	Obj\NoYes

Binary Input

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value Current value of the binary input	V	Obj\OffOn; Adjustable (only when the object is 'Out-of-Service')
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the binary input. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the binary input. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Service indicates whether the physical input that the object represents is in service.	US	Obj\NoYes
Polarity Reversed	P	Obj\NoYes
Off State Text Device support for this object is optional	FL	Obj\Text
On State Text Device support for this object is optional	TL	Obj\Text

Binary Output

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value – Priority *p* 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 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, 16 is used. On reading, the priority is ignored and the highest priority value returned. See *Value Table* for more information.	V.P*p*	Obj\OffOn; Adjustable To release or clear a value for a priority, set the value to '' (blank)
Value Table Priority array table containing the value for each priority	VT	Fixed container: *[BACnet v12\BinOut\ValTable]*
Default Value When there are no values in the priority array, the default value is used	DV	Obj\OffOn; Adjustable
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the binary output. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the binary output. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the output is not in service, decoupling the Present Value from the physical output	US	Obj\NoYes
Polarity Reversed	P	Obj\NoYes
Off State Text Device support for this object is optional	FL	Obj\Text
On State Text Device support for this object is optional	TL	Obj\Text

Binary Value

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value – Priority *p* 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 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, 16 is used. On reading, the priority is ignored and the highest priority value returned. See *Value Table* for more information.	V.P*p*	Obj\OffOn; Adjustable To release or clear a value for a priority, set the value to '' (blank)
Value Table Priority array table containing the value for each priority Device support for this object is only required if present value is adjustable	VT	Fixed container: *[BACnet v12\BinVal\ValTable]*
Default Value 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	DV	Obj\OffOn; Adjustable
Description Device support for this object is optional	D	Obj\Text
Status Flag *b* Health of the binary value. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the value is prevented from being modified by software local to the device	US	Obj\NoYes
Off State Text Device support for this object is optional	FL	Obj\Text
On State Text Device support for this object is optional	TL	Obj\Text

Multistate Input

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value Current value of the multi-state input	V	Obj\Num; Range 1…number of states; Adjustable (only when the object is 'Out-of-Service')
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the multi-state input. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the multi-state input. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the input is not in service decoupling the Present Value from the physical input	US	Obj\NoYes
Number of States	NS	Obj\Num
State *n* Text Text description of the state value. The state number, *n*, is in the range 1…number of states. Device support for this object is optional	A.E*n*	Obj\Text

Multistate Output

Object Type: *[BACnet v12\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	Type
Name Unique object name within the device	N	Obj\Text
Present Value – Priority *p* 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 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, 16 is used. On reading, the priority is ignored and the highest priority value returned. See *Value Table* for more information.	V.P*p*	Obj\Num; Adjustable To release or clear a value for a priority, set the value to '' (blank)
Value Table Priority array table containing the value for each priority	VT	Fixed container: *[BACnet v12\MultiOut\ValTable]*
Default Value When there are no values in the priority array, the default value is used	DV	Obj\Num; Adjustable
Description Device support for this object is optional	D	Obj\Text
Device Type Description of the physical device connected to the multi-state output. Device support for this object is optional	DT	Obj\Text
Status Flag *b* Health of the multi-state output. Status Flag, *b*, is a number in the range 0…3, where: 0=In Alarm, 1=In Fault, 2=Value Overridden, 3=Out of Service	SF.B*b*	Obj\NoYes
Event State Indicates if the object has an active event state associated with it	ES	Obj\ENum; 0…4: Where: 0=Normal, 1=Fault, 2=Off-normal, 3=High limit, 4=Low limit
Out of Service Indicates if the output is not in service, decoupling the Present Value from the physical output	US	Obj\NoYes
Number of States	NS	Obj\Num
State *n* Text Text description of the state value. The state number, *n*, is in the range 1…number of states. Device support for this object is optional	A.E*n*	Obj\Text

Value Table

Object Type: *[BACnet v12\AnOut\ValTable]*
Object Type: *[BACnet v12\AnVal\ValTable]*
Object Type: *[BACnet v12\BinOut\ValTable]*
Object Type: *[BACnet v12\BinVal\ValTable]*
Object Type: *[BACnet v12\MultiOut\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 … 16	available

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	Type
Value - Priority *p* The priority, *p*, is in the range 1…16. See table above	E*p*	Depends on BACnet object, will match Present Value type

Appendix A: BACnet Units

BACnet analog objects provide the following units codes:

Value	Units
0	m^2
1	ft^2
2	mA
3	amps (A)
4	ohms (Ω)
5	volts (V)
6	kV
7	MV
8	VA
9	kVA
10	MVA
11	VA reactive
12	kVA reactive
13	MVA reactive
14	degrees phase
15	power factor
16	joules (J)
17	kJ
18	watt-hours (Wh)
19	kWh
20	btus
21	therms
22	ton-hours
23	J / kg dry air
24	btus per pound dry air
25	cycles per hour
26	cycles per min
27	hertz (Hz)
28	g of water per kg dry air
29	%RH
30	mm
31	m
32	inches
33	feet (ft)
34	W/ft^2
35	W/m^2
36	lumens
37	luxes
38	foot candels
39	kg
40	pounds mass
41	tons
42	kg/s
43	kg/min
44	kg/hr
45	pounds mass per min
46	pounds mass per hr
47	watts (W)
48	kW
49	MW
50	btus/hr
51	horsepower
52	tons refrigeration

Value	Units
53	pascals (Pa)
54	kPa
55	bars
56	pounds force per $inch^2$
57	cm of water
58	inches of water
59	mm Hg
60	cm Hg
61	inches Hg
62	°C
63	K
64	°F
65	degree days C
66	degree days F
67	years
68	months
69	weeks
70	days
71	hours
72	mins
73	secs
74	m/s
75	km/hr
76	feet/sec
77	feet/min
78	m/hr
79	ft^3
80	m^3
81	imperial gallons
82	liters
83	us gallons
84	ft^3 / min
85	m^3 / s
86	imperial gallons/min
87	l / s
88	l / min
89	us gallons/min
90	degrees angular
91	°C/hr
92	°C/min
93	°F/hr
94	°F/min
95	no units
96	ppm
97	ppb
98	%
99	% per s
100	per min
101	per sec
102	psi per degree F
103	radians
104	rev/min
105-114	currency 1-10

Value	Units
122	kΩ
123	MΩ
124	mV
125	kJ / kg
126	MJ
127	J / K
128	J / kg K
129	kHz
130	MHz
131	per hour

Value	Units
132	mW
133	hectopascals
134	millibars
135	m^3 / hr
136	l / hr
137	kW hr / m^2
138	kW hr / ft^2
139	MJ / m^2
140	MJ / ft^2
141	W / m^2 K

BACnet Protocol Implementation Conformance Statement (PICS)

Date	August 1, 2006				
Vendor Name	North Building Technologies Ltd.				
Product Name	ObServer BACnet Interface, Commander BACnet Interface				
Product Model Number	BACnet OSM, BACnet CDM				
Application Software Version	BACnet v1.2	**Firmware Revision**	OSM v2.0	**BACnet Protocol Revision**	1

Product Description

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

The BACnet Point-to-Point interface can retrieve and modify the values of BACnet objects from other devices.

BACnet Standardized Device Profile (Annex L)

The driver does not conform to any standardized profile.

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 – WriteProperty – A	DS-WP-A
Device Management – Dynamic Device Binding – A	DM-DDB-A
Device Management – Dynamic Device Binding – B	DM-DDB-B
Device Management – Time Synchronization – A	DM-TS-A
Device Management – ReinitializeDevice – A	DM-RD-A
Network Management – Connection Establishment – A	NM-CE-A
Network Management – Connection Establishment – B	NM-CE-B

Segmentation Capability

☑ Able to transmit segmented messages Window Size: 2
☑ Able to receive segmented messages Window Size: 2

Standard Object Types Supported

Object Type	Optional Properties Supported	Writable Properties Supported
Device		

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)
☐ Ethernet, ISO 8802-3 (Clause 7)
☐ LonTalk, ISO/IEC 14908.1 (Clause 11)
☐ MS/TP master (Clause 9)
☐ MS/TP slave (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 6
☐ Annex 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.

☑ ANSI X3.4	☐ IBM/Microsoft DBCS	☐ ISO 8859-1
☐ ISO 10646 (UCS-2)	☐ ISO 10646 (UCS-4)	

Network Security Options

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

Driver Versions

Version	Build Date	Details
1.0	14/07/1998	Driver released
1.0	14/11/1998	Updated ObView support
1.0	18/11/1999	Resolved issue with address field when connected to network of devices
1.0	18/08/2000	Updated with changes from 135-1995 addendum b
1.0	05/11/2002	Add driver objects SS and SE Updated with relevant changes from 135-2000
1.0	30/04/2004	Resolved issue when text values have a length greater than 50 chars
1.0	04/06/2006	Mod: add support from multi-state input/output objects Mod: Add object NxAx to access devices using MAC address on MS/TP Mod: Add support for password in connected router
1.0	12/10/2015	Mod: Now 0 licence units Mod: Default baud rate 38400, and network to 33

Next Steps…

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

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