

CNL Software BACnetGeneric Driver

Device Driver Specification. Manually edited, Do not regenerate.

29/10/2019 14:20:08



A Whole World of Integration



Table of Contents

1	Document Versions.....	5
2	Referenced Documents.....	6
3	Manufacturer	7
4	IPSecurityCenter Versions.....	8
5	Operating Systems	9
5.1	Client Side Functionality	9
5.2	Server Side Functionality	9
6	Models / Firmware Versions.....	10
	BACnet Devices	10
7	Hardware Configurations.....	11
8	Driver Package	12
9	Driver Features.....	14
9.1	BACnetGeneric Server.....	14
9.1.1	Device Connection and Online States.....	14
	DC1.0 Device Online Status.....	14
	DC2.0 Authentication.....	14
9.1.2	Video	15
9.1.3	Properties.....	16
	Internal Device Id.....	16
	Discovery Option.....	16
	Object List	16
	Device Connection Timeout.....	16
	Internal Port	16
	Subscription List.....	16
	Resubscription Period (s)	17
	Device List	17
	Connection Check Interval (s)	17
	Spatial Reference Identifier	17
9.1.4	Methods.....	18
	9.1.4.1 Refresh Devices.....	18
	9.1.4.2 Subscribe To COV of Listed Objects	18
	9.1.4.3 Export Subscription List.....	18
9.1.5	Events.....	20

9.1.5.1	Object Added Event	20
9.1.5.2	Property Info Event	20
9.2	BACnet Device	21
9.2.1	Device Connection and Online States	21
DC1.0	Device Online Status	21
DC2.0	Authentication	21
9.2.2	Video	22
9.2.3	Properties	23
Object Identifier	23	
Object Type	23	
9.2.4	Methods	24
9.2.4.1	Read Property	24
9.2.4.2	Write Property	24
9.2.4.3	Read All Properties	25
9.2.4.4	Subscribe To Events	25
9.2.4.5	Unsubscribe To Events	25
9.2.4.6	Refresh Assets	26
9.2.4.7	Read Object List	26
9.2.5	Events	27
9.2.5.1	Error Info Event	27
9.2.5.2	Object Found Event	27
9.2.5.3	Connection Lost	27
9.2.6	Built-In Interfaces	29
9.3	BACnet Objects	29
9.3.1	Device Connection and Online States	29
DC1.0	Device Online Status	29
DC2.0	Authentication	29
9.3.2	Video	30
9.3.3	Properties	31
Object Identifier	31	
Object Type	31	
Parent Device Id	31	
Device Type	31	
9.3.4	Methods	32

9.3.4.1	Read current value	32
9.3.4.2	Subscribe COV	32
9.3.4.3	UnsubscribeCOV	32
9.3.4.4	Read Property	32
9.3.4.5	Write Property	33
9.3.4.6	Write current value	33
9.3.5	Events	35
9.3.5.1	Value Changed Event	35
9.3.5.2	Property Info Event	35
9.3.5.3	State Info Event	35
9.3.5.4	Error Info Event	36
9.3.6	Built-In Interfaces	37
10	Installation	37
10.1	Prerequisites	37
10.2	Driver Installation	37
10.2.1	Device Configuration	38
10.3	Additional Installation Information	38
10.3.1	Configuration Properties	38
10.3.1.1	Connection Details	38
10.3.1.2	Discover Option Property	38
10.3.1.3	Internal Device Id Property	39
10.3.1.4	InternalPort	39
10.4	BACnet Information	39
10.4.1	BACnet Object Identifiers	39
10.4.2	BACnet Property Identifiers	39
10.4.3	Driver Compatibility	40
11	Known Limitations	40

1 Document Versions

Version	Date	Name	Change
1.0	2019-10-24	C	Document Created.
1.1	2019-10-24	AM	Notes on this driver replacing original BACnet driver
1.2	2019-11-06	DC	Added a limitation with regards to custom objects
1.3	2020-06-30	JA	Added prerequisites

Note:

This driver replaces the deprecated BACnet driver.

The two drivers use different name spaces and are not cross compatible for device generation/placement.

For pre-configured systems continuing to use the original BACnet driver is acceptable but this driver should be used for new installations since it has enhanced capabilities.

2 Referenced Documents

Document	Version	Description
Driver Project Requirements (DDK-PR)	1.0	The CNL Software BACnet Server driver must conform to all the requirements detailed in this document.
Driver Connection and Online States Requirements (DDK-DC)	1.0	The CNL Software BACnet Server driver must conform to all requirements in this document detailed in the section: Device Connection and Online States

3 Manufacturer

Name CNL Software



Website <http://www.cnlsoftware.com>

Description CNL Software

4 IPsecCenter Versions

The driver must be compatible with the following IPsecCenter versions:

IPsecCenter Version	Supported
4.9.4	<input checked="" type="checkbox"/>

5 Operating Systems

5.1 Client Side Functionality

Operating Systems	Supported
-------------------	-----------

5.2 Server Side Functionality

Operating Systems	Supported
Windows Server 2008 R2	<input checked="" type="checkbox"/>
Windows Server 2012	<input checked="" type="checkbox"/>

6 Models / Firmware Versions

Model	Versions	SDK
BACnet Devices		

7 Hardware Configurations

TODO

**Build configuration diagram
linking servers together.**

(ConfigurationDiagram.png)

8 Driver Package

The driver package is named: `cnl_ipsc_cnlsoftware_bacnetserver_[BUILD-VERSION].ipsc`

9 Driver Features

9.1 BACnetGeneric Server

9.1.1 Device Connection and Online States

The full requirements for these features can be found in the [Device Connection and Online States Requirements](#)

Feature	
DC1.0 Device Online Status	None
DC2.0 Authentication	None

9.1.2 Video

This device does not support video.

9.1.3 Properties

General requirements for properties can be found in [Driver Project Requirements](#).

Name	Type	Description	Default Value & Ranges
Internal Device Id	uint	The ID to be used for the internal device listening in the driver, for responding to BACnet Whols requests.	Default: Min: Max:
Discovery Option	DiscoveryOption	Select the discovery option for the BACnet server. None means dont discover objects, All means include all discovered objects, Whitelist means only include discovered objects in the object list csv file.	Default: All Min: Max:
Object List	string	Path to CSV file to define a whitelist of BACnet objects to add into IP Security Center	Default: Min: Max:
Device Connection Timeout	int	The length of time (in milliseconds) to wait while checking that a connection to a device can still be made. If a response is not received within the timeout period, then the device will be taken offline.	Default: 10000 Min: 1000 Max: 100000
Internal Port	int	Port that connection manager uses for communication	Default: 47808 Min: Max:
Subscription List	string	The list of object ids that we want to subscribe to COV	Default: Min: Max:

Resubscription Period (s)	int	How often to resubscribe to COV in seconds	Default: 100 Min: 10 Max:
Device List	string	Path to the list containing information about devices that need to be connected to	Default: Min: Max:
Connection Check Interval (s)	int	Interval between polls to check device connectivity (seconds)	Default: 5 Min: Max:
Spatial Reference Identifier	int	A unique value used to unambiguously identify projected, unprojected, and local spatial coordinate system definitions.	Default: 4326 Min: Max:

9.1.4 Methods

General requirements for methods can be found in [Driver Project Requirements](#).

9.1.4.1 Refresh Devices

Refreshes list of objects for each device

Returns void.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
------	------	-------------	------	--------------------------

9.1.4.2 Subscribe To COV of Listed Objects

Subscribe to COV of all the objects that are in the list provided in subscription list property

Returns void.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
------	------	-------------	------	--------------------------

9.1.4.3 Export Subscription List

Exports the list of objects that we are currently subscribed to COV of

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
File Path	string	Path and filename of the exported file		Default: Min: Max:

9.1.5 Events

General requirements for events can be found in [Driver Project Requirements](#).

9.1.5.1 Object Added Event

Event triggered when a BACnet object is added.

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Object Identifier	string	BACnet Object Identifier
Object Type	string	BACnet Object Type
BACnet Object Name	string	BACnet Object Name

9.1.5.2 Property Info Event

Event triggered when property info is received

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Object Identifier	string	BACnet Object Identifier
Property identifier	string	Name of the BACnet property
Property Value	string	Value of the BACnet property

9.2 BACnet Device

9.2.1 Device Connection and Online States

The full requirements for these features can be found in the [Device Connection and Online States Requirements](#)

Feature	
DC1.0 Device Online Status	None
DC2.0 Authentication	None

9.2.2 Video

This device does not support video.

9.2.3 Properties

General requirements for properties can be found in [Driver Project Requirements](#).

Name	Type	Description	Default Value & Ranges
Object Identifier	string	BACnet Object Identifier	Default: Min: Max:
Object Type	string	BACnet Object Type	Default: Min: Max:

9.2.4 Methods

General requirements for methods can be found in [Driver Project Requirements](#).

9.2.4.1 Read Property

Read Property of a BACnet object.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
Object Identifier	string	BACnet Object Identifier	Default: Min: Max:
Property Identifier	string	Property identifier.	Default: Min: Max:

9.2.4.2 Write Property

Write property on a BACnet object. This method can be used to write to a BACnet object, connected to the BACnet device, which has not been added as a device in IPSC (e.g. a device not in the whitelist).

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
Object Identifier	string	BACnet Object Identifier	Default: Min: Max:
Property Identifier	string	BACnet Property Identifier	Default: Min: Max:

Property Value	string	Property Value	Default: Min: Max:
Priority	int		Default: BACnet priority for the operation, where 1 means highest priority Min: 1 Max: 16

9.2.4.3 *Read All Properties*

Read All Properties of an object (for information purposes)

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
BACnet Object Id	string	BACnet Object Id	Default: Min: Max:

9.2.4.4 *Subscribe To Events*

Subscribe To Events from the objects attached to this device.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
------	------	-------------	--------------------------

9.2.4.5 *Unsubscribe To Events*

Unsubscribe To Events for objects attached to this device.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
------	------	-------------	--------------------------

9.2.4.6 Refresh Assets

Refresh list of BACnet objects attached to the device by reading device object list.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
------	------	-------------	--------------------------

9.2.4.7 Read Object List

This method queries the BACnet device to find out what BACnet objects are attached to that device i.e. all the BACnet inputs, outputs, values and custom objects etc.

Returns void.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
------	------	-------------	--------------------------

9.2.5 Events

General requirements for events can be found in [Driver Project Requirements](#).

9.2.5.1 Error Info Event

Event triggered when error information is received from BACnet

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Property Name	string	This property describes the type of error detected.
propertyValue	string	Message provides additional details on the error that occurred.

9.2.5.2 Object Found Event

Event triggered when a BACnet object attached to the device is found, as a result of calling Read Object List. This allows us to see the objects attached to the device, without adding them as devices in IPSecurity Center

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Object Identifier	string	BACnet Object Identifier
Object Type	string	BACnet Object Type
BACnet Object Name	string	BACnet Object Name

9.2.5.3 Connection Lost

Connection to the device has been lost

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
------	------	-------------

9.2.6 Built-In Interfaces

This section provides details of built-in interfaces that are implemented on this device. Full details of these interfaces can be found in the DDK documentation.

Interface	Description
IGeoSpatialAwareWithAlt	Defines a locatable object with an Altitude
IGeoSpatialAware	Defines a locatable object

9.3 BACnet Objects

This is the base object for all other objects, and they all have the same methods and properties, so won't be listed in the RDIN explicitly.

9.3.1 Device Connection and Online States

The full requirements for these features can be found in the [Device Connection and Online States Requirements](#)

Feature	
DC1.0 Device Online Status	None
DC2.0 Authentication	None

9.3.2 Video

This device does not support video.

9.3.3 Properties

General requirements for properties can be found in [Driver Project Requirements](#).

Name	Type	Description	Default Value & Ranges
Object Identifier	string	BACnet Object Identifier	Default: Min: Max:
Object Type	string	BACnet Object Type	Default: Min: Max:
Parent Device Id	string	Parent BACnet Device Identifier	Default: Min: Max:
Device Type	string	Project specific object type descriptor. Can be edited directly or populated from object list CSV file .	Default: Min: Max:

9.3.4 Methods

General requirements for methods can be found in [Driver Project Requirements](#).

9.3.4.1 *Read current value*

Read the PRESENT_VALUE property of the BACnet object

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
------	------	-------------	------	--------------------------

9.3.4.2 *Subscribe COV*

Subscribe to changes in the PRESENT_VALUE property for this object

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
------	------	-------------	------	--------------------------

9.3.4.3 *UnsubscribeCOV*

Unsubscribe from change of value events for this object

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Type	Default Value and Ranges
------	------	-------------	------	--------------------------

9.3.4.4 *Read Property*

Read a property on the object.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
Property Identifier	string	Identifier of the property to read.	Default: Min: Max:

9.3.4.5 *Write Property*

Write to a property on this object.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
Property Identifier	string	Identifier of the property to write.	Default: Min: Max:
Property Value	string	Property value to write.	Default: Min: Max:
Priority	int	BACnet priority for the operation, where 1 means highest priority	Default: Min: 1 Max: 16

9.3.4.6 *Write current value*

Write to PRESENT_VALUE property of the BACnet object

This method is exposed as an operator action.

Returns bool.

Performance

The method must complete within 2 seconds.

Parameters

Name	Type	Description	Default Value and Ranges
Property Value	string	Property Value	Default: Min: Max:
Priority	int	BACnet priority for the operation, where 1 means highest priority.	Default: Min: 1 Max: 16

9.3.5 Events

General requirements for events can be found in [Driver Project Requirements](#).

9.3.5.1 Value Changed Event

Event triggered when PRESENT_VALUE property changes

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Present Value	string	Present Value
Fault	bool	Indicates if fault exists.
In Alarm	bool	Indicates if input is currently in alarm state.
Out Of Service	bool	Indicates if input is out of service.
Overridden	bool	Indicates if input is overridden.
DataType	string	Data Type

9.3.5.2 Property Info Event

Event triggered when BACnet property information is received

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Property Identifier	string	BACnet Property identifier.
propertyValue	string	
Data Type	string	Data Type

9.3.5.3 State Info Event

Event triggered when event is received from BACnet object.

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Priority	byte	Priority
Event Type	string	Event Type
Message	string	Message
Notify Type	string	Notify Type
From State	string	FromState
To State	string	To State
Event Values	string	Event Values

9.3.5.4 *Error Info Event*

Event triggered when error information is received from BACnet

Performance

The driver must be able to handle 4000 events per hour.

Event Properties

Name	Type	Description
Property Name	string	This property describes the type of error detected.
propertyValue	string	Message provides additional details on the error that occurred.

9.3.6 Built-In Interfaces

This section provides details of built-in interfaces that are implemented on this device. Full details of these interfaces can be found in the DDK documentation.

Interface	Description
IGeoSpatialAwareWithAlt	Defines a locatable object with an Altitude
IGeoSpatialAware	Defines a locatable object

10 Installation

10.1 Prerequisites

10.2 Driver Installation

- Start the IPSecurityCenter™ client and any supporting services
- Open the Device Driver Manager from the System Configuration
- Click the **Install** button
- Select the CNL Software BACnet Server Driver Package in the Open file dialog
- Wait for the driver to be uploaded

The driver packages should be listed in the Device Driver Manager.

Additional Installation Details

10.2.1 Device Configuration

- Right click in a folder (e.g. Devices) in the System Configuration: **New** → **Device On** → **Server**
- Click **Next** on the introduction
- Select **CNL Software** in the **Device Manufacturer** list
- Select **BACnet Server** in the Available Devices list
- Click **Next** to enter the device details: Enter the CNL Software BACnet Server hostname or IP address, the port (use 0 to use the default port), and user name and password if integrated security is not being used.
- Click **Next** and **Finish** to add the device.
- Enable the device to bring it online.

10.3 Additional Installation Information

Prerequisites : **VisualStudio 2015 runtime(64 bit)** - vc2015.3_redist.x64.exe

10.3.1 Configuration Properties

10.3.1.1 Connection Details

To connect to BACnet devices, a .csv file must be supplied in this form:

```
IP,Port,DeviceInstanceId,NetworkNumber,HardwareAddress,HardwareAddressLength  
10.40.100.30,47808,10030,0,0,0  
192.168.49.128,47808,5000,0,0,0
```

Note: The header information must be supplied, otherwise the driver won't be able to parse the .csv file. Network number, hardware address and hardware address length can normally be left as 0 values. Hardware address may be useful if the device is behind a bacnet router.

If objects are to be subscribed to automatically, a .csv file with object custom identifiers must be supplied in this form:

```
10030:BINARY_INPUT:100301  
10030:BINARY_INPUT:100302  
5000:BINARY_INPUT:3
```

Note: You can subscribe to the objects manually through IPSC and then run Export Subscription List method on the server. This method will generate a .csv document with currently subscribed objects.

10.3.1.2 Discover Option Property

This can take one of three values:

- **None**: this setting is likely only to be useful for debugging purposes.
- **All**: when selected, all objects connected to the BACnet device will be added as IPSC device objects.
- **Whitelist**: when selected, objects connected to the BACnet device will only be added if they contain an entry in the whitelist (i.e. from the CSV file specified with property Object List).

10.3.1.3 Internal Device Id Property

This property allows us to provide an instance ID for the BACnet Device hosted by the driver. This is needed by some BACnet devices before they will send events to the driver. The instance ID chosen must not clash with any other BACnet devices on the network.

A further constraint is that within a single Connection Manager process, all instances of the BACnet driver must use the same Internal Device Id.

10.3.1.4 InternalPort

The BACnet SDK we are using is a static SDK. It has a port setting that can only be configured once per Connection Manager process, which means we can only have 1 Server device per Connection Manager. If the port is set to zero, then the default port number for BACnet (47808) will be used.

10.4 BACnet Information

10.4.1 BACnet Object Identifiers

The BACnet standard includes a list of predefined object type. In the driver they are represented as strings in the following form:

```
NOTIFICATION_CLASS:3000035
```

To be able to add multiple devices in one driver we also add the parent device identifier to the front, like this:

```
10030:NOTIFICATION_CLASS:3000035
```

Manufacturers may create object of types not defined in the standard. Each BACnet object in IPSecurity Center has a property showing the object identifier. This string value can be used where a method parameter needs object identifier.

10.4.2 BACnet Property Identifiers

The BACnet standard included a predefined list of property identifiers. Manufacturers of BACnet devices may create their own custom properties for BACnet objects. If a property identifier is in the standard list then it will look like this ("standard" form):

```
PRESENT_VALUE
```

If a property identifier is not in the standard list then its numeric value will be shown e.g.

For setting the propertyIdentifier parameter on a method call you can use either form. When an event is received from BACnet then it will be displayed in the “standard” form for a recognized property if possible, else as a numeric value.

10.4.3 Driver Compatibility

The following devices are known to be incompatible with the CNL Software BACnet Server.

Model

11 Known Limitations

- The devices can't have instance number of 0.
- This driver cannot coexist with CNL.IPSecurityCenter.Drivers.BACnet on the same connection manager due to both using the same SDK. There can only be one SDK instance per process.
- There can also only be one instance of Server device per connection manager for the same reason.
- We cannot read or write properties to custom objects as custom objects do not conform to the BACnet standard and can have any properties they want. To be able to read/write them we need to extend this driver specifically for each manufacturer. Custom objects were not part of the requirements so far, once they become we will need a separate driver specifically for that manufacturer.