

CAS 2500-04 & CAS 2500-04-UL
BACnet IP Data Client
(Hardware and Software Solutions)
Manual

Blank Page

TABLE OF CONTENTS

TABLE OF CONTENTS	3
1. BACnet IP Data Client Description	5
2. Connections	6
2.1. Block Diagram.....	6
2.2. Wiring / Connections.....	7
2.3. Limitations and Best Practices.....	7
3. Configuration	8
3.1. BACnet IP Configuration.....	8
3.2. Trending Settings.....	11
4. Viewing and Retrieving Data	13
4.1. Reports Page.....	13
4.2. Historical Data	13
4.3. Rest Server Functionality.....	14
5. Commissioning, Diagnostics and Trouble Shooting	17
5.1. What to Take to Site for Commissioning.....	17
5.2. Data Client Status	19
5.3. Data Client Diagnostics.....	19
5.4. Data Client Stats	19
5.5. Debug log.....	20
5.6. Another Method for Changing the IP Address – DHCP (CAS 2500-04-UL Only).....	23
5.7. Discovering the Gateway.....	24

- 5.8. Downloading New Firmware..... 24
- 6. Specifications.....26
- 7. Additional Support.....27

1. BACnet IP Data Client Description

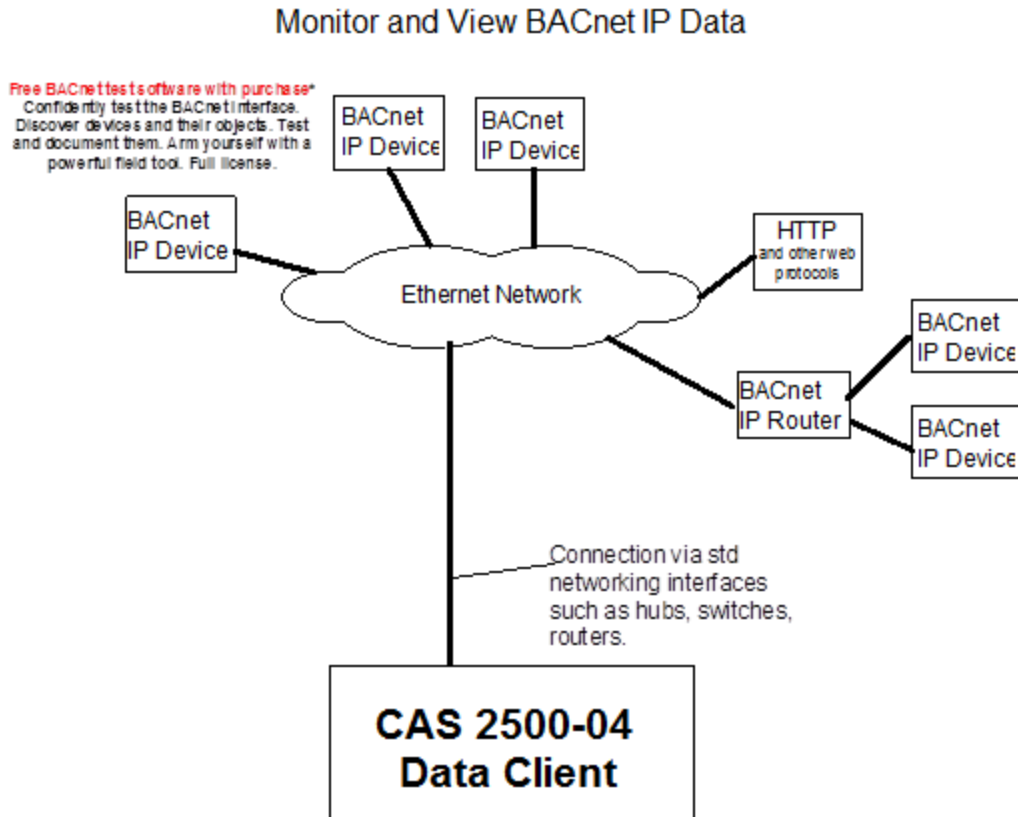
The BACnet IP Data Client (CAS 2500-04 and CAS 2500-04-UL) can connect to one or more BACnet IP devices and poll for properties and values of the objects stored on those devices. The devices can be on the same, or on different, BACnet networks than the BACnet IP Data Client. Devices can be polled even if they are on the other side of a BACnet router.

The Data Client connects BACnet IP Devices, reads data and stores it internally. Users can view the current values of the points they have configured. Users can also set up a historical data store to use as trending data. These values, both current and historical, can be acquired from the Data Client through its Rest Server as XML, CSV, or JSON.

The Data Client requires minimal configuration in order to start polling for values.

2. Connections

2.1. Block Diagram



2.2. Wiring / Connections

To connect the Data Client to an existing BACnet network simply use a standard Ethernet cable.

Note: You may have to change the IP address of the Data Client to be on the same subnet as the other BACnet devices.

Tip: You may want to use a hub in between the Data Client and the rest of the network. This is to help with trouble shooting should anything go wrong with the setup.

2.3. Limitations and Best Practices

Maximum Number of Points polled per Data Client

The Data Client can currently support polling up to 500 BACnet IP properties and values. Should you require polling more points, please feel free to contact us.

3. Configuration

3.1. BACnet IP Configuration

To configure the BACnet IP Points, first open a web browser and browse to the following webpage:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to <http://localhost:8080/bin/bacnetipclient/config/>
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to <http://ip/bin/bacnetipclient/config/> where ip is the IP Address of the Data Client

You will see the following page:

BACnet IP Client

BACnet IP Devices

No BACnet IP devices have been configured yet.

BACnetIP_tasks

Actions: [Insert](#)

Error: Table is empty

To begin configuring a BACnet Point click on the “Insert” link under BACnetIP_tasks. You will see the following form:

BACnet IP Client**Insert new record in to 'BACnetIP_tasks'**

Name	Value
Name	<input type="text"/>
Network	<input type="text"/>
Device ID	<input type="text"/>
IP Address	0.0.0.0
Port	47808
SADR	<input type="text"/>
Object Type	Analog Input ▾
Object ID	<input type="text"/>
Property	present_value ▾
Service	Read Property ▾
Units	no_units ▾
Scan	30

Here is a description of the fields:

- Name:** The name of the task. This can be anything and is used to help identify the task.
- Network:** The network that the BACnet device is on.
- Device ID:** The ID of the BACnet device.
- IP Address:** The IP Address of the BACnet Device.
- Port:** The IP Port for the BACnet Device. (Default is 47808)
- SADR:** OPTIONAL: Used only if trying to poll a device that is on a different network (i.e. through a BACnet Router or BBMD). The Source Address of the BACnet device. Must be in Hex.
- Object Type:** The object type of the BACnet object being polled. Example: Analog Output
- Object ID:** The ID of the BACnet object being polled.
- Property:** The property of the BACnet object being polled. Default: present_value.

- Service:** **Read Property** – Sends a ReadProperty message for the configured object and property
- Read Property Multiple** – Combines other ReadPropertyMultiple tasks into one ReadPropertyMultiple message.
- Units:** The units of the property of the BACnet object being polled. Default: no_units
- Scan:** How often to poll for this object in seconds.

Enter the values into the Fields and click Insert to save them. To cancel changes simply close the page without submitting.

If successful you will see the following page:

BACnet IP Client

Success, Record #1 has been added

BACnet IP Devices

ID	IP Address	Device Instance	Network	SADR	Port
1	192.168.1.200	123456	0		47808

BACnetIP_tasks

Actions: [Insert](#)

Displaying 30 records from 0-1 of a total 1

Action	Id	Data_offset	Device_id	Name	Object_id	Object_type	Object_units	Property	Scan	Service
Edit Delete	1	1	1	Test	1	Analog_input	No_units	Present_value	30	ReadProperty

If there were any errors in any of the fields, you will see a red list of all the fields that had incorrect inputs. For Example:

BACnet IP Client

Invalid DeviceID=[one]: DeviceID value must be a number

Invalid IP Address=[0.0.0.0]: IP Address must be in the form: xxx.xxx.xxx.xxx where xxx is a number between 0 and 255

Invalid Network=[hello]: Network value must be a number

Invalid ObjectID=[123456789987]: ObjectID must be with range 0 - 4194302

Invalid SADR=[LL]: SADR value must be a hex number

Error on Insert: Invalid Input. Changes not saved.

Insert new record in to 'BACnetIP_tasks'

Name	Value	Description
Name	<input type="text" value="Test"/>	The name of the task. This can be anything and is used to help identify the task.
Network	<input type="text" value="hello"/>	The network that the BACnet device is on
Device ID	<input type="text" value="one"/>	The ID of the BACnet device.
IP Address	<input type="text" value="0.0.0.0"/>	The IP Address of the BACnet device
Port	<input type="text" value="47808"/>	The IP Port for the BACnet device. Default: 47808
SADR	<input type="text" value="LL"/>	Optional: The Source Address of the BACnet device. Must be in Hex. Example: 01E843
Object Type	<input type="text" value="Analog Input"/>	The object type of the BACnet object being polled. Example: Analog Output
Object ID	<input type="text" value="123456789987"/>	The ID of the BACnet object being polled.
Property	<input type="text" value="present_value"/>	The units of the property of the BACnet object being polled. Default: no_units
Service	<input type="text" value="Read Property"/>	Read Property: Sends a ReadProperty message for the configured object and property. Read Property Multiple: Combines other ReadProperty/Multiple tasks into one ReadProperty/Multiple message.
Units	<input type="text" value="no_units"/>	The property of the BACnet object being polled. Default: present_value
Scan	<input type="text" value="30"/>	How often to poll for this object in seconds.

Tips: You can edit a task that was just created by clicking on the “Edit” Link after inserting a task. In a like manner, you can also delete a task by clicking on the “Delete” Link.

3.2. Historical Settings

To Setup the Data Client to store historical values, open a web browser and go to the following page:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to <http://localhost:8080/bin/history/>
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to <http://ip/bin/history/> where ip is the IP Address of the Data Client

You will see the following form:

History config

Name	Options
Enabled	<input type="checkbox"/>
Format	On Change ▼
Timeout	3600
Max records count	5000
Archiving Method	Single File ▼
Archive to disk	<input type="checkbox"/>

Total records: 0

Database Archived: 0

Here is a description of the fields:

- Enabled:** Check this box to enable history logging. (Default is Disabled)
- Format:** **Full** – Stores the result of every poll of your device. Note this will fill up the database rather quickly and is not recommended.
On Change – Stores the result of a poll when the values changes or the time expires. Recommended.
- Timeout:** Used with the On Change format. Stores a key frame in the database on a timeout. This value is in seconds. (Default is 3600 = 1 hour)
- Max Record Count:** How many records to keep active in the database before archiving the oldest records. (Default is 1000)
- Archiving Method:** **Single File** – Archives data to a single file
Hourly – Archives data into separate files based on the hour.
Daily – Archives data into separate files based on the day.
Monthly – Archives data into separate files based on the month.
- Archive to Disk:** Check this box to enable archiving to disk. When the max records count is reached, the bottom 20% of records are removed from the database and can be stored to disk if enabled or deleted if disabled. (Default is Disabled)

4. Viewing and Retrieving Data

4.1. Reports Page

Browse to the following web address:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to <http://localhost:8080/bin/reports/>
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to <http://ip/bin/reports/> where ip is the IP Address of the Data Client

The reports page shows the current value of the configured points. It also lists the timestamp of the most recent data and which drivers act upon that one data point. For example:

Reports

This table shows the flow of data within the CAS Gateway.
It will also show the current values of the datapoints as well as the timestamp of when the data was last updated.

Displaying 30 records from 1-2 of a total 2

Actions	Data			Read		Passive		Serve		Write		Mods	
	ID	Value	Modified	Driver	Task	Driver	Task	Driver	Task	Driver	Task	Read from	Stored to
Edit XML CSV JSON	1	0	Never Updated										
Edit XML CSV JSON	2	26.389	2013-07-10T19:16:35+00:00	BACnetIP	Test								

Displaying 30 records from 1-2 of a total 2

4.2. Historical Data

If history is enabled, you can look at all the historical data currently stored internally. To view this data, browse to the following web address:

- If CAS 2500-04 BACnet IP Data Client (Software Version) browse to http://localhost:8080/bin/system/tables?table=da_data_history/
- If CAS 2500-04-UL BACnet IP Data Client (Hardware Version) browse to http://ip/bin/system/tables?table=da_data_history/ where ip is the IP Address of the Data Client

Here is an example of what you could see on this webpage:

da_data_history

Actions: [Insert](#)

Displaying 30 records from 0-3 of a total 3

Action	Id	Data_id	Modified	Name	Value
Edit Delete	1	2	1373488510	Test	26.389
Edit Delete	2	2	1373488540	Test	26.389
Edit Delete	3	2	1373488570	Test	26.389

This table will display all of the currently stored historical values and their timestamps.

If Archive to Disk is enabled, then once this data store fills up, the bottom 20% of the records will be written to a file based on the Archive Method selected.

This file can be found in the file system of the Data Client in the “history” directory.

For the CAS 2500-04 BACnet IP Data Client (Software Version) the history directory can be found in the My Documents/CAS Gateway/history

For the CAS 2500-04-UL BACnet IP Data Client (Hardware Version) the history directory can be found in the root directory. **Note:** You can access these files either through a HTTP Request or through FTP.

4.3. Rest Server Functionality

All the data, including historical values that have not been archived, can be acquired using REST functions. This data is available as XML, JSON, or CSV.

There are two ways to see the data in this manner.

- 1) Browse to the reports page as instructed in Section 4.1 Reports Page. Next to each entry there is a link for XML | CSV | JSON|. Click on one of these options to view the data in that particular format. The example below is for the XML version of the data:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <id>2</id>
  </query>
  ▼<response status="OK" count="1">
    <data id="2" modified="1373489260">26.222</data>
  </response>
</HttpXML>
```

- 2) Type in a web browser the REST function with the correct parameters to get the requested data.

Here is an example of a request for the current XML data of a point:

<http://ip/bin/xml?act=current&id=2>

In this request here are the parameters:

- **ip** is the IP Address of the data client. (If this is the CAS 2500-04 BACnet IP Data Client – Software Version, then the ip will be localhost:8080).
- **xml** the response will be in XML format. Change this to json or csv if you require those formats
- **act=current** is requesting for the current data
- **id=2** is requesting for the data of point with id 2. To find out what the id is of various points, please refer to the Reports Page (See Section 4.1 Reports Page) and look under the ID column to find the ID of the point you wish to request the data.

A successful request will have a response in the format requested. For example, XML:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <id>2</id>
  </query>
  ▼<response status="OK" count="1">
    <data id="2" modified="1373489260">26.222</data>
  </response>
</HttpXML>
```

You can also request all the historical values of a point:

http://ip/bin/xml?act=current&table=da_data_history&data_id=2

This request is a little more complicated, but here are the parameters used:

- **ip** is the IP Address of the data client. (If this is the CAS 2500-04 BACnet IP Data Client – Software Version, then the ip will be localhost:8080).
- **xml** the response will be in XML format. Change this to json or csv if you require those formats
- **act=current** is requesting for the current data
- **table=da_data_history** is requesting data from the history records
- **data_id=2** is requesting for the data of point with id 2. To find out what the id is of various points, please refer to the Reports Page (See Section 4.1 Reports Page) and look under the ID column to find the ID of the point you wish to request the data.

A successful request will have a response in the format requested. For example, XML:

```
▼<HttpXML>
  ▼<query>
    <act>current</act>
    <data_id>2</data_id>
    <table>da_data_history</table>
  </query>
  ▼<response status="OK" count="9">
    <data data_id="2" id="37" modified="1373489590" name="Test">26.000</data>
    <data data_id="2" id="38" modified="1373489620" name="Test">26.000</data>
    <data data_id="2" id="39" modified="1373489650" name="Test">26.111</data>
    <data data_id="2" id="40" modified="1373489680" name="Test">26.111</data>
    <data data_id="2" id="41" modified="1373489710" name="Test">26.000</data>
    <data data_id="2" id="42" modified="1373489740" name="Test">26.000</data>
    <data data_id="2" id="43" modified="1373489770" name="Test">26.111</data>
    <data data_id="2" id="44" modified="1373489800" name="Test">26.111</data>
    <data data_id="2" id="45" modified="1373489830" name="Test">26.111</data>
  </response>
</HttpXML>
```


5. Commissioning, Diagnostics and Trouble Shooting

5.1. What to Take to Site for Commissioning

1. The data client and other supplied components.
2. Serial Cables

A Null Modem cable is used to connect to the Data Client diagnostic port. Take one with you.

3. Laptop
4. Data Client 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 BACnet Explorer

CAS BACnet Explorer is the perfect utility for testing, debugging and discovering BACnet networks and devices. This utility is also good for initially configuring the CAS 2500-04 and CAS 2500-04-UL

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

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

8. Ethernet Patch cables

9. 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>

5.2. Data Client Status

Browse to <http://ip/bin/reports> and you will see the present values of the data points. (See Section 4.1 Reports Page)

If all of the data values are displayed as “-1” (or whatever the configured default value is) then it could mean one of two things.

- 1) The Data Client has just been configured and has begun to poll for values. Wait for a little while for the first couple of scan intervals to finish, and then refresh the page. Current correct values should be displayed.
- 2) The Data Client is not connected to the network. Either the Data Client was never connected, or the Data Client got disconnected from the device.

You must manually refresh this page to get the updated values.

5.3. Data Client Diagnostics

Power Led: Green Solid = Normal Condition.

RJ45 LED: Green to show link.

5.4. Data Client Stats

The stats webpage of the Data Client displays many useful statistics regarding the operation of the Data Client. There are stats recorded for BACnet Bytes Sent, BACnet Messages Received, and many more. Please refer to the stats page to see if there are any errors currently occurring on the Data Client.

The stats page can be found at the following web address:

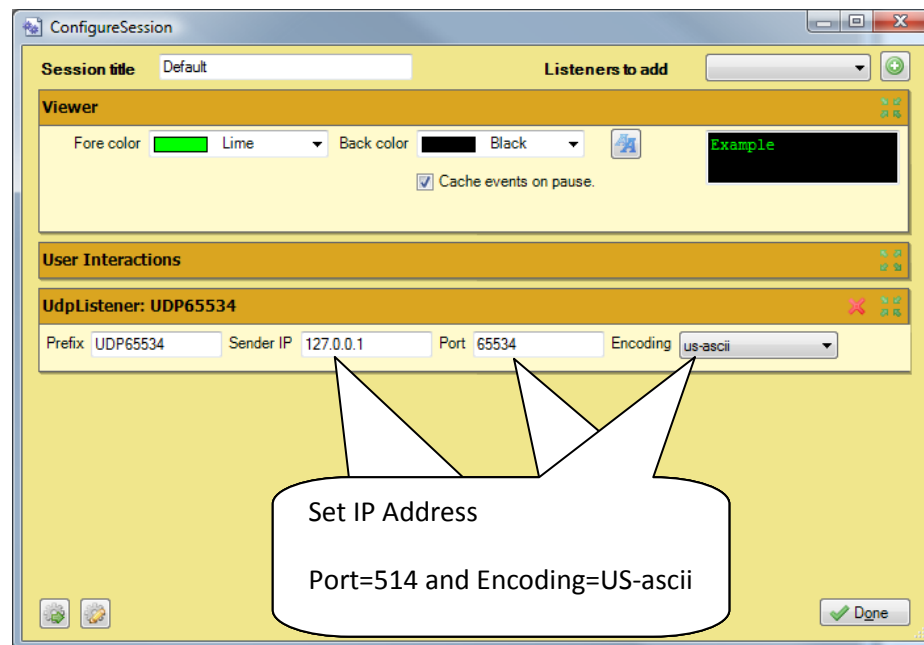
<http://ip/bin/system/info> where ip is the IP Address of the Data Client. (If using the CAS 2500-04 BACnet IP Data Client – Software Version, the ip will be “localhost:8080”).

5.5. Debug log.

The debug messages are sent on UDP port 514 to the broadcast IP address: {255.255.255.255} as plain ASCII text. You can use "logview4net" tool to view and recorded the debug messages as they are sent from the device.

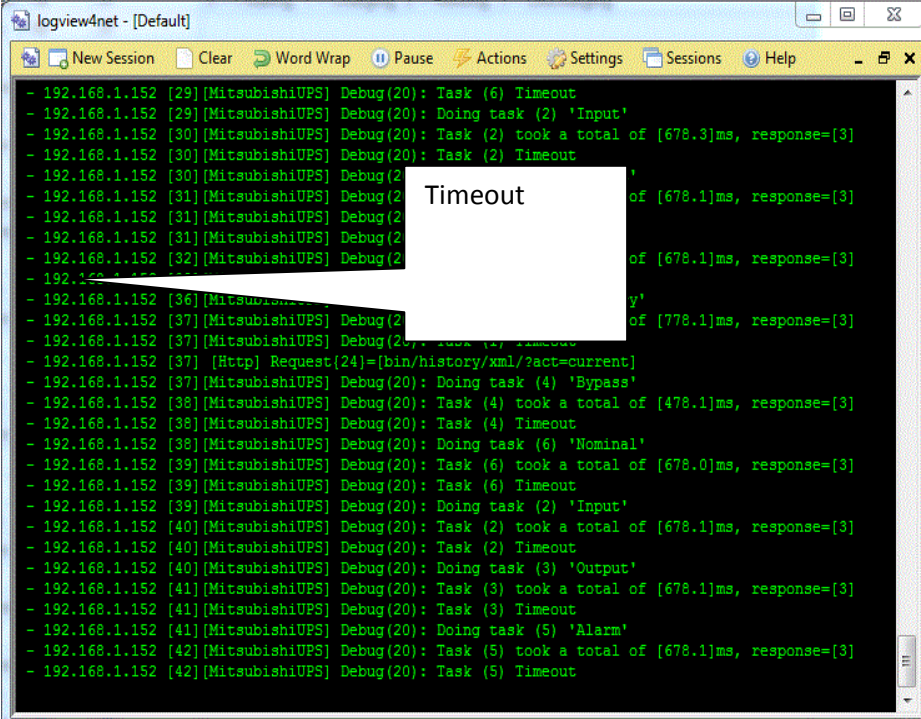
Logview4net

Free and open source tool built to viewing and monitoring logs. It works with many different file formats and protocols including UDP. This tool can be download for "free" from the publishers website <http://logview4net.com/>



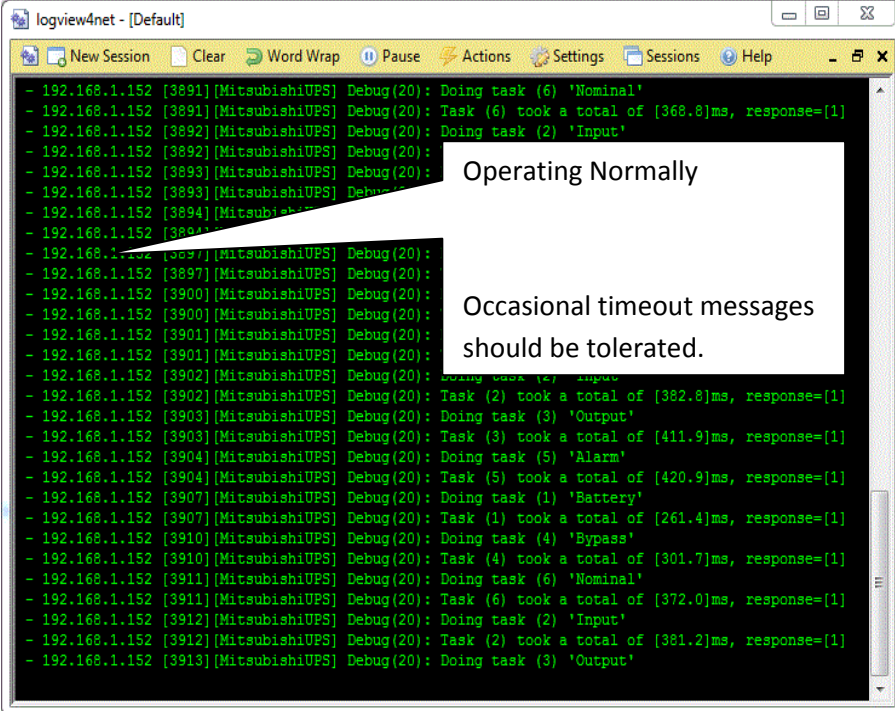


Click Done



```
logview4net - [Default]
New Session Clear Word Wrap Pause Actions Settings Sessions Help
- 192.168.1.152 [29][MitsubishiUPS] Debug(20): Task (6) Timeout
- 192.168.1.152 [29][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) took a total of [678.3]ms, response=[3]
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [30][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [31][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [32][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [32][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [36][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Task (2) took a total of [778.1]ms, response=[3]
- 192.168.1.152 [37] [Http] Request(24)=[bin/history/xml/?act=current]
- 192.168.1.152 [37][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Task (4) took a total of [478.1]ms, response=[3]
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Task (4) Timeout
- 192.168.1.152 [38][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Task (6) took a total of [678.0]ms, response=[3]
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Task (6) Timeout
- 192.168.1.152 [39][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Task (2) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Task (2) Timeout
- 192.168.1.152 [40][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Task (3) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Task (3) Timeout
- 192.168.1.152 [41][MitsubishiUPS] Debug(20): Doing task (5) 'Alarm'
- 192.168.1.152 [42][MitsubishiUPS] Debug(20): Task (5) took a total of [678.1]ms, response=[3]
- 192.168.1.152 [42][MitsubishiUPS] Debug(20): Task (5) Timeout
```

Abnormal operation. No communication with device. Perform Veeder Device Connection Diagnostics.



```
logview4net - [Default]
New Session Clear Word Wrap Pause Actions Settings Sessions Help
- 192.168.1.152 [3891][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [3891][MitsubishiUPS] Debug(20): Task (6) took a total of [368.8]ms, response=[1]
- 192.168.1.152 [3892][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [3892][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3893][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3894][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3894][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3897][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3897][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3900][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3900][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3901][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3901][MitsubishiUPS] Debug(20):
- 192.168.1.152 [3902][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [3902][MitsubishiUPS] Debug(20): Task (2) took a total of [382.8]ms, response=[1]
- 192.168.1.152 [3903][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
- 192.168.1.152 [3903][MitsubishiUPS] Debug(20): Task (3) took a total of [411.9]ms, response=[1]
- 192.168.1.152 [3904][MitsubishiUPS] Debug(20): Doing task (5) 'Alarm'
- 192.168.1.152 [3904][MitsubishiUPS] Debug(20): Task (5) took a total of [420.9]ms, response=[1]
- 192.168.1.152 [3907][MitsubishiUPS] Debug(20): Doing task (1) 'Battery'
- 192.168.1.152 [3907][MitsubishiUPS] Debug(20): Task (1) took a total of [261.4]ms, response=[1]
- 192.168.1.152 [3910][MitsubishiUPS] Debug(20): Doing task (4) 'Bypass'
- 192.168.1.152 [3910][MitsubishiUPS] Debug(20): Task (4) took a total of [301.7]ms, response=[1]
- 192.168.1.152 [3911][MitsubishiUPS] Debug(20): Doing task (6) 'Nominal'
- 192.168.1.152 [3911][MitsubishiUPS] Debug(20): Task (6) took a total of [372.0]ms, response=[1]
- 192.168.1.152 [3912][MitsubishiUPS] Debug(20): Doing task (2) 'Input'
- 192.168.1.152 [3912][MitsubishiUPS] Debug(20): Task (2) took a total of [381.2]ms, response=[1]
- 192.168.1.152 [3913][MitsubishiUPS] Debug(20): Doing task (3) 'Output'
```

Operating Normally

Occasional timeout messages should be tolerated.

Normal Operation.

5.6. Another Method for Changing the IP Address – DHCP (CAS 2500-04-UL Only)

This device supports DHCP and DHCP is disabled.

When shipped the device

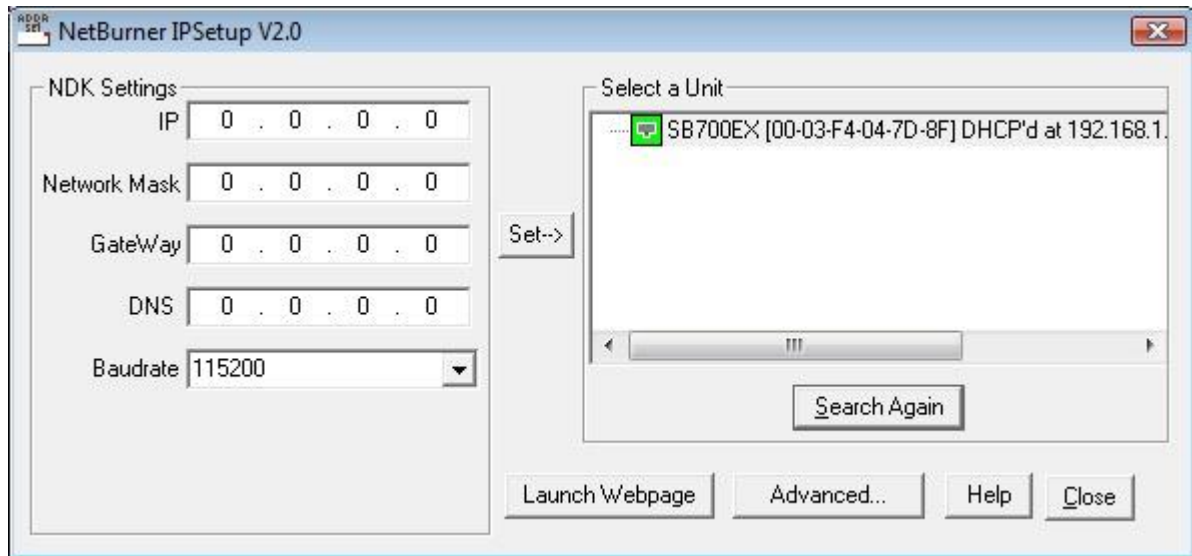
IP:	192.168.1.113
Mask:	255.255.255.0
Default Gateway:	192.168.1.1

If you simply want to change the IP address then use the simpler method provided in section **Error! Reference source not found. Error! Reference source not found..**

A tool is provided to change the IP address of the gateway. The tool can be downloaded from:

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

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.



To change the IP address complete the Fields and click the 'Set' button.

To set it to DHCP, simply put all fields to 0.0.0.0 and click the 'Set' button.

5.7. Discovering the Data Client

Use the tool provided to change the IP address to discover the gateway and learn what its pre-allocated IP address is. See section 5.5 Another Method for Changing the IP Address

5.8. Downloading New Firmware

If you are sent new firmware you will be provided with specific instructions. These are generic – i.e. folder and file names may be different.

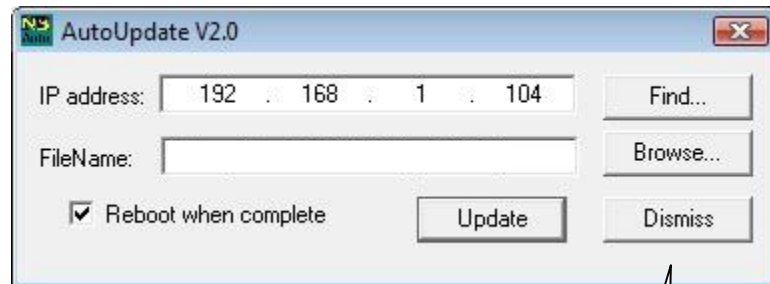
A tool is provided. It can be downloaded from

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■ Tel: (866) 383-1657, ■ Fax: (416) 915-4024 ■

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

Screen Shot from the Firmware update tool.



File name and path may change. You will be provided with specific instructions.

Click to find a gateway (discover)

6. Specifications

- **UL and ULc approved**
- 10/100BaseT with RJ-45 connector
- 1x RS232 Port
- 1x RS485 Port (Different Models have additional ports)
- 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

7. Additional Support

Should you require any additional support, please feel free to contact us by:

Email: support@chipkin.com

Or

Phone: 1-866-383-1657 extension 208

Revision History

Date	Resp	Format	Driver Ver.	Doc. Rev.	Comment
10 Jul 2013	ACF		0.47	0	Document Created