

CAS 2700-53

Pulse API to BACnet IP Gateway

Manual

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1. Pulse API to BACnet IP Gateway Description

The Pulse API to BACnet IP Gateway connects to the internet to poll data from a Pulse Server that collects data from Pulse API enabled devices. This implementation of the Gateway communicates requests data using XML commands and URLs. The Gateway can be configured to poll for data from multiple devices and sites.

The Gateway connects to the Pulse Server, reads data, and stores it internally. When a remote system requests data, the data is served in a form that is appropriate to the requesting protocol. In this case the protocol is BACnet IP.

This manual contains additional information about how the Gateway operates as well as instructions on how to setup the connections to the Gateway and how to configure and read data from the Gateway.

The following is a brief description of the sections covered in this manual.

2. Connections

This section contains information about how to connect to the Gateway. It includes block diagrams and any wiring diagrams that are needed.

3. Setting up the Gateway

This section describes how to connect to the Gateway initially and how to set the IP Address

4. Configuring the Gateway

This section has instructions and images of how to configure the Gateway through the web page interface.

5. Reading the Data

This section contains examples of the possible Pulse API data stored on the Gateway and how to read the Reports Page

6. Commissioning, Diagnostics, and Troubleshooting

This section contains details on what to bring to site when installing the Gateway, how to take diagnostics and the tools to use, and how to trouble shoot and take logs.

2. Connections

This section contains information about how to connect to the Gateway. It contains a block diagram and limitations and best practices when connecting the Gateway.

2.1 Block Diagram

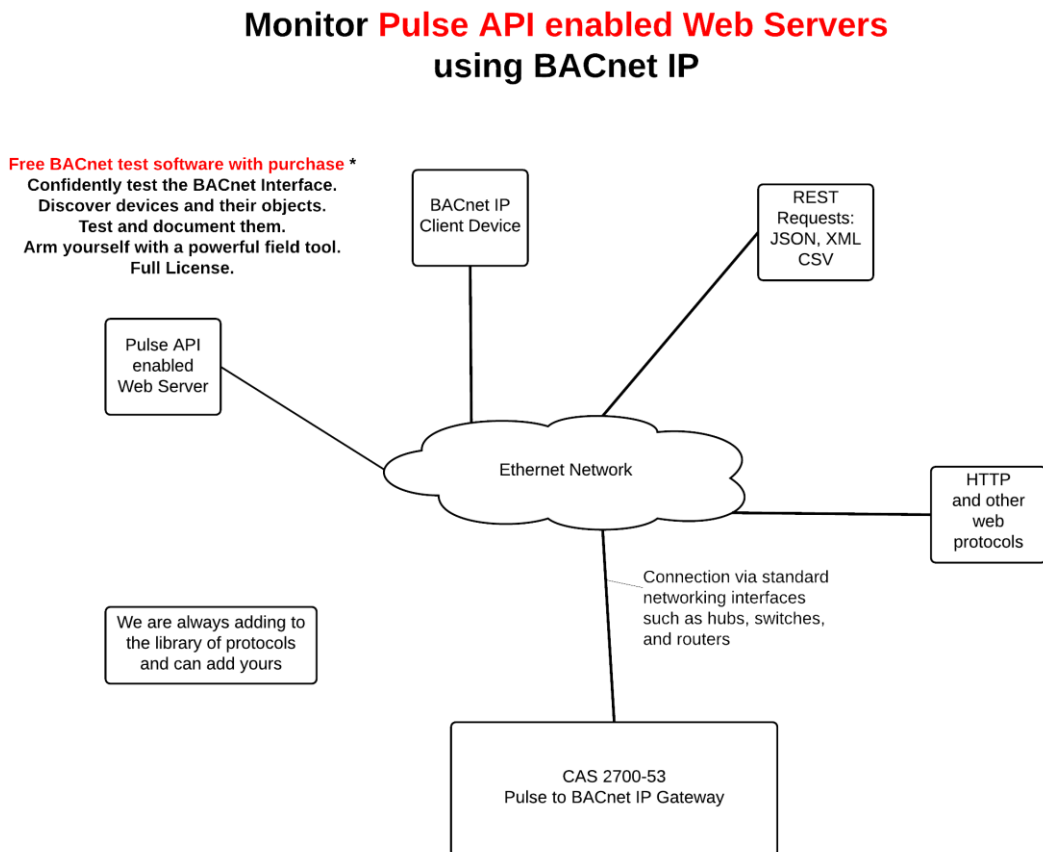


Image 2.1 – Block Diagram of CAS 2700-53 Pulse API to BACnet IP Gateway

2.2 Wiring and Connections

This section contains wiring diagrams for the various connections that are possible for this Gateway. The Gateway has 3 main ports:

Port 0

This port is a RS485 port and is used primarily for Modbus RTU. It can support full and half duplex RS485. This port is **NOT** used by the Pulse API to BACnet IP Gateway.

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Port 1

This port is setup as a RS232 port and is **NOT** used by the Gateway.

Ethernet Port

This port is used by the TCP/IP and UDP drivers of the Gateway. Default port for accessing the internal web server of the Gateway is 80. Since the Pulse Servers use SSL, the Gateway connects to the Pulse Server using port 443.

2.3 Limitations and Best Practices

Maximum Number of Data Points per Gateway

The Gateway can support the polling and serving of 500 data points.

Please contact sales if you require polling more than 500 points.

3. Setting up the Gateway

This section contains information and instructions on what to do when connecting to the Gateway for the first time.

3.1 Determining the IP Address

Before connecting to the Gateway, you will need to determine the IP Address of the Gateway. By default, the Gateway is assigned a Static IP Address of **192.168.1.113** when it is shipped.

To find the IP Address, look on the back of the Gateway. There should be a business card attached to the back of the Gateway that has the IP Address and Reference #. See below for an example



Image 3.1 – Business Card attached to back of CAS Gateway

Take note of the Ref# as this will be used by the support team to pull up additional information about the project.

The IP Address that is written on the business card should be the Static IP Address assigned to the Gateway.

3.2 Connecting to the Gateway

To Change the IP Address of the Gateway (Section 3.3) or to Configure the Gateway (Section 4), you use a PC and connect to the Gateway using an Ethernet cable. (The Ethernet cable should have been provided with the Gateway when shipped).

Before connecting the Ethernet cable, set your computer's IP Address to be similar to the Gateway's IP Address.

For Example, a Gateway is assigned the following IP Address by default:

IP Address – 192.168.1.113

Netmask – 255.255.255.0

Gateway – 192.168.1.1

So set your computer to the following:

IP Address – 192.168.1.100

Netmask – 255.255.255.0

Gateway – 192.168.1.1

After setting the IP Address on the computer, connect the Ethernet cable to the computer and to the Gateway.

3.3 Changing the IP Address

To change the IP Address of the Gateway, you will need to use the IP Setup Tool. The tool can be found on the blue USB stick that should have come with the Gateway.

Run the IP Setup Tool application and you will see the following window open:

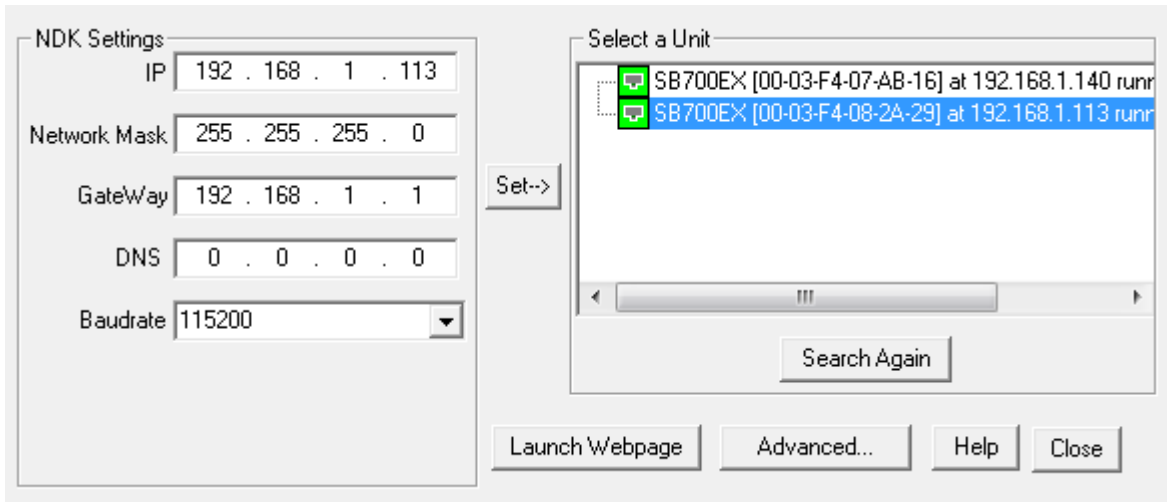


Image 3.3 – IP Setup Tool

The 'Select a Unit' section will have the Gateway you purchased listed with the assigned IP Address.

To change the IP Address, change the fields list on the left side under the 'NDK Settings'

Note: Please do **NOT** change the Baudrate value.

Once you have changed all of the settings, click the 'Set→' button in the middle of the window. The Gateway will automatically reboot to assign the new IP Address.

After you have finished changing the IP Address, you may not see the device in the 'Select a Unit' anymore when pressing the 'Search Again' button. This is because your computer is now on another subnet than the Gateway.

Change your computer back to the original address and you should be able to see the Gateway again when you press the 'Search Again' button.

Now you can add the Gateway to the site network. Note down the new IP Address so that others will know the assigned IP Address.

3.4 Testing the Connection

After changing the IP Address, test the connection to the Gateway.

To test the connection, you can use one of two methods.

1. Open a Web browser and type in the IP Address of the Gateway into the address bar.
2. If the IP Setup Tool is still open, click on the Gateway in the 'Select a Unit' section and press the 'Launch Webpage' button. This will open a Web browser to the start page of the Gateway.

Regardless of the method, you will see the Start Here page of the Gateway. It should be similar to the following:

CAS Gateway Welcome FAQ Drivers

Start Here

1. Connect power and an ethernet cable to the device.
The power LED should illuminate and the ethernet LEDs should periodically blink.
2. Determine the devices IP address.
See: What is the device's IP address and how do I change it?
3. Browse to the system page with a internet browser (Microsoft's Internet explorer, Mozilla's FireFox, Google's Chrome) to ensure that this device is functioning correctly. This page will contain information about the current system and will allow for configuration. This page may be password protected depending on the installation.

[System Page »](#)

Attention

Your device may have been shipped with a **default configuration**. Please contact techincial support for help with configuring your device
To manually configure the CAS gateway please browse to the **System Page**
For additional information please refer to the **Drivers Page**.

More help

We are here to help you.
Please feel free to contact us directly with any questions, comments or suggestions.

Email:	info001@chipkin.com
Phone:	1-866-383-1657 (Toll Free)

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Image 3.4 – CAS Gateway Start Here page

If this page is visible, then the connection to the Gateway is good and you can continue to the next step – Section 4: Configuring the Gateway

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3.5 Logging In For the First Time

If you are browsing the webpages of the Gateway for the first time (or whenever the web browser's cache is cleared), you may be prompted for a user name and password.

By default, when shipped, the Gateway comes with the following username and password:

- Username: admin
- Password: admin

After logging in, it is possible to change the password by accessing the System Page at <http://ip/bin/system> where ip is the IP Address of the Gateway.

Look for the "Change Password" section on the System Page as seen in the image below

Change password
The password must be greater than 4 letters.

Old password	<input type="text"/>
New password	<input type="text"/>
Confirm new password	<input type="text"/>

Image 3.5 – CAS Gateway Change Password

Note: Username will always remain 'admin'

4. Configuring the Gateway

To configure the Pulse API to BACnet IP Gateway, refer to the following instructions:

1. Open a Web Browser
2. Browse to the following Web Page: <http://ip/bin/pulseapi/config/> where ip is the IP Address of the Gateway.

Or by clicking on the PulseAPI Config link highlighted in the image below.



Image 4.1 -Pulse API Configuration Link

You will see the following form:

Pulse API Configuration
BACnet IP Configuration

Port	Device ID	Device Name
47808	389001	Device (389001)

Save BACnet Device

XPathXML_devices
 Actions: Insert | Download as CSV
 Displaying 30 records from 0-2 of a total 2

Image 4.2 –Pulse API Configuration Page

There are two different sections of the form to fill out.

Note: After finishing the configuration, you must save and reboot the Gateway for the configured settings to take place.

4.1 BACnet IP Server Configuration

The parameters for the BACnet IP Server Configuration are as follows: (Default values are **Bolded**)

- **Port:** The port for the UDP connection for BACnet IP. Default Value: **47808**
- **Device ID:** The BACnet Device ID for the Gateway. Default Value: **389001**
- **Device Name:** The name of this BACnet Device. Default Value: **Device (389001)**

Click on the 'Save BACnet Device'. If successful, you will see the following message banner.

Saved BACnet IP Device Configuration successfully. When finished with the complete configuration, please restart the CAS Gateway for any changes to take effect

Image 4.3 –BACnet IP Server Configuration Successful

4.2 Pulse API Configuration

To add Pulse API Data Points to poll, click on the 'Insert' link highlighted below.

XPathXML_devices

Actions: [Insert](#) | [Download as CSV](#)

Displaying 30 records from 0-2 of a total 2

Image 4.4 -Pulse API Configuration Link

A form will appear to add a new Pulse API Data Point.

Insert new record in to 'XPathXML_devices'

Name	Value	Description
Location	Canada ▾	The location where the Pulse data is being hosted.
Pulse Key	<input type="text"/>	The Key provided by Pulse to access the data
Pulse Resource	Spaces ▾	The main resource category of the data to poll. Points are currently not available
Pulse ID	<input type="text"/>	The ID of the resource to poll
Data Resource	Electricity ▾	The data resource category of the State or Point to poll
Data Quantity	ApparentPower ▾	The specific data value to poll
Scan Interval	300	How often to poll for the data value in seconds. Default: 300 (5 mins)

Image 4.5 -Pulse API Configuration Form

The fields for the form are as follows:

- **Location** – The location of the data server. Valid values are Canada or US
- **Pulse Key** – The key provided by Pulse to access the data
- **Pulse Resource** – The main pulse resource. Only States are supported
- **Pulse ID** – The ID of the resource to poll
- **Data Resource** – The data resource of the State or Point to poll
- **Data Quantity** – The specific data value to poll
- **Scan Interval** – How often in seconds to poll for data.

Once the form has been filled out, click the 'insert' button to add the device.

If successful, you will see the data point added as a new row in the table.

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XPathXML_devices

Actions: Insert| Download as CSV

Displaying 30 records from 0-2 of a total 2

Action	ID	Pulse Resource	Pulse ID	Data Resource	Data Quantity	Scan	Pulse Location	Pulse Key
Delete	1	spaces	388	Electricity	ApparentPower	300	Canada	9C3B13239D75E73FDE883C934FF647A1
Delete	2	spaces	387	Electricity	ApparentPower	300	Canada	9C3B13239D75E73FDE883C934FF647A1

Image 4.6 –Pulse API Configuration Successful

Continue adding more data points.

4.3 Saving the Configuration

After adding all the Rib Devices to the configuration, return to the System Page by browsing to the following IP Address: <http://ip/bin/system/> where ip is the IP Address of the Gateway.

To Save the Database, click the 'Save Database' link , then click the Ok button when prompted. You will see some XML saying that the Save was successful. Click the 'Back' button in the web browser.

Now Reboot the Gateway by Clicking the 'Reboot System' link. When prompted, click the Ok button. Link is highlighted in the image below

System Actions

This page is for system wide actions that effect all the drivers.

System

- **Reboot System** - Use this link to send a reboot REST request to the system.
- **Save Database** - Use this link to send a save database REST request to the system.
- **Delete Database** - Use this link to send a delete database REST request to the system.
- **Generate Configuration File** - Use this link to generate a configuration file.

Image 4.7 – System Actions Page – Reboot System

The Gateway will take 30-45 seconds to reboot.

Note: The Gateway must be rebooted after configuration because the BACnet IP Objects are generated during the boot cycle.

5. Reading the Data

The data read by this Gateway is made available through the BACnet IP Protocol. The Gateway acts as a BACnet IP Device. This section describes how the data is formatted, what data is stored as BACnet Points, and what functions are supported.

5.1 BACnet IP Data

The Gateway acts as a BACnet IP Server. Please refer to section 4 – Configuring the Gateway for more information on how to setup the BACnet IP Server parameters.

For more information about BACnet in general, please read this guide:

<http://www.chipkin.com/files/pdf/Bacnet%20For%20Field%20Technicians.pdf>

5.1.1 Supported BACnet Services

The Gateway supports the following BACnet services:

- Who-Is
- Who-Has
- Read Property
- Read Property Multiple
- Write Property
- Write Property Multiple
- Subscribe COV
- Time Synchronization

Note: CAS is always updating the BACnet IP Driver. For a recent list of supported services, please visit www.chipkin.com or contact us. If there are services that you require, please contact us to discuss how we can add them to the driver.

5.1.2 BACnet IP Data

The following is a list of data points that can be configured on the Gateway.

Pulse Resource	Data Resource	Data Quantity	BACnet Object	Read/Write
State	Electricity	ApparentPower	Analog-Input	Read Only
State	Electricity	Energy	Analog-Input	Read Only

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5.2 Reports Page

The reports page gives some additional information about the BACnet Data points. It also lists the current values as well as some notes about what the values mean.

To access the Reports page, type in the following to a web browser address bar:

<http://ip/bin/pulseapi/report> where ip is the IP Address of the Gateway.

Pulse API Reports

Name	BACnet	Value	Units
Space_388_Electricity_ApparentPower	analog_input (1)		kilovolt_amperes
Space_387_Electricity_ApparentPower	analog_input (2)		kilovolt_amperes

6. Commissioning, Diagnostics, and Troubleshooting

6.1 What to Take for Site for Installing and Commissioning the Gateway

The following is a list of general Gateway tools. Take what you would need for your specific project and ignore the others.

1. The gateway and other supplied components.
2. USB->232 Converter and / or USB->RS485 Converter

Any will do. This will allow you run tests using the 232 or 485serial connection. Connect to the device and find out which COM port is now available, use CAS Modbus Scanner to retrieve data.

3. Laptop
4. Gateway IP Address Allocation Tool

Download from

<http://www.chipkin.com/articles/cas-gateway-ip-address-tool>

5. Wireshark packet sniffer software – free download
<http://www.wireshark.org/download.html>
6. CAS Modbus Scanner – free download

CAS Modbus Scanner is a utility to retrieve coils, inputs, holding registers, and input registers from a Modbus enabled device. Values retrieved from the device can be viewed in many different formats including Binary, HEX, Uint16, Int16, Uint32, Int32, and Float32.

<http://www.chipkin.com/cas-modbus-scanner>

7. Serial Mini Tester



8. DB9 and DB25 male and female connector make-up kits (Solder free)

Always useful but not required if you have tested your cable prior to attending the site.

9. Rx / TX cross over.

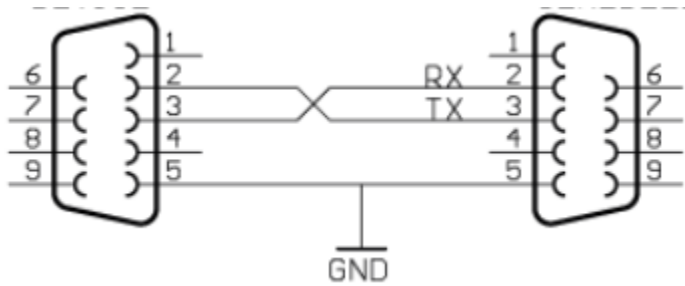
Always useful but not required if you have tested your cable prior to attending the site.

It is useful to be able to swap the conductors connected to pins 2 and 3. Take a module with you. It is easier than changing the wires.

For example, the Ziotek Null Modem Adapter DB25

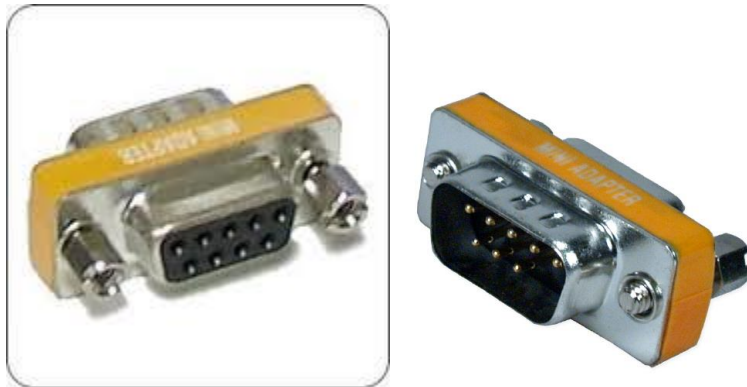
[http://www.cyberguys.com/product-
details/?productid=751&rtn=750&core_cross=SEARCH_DETAIL_SIMILAR#page=page-1](http://www.cyberguys.com/product-details/?productid=751&rtn=750&core_cross=SEARCH_DETAIL_SIMILAR#page=page-1)

female shown



10. Gender Benders

Always useful but not required if you have tested your cable prior to attending the site.



11. Ethernet Patch cables

12. Hub

Used as a last resort if there are problems on Modbus or BACnet

A hub is not a switch. A hub can be used for trouble-shooting whereas only a 'supervised' switch can. Most switches are not supervised.

<http://www.chipkin.com/articles/hubs-vs-switches-using-wireshark-to-sniff-network-packets>

6.2 Diagnostics

Gateway Hardware Diagnostics

1. Power Led: Green Solid = Normal Condition.
2. RJ45 LED: Green to show link.

PulseAPI Driver or General Gateway Software Diagnostics

Open a Web Browser

Type in the following address: <http://ip/bin/system/info>

Example of the Stats Page

TCP443.bytes.sent	0070
TCP443.connection.disconnected	36
TCP443.connection.succeeded	36
XPathXML.System.errors	1
XPathXML.init.success	1
XPathXML.task.1.read	19
XPathXML.task.1.read.Ok	18
XPathXML.task.1.read.error.fail	1
XPathXML.task.1.read.status	OK
XPathXML.task.3.read	18
XPathXML.task.3.read.Ok	18

Stats Page contains statistics of the various components of the driver and tasks of the Gateway. All errors are colored red. When calling Chipkin Automation Systems for Support, please take a screen shot of the Stats Page to give to Technical Support.

6.3 Trouble-Shooting

6.3.1 Taking Logs

Debugging and Error messages from the Gateway are sent on UDP port 514 to the broadcast IP address: {255.255.255.255} as plain ASCII text.

You can use Wireshark to take a log of these messages.

A Wireshark log is also very useful for any TCP (like Modbus TCP) or UDP (like BACnet IP) protocols as the bytes and messages that are sent and received from the Gateway will also be logged.

Note: To properly take a log, a hub (not a switch) is required.

For more help with taking logs, please feel free to contact us.

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6.3.2 Testing BACnet – Use CAS BACnet Explorer

You have been provided with a USB key to the CAS BACnet Explorer. This key activates the software. It cannot run without it. If you don't have your USB key, you can still activate the application – it requires an internet connection. A video provides help.

<http://www.chipkin.com/articles/cas-bacnet-explorer-software-activation-video>

You might also want to refer to these articles.

<http://www.chipkin.com/articles/cas-bacnet-explorer-usbsoftware-activation-problems>

<http://www.chipkin.com/cas-bacnet-explorer-licenses-faq>

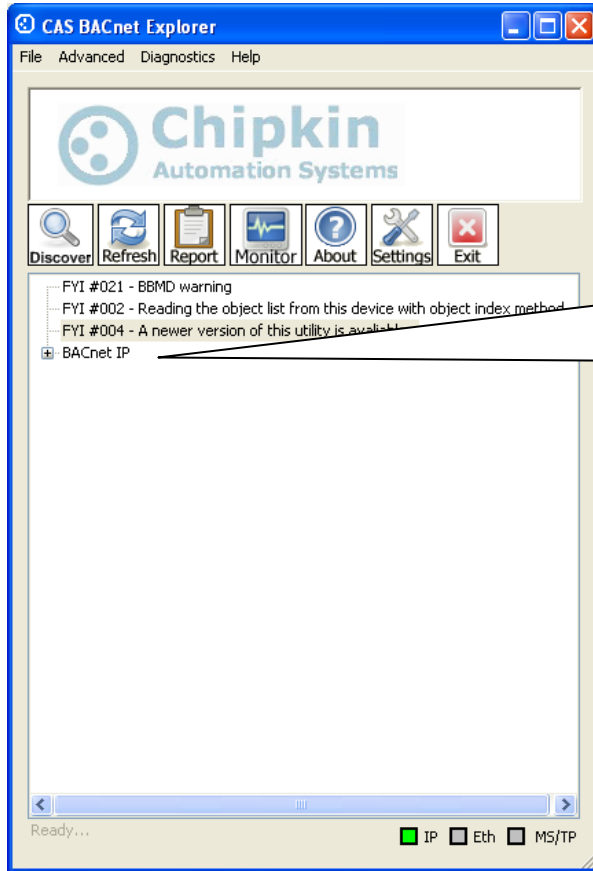
Install and activate the application. Download from here.

<http://www.chipkin.com/cas-bacnet-explorer/>

Procedure

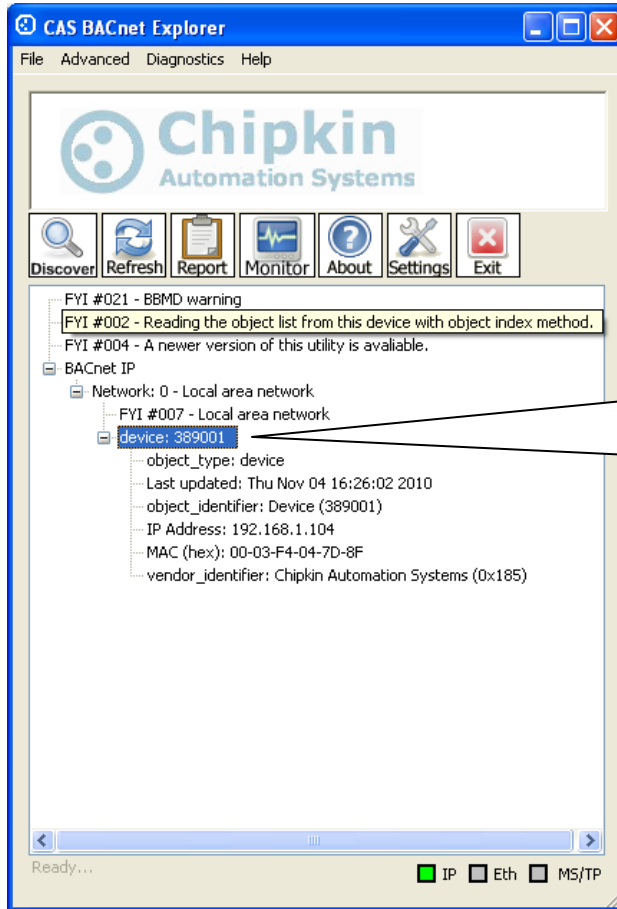
1. Start the application
2. Click Settings
3. Check IP – uncheck MSTP and Ethernet
4. Click on the network card you will use.
5. Click Ok.
6. Now click discover
7. Click Send

See the following set of images that describe the discovery process.

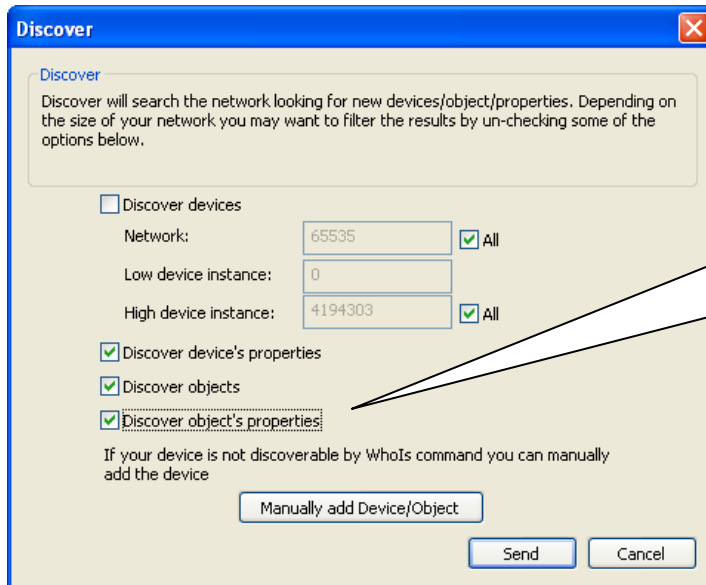


Device(s) were discovered.

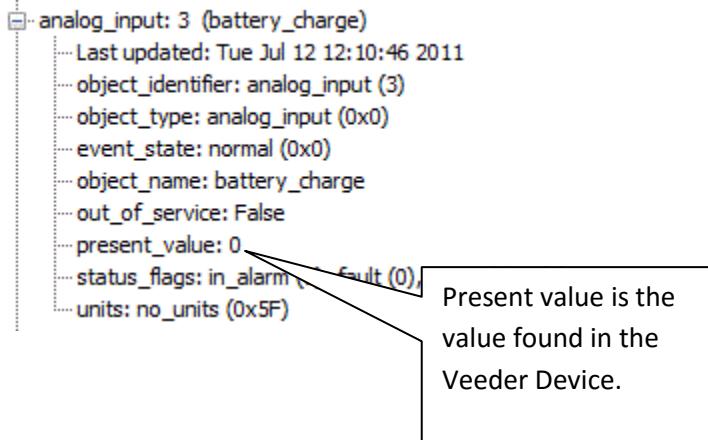
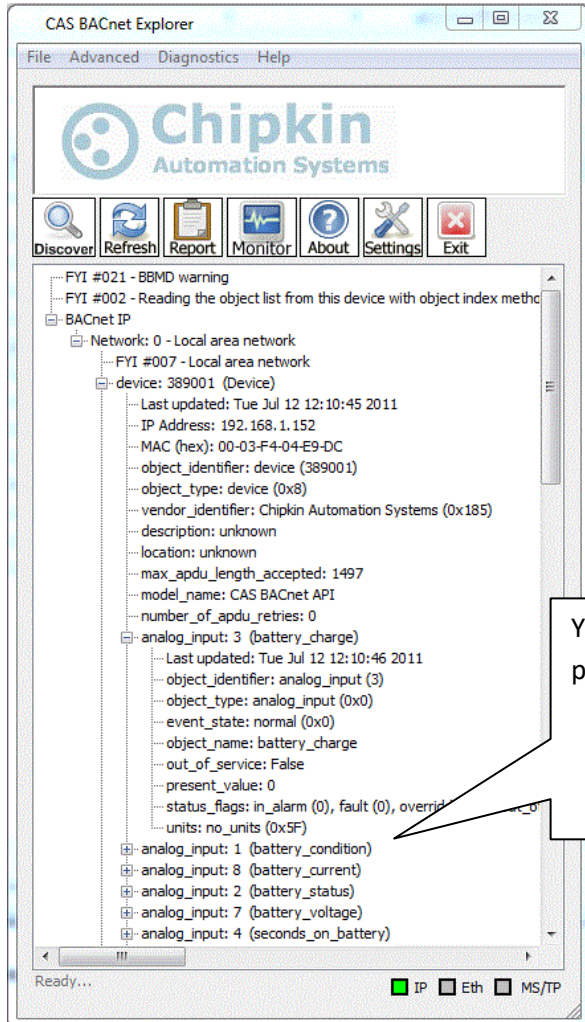
Click the + to open



Select the device and click discover again.



Check the 'Discover properties' box.
Click the Send



6.4 Additional Functionality

6.4.1 Another Method for Changing the IP Address – DHCP

This device supports DHCP, but when shipped, usually a Static IP Address is assigned.

IP = 192.168.1.113

Netmask = 255.255.255.0

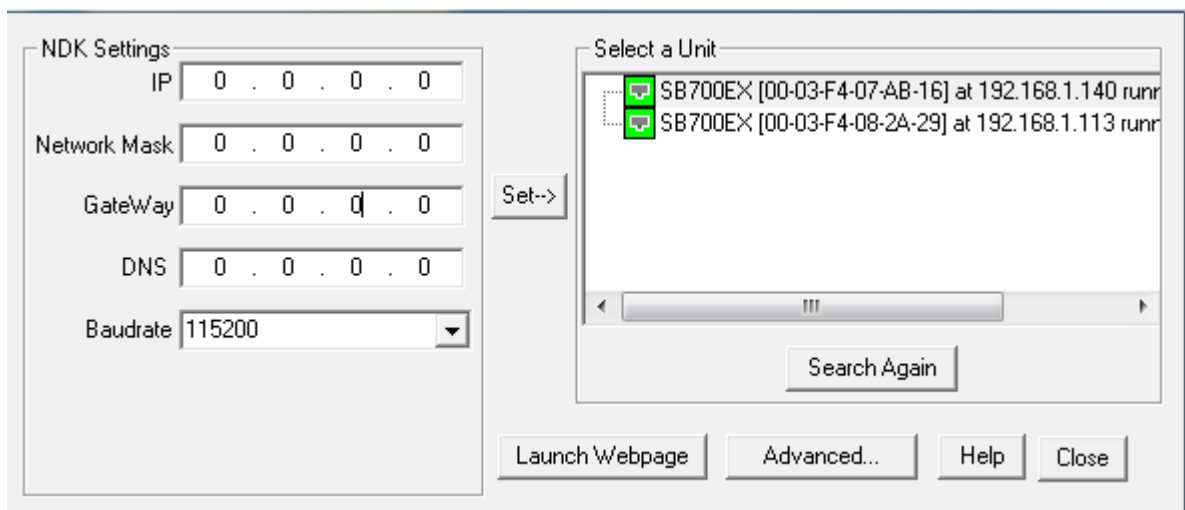
Gateway = 192.168.1.1

To enable and to set the Gateway to DHCP, follow these instructions:

1. Download the tool to change the IP address of the gateway. The tool can be downloaded from:

<http://www.chipkin.com/articles/cas-gateway-ip-address-tool>

2. When you start this tool it discovers gateways and list them in the right had side 'Select a Unit' area. If the area is blank then click the 'Search Again' button. If it remains blank check that the Ethernet connection is made – is there a green link LED on the RJ45 and on the hub/switch you are connected to.



3. To set it to DHCP, simply put all fields to 0.0.0.0 and click the 'Set' button as displayed in the image above.

6.4.2 Downloading New Firmware

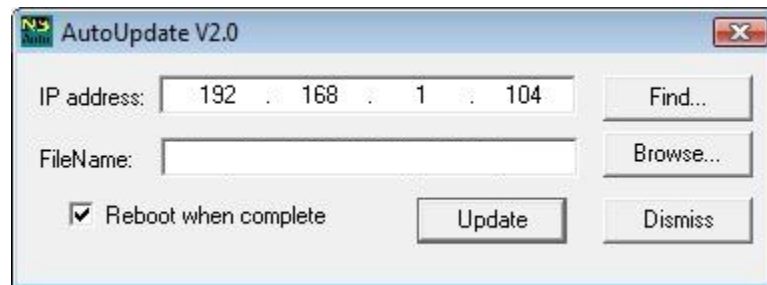
During support, it is sometimes required to download new firmware with bug fixes or additional debugging details.

If you are sent new firmware, you will be provided with specific instructions on how to load it. The following instructions are generic:

A tool is provided. It can be downloaded from

<http://www.chipkin.com/articles/cas-gateway-firmware-download-tool>

Screenshot from the Firmware update tool.



6.5 Support Contact Information

This driver was developed by Chipkin Automation Systems (CAS). CAS is proud to provide support for the driver. For support please call CAS at +1 (866) 383-1657 or contact by email at support@chipkin.com

7. Hardware Specification

- **UL and ULc approved**
- 10/100BaseT with RJ-45 connector
- 1x RS232 Port
- 1x RS485 Port
- 2MBytes flash memory, 8MBytes of SDRAM
- Power: 5-24VDC
- Operating Temperature: 0 to 70 C
- Dimensions: 4.2" x 3.25" x 1"
- LEDs: Link, Speed/Data, Power

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8. Revision History

Date	Resp	Driver Ver.	Doc. Rev.	Comment
03 Dec 2015	ACF	0.02	0	Document Created