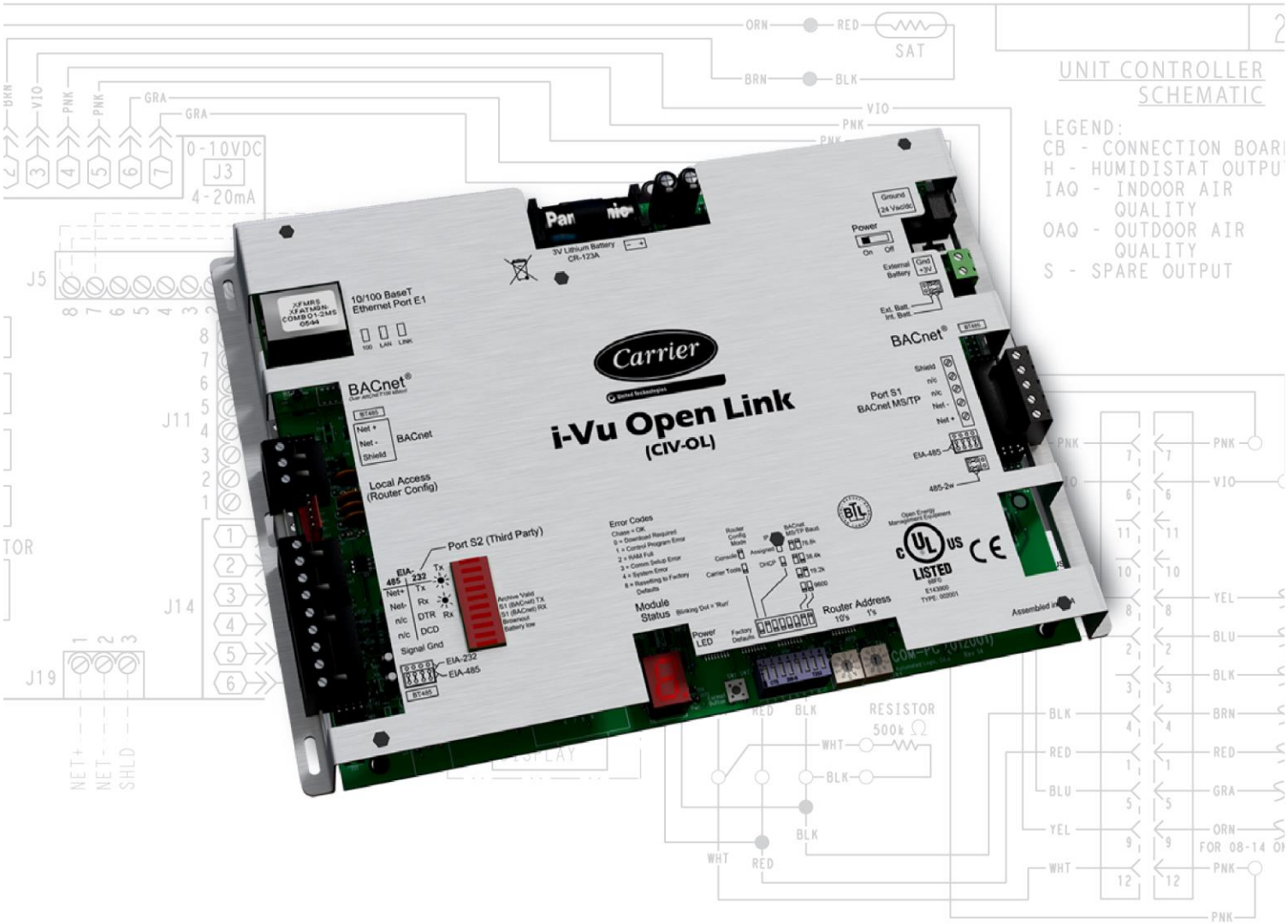
i-Vu Open Link
Installation and Start-up Guide



 Verify that you have the most current version of this document from **www.hvacpartners.com** or **www.accounts.ivusystems.com** or your local Carrier office.

Important changes are listed in **Document revision history** at the end of this document.

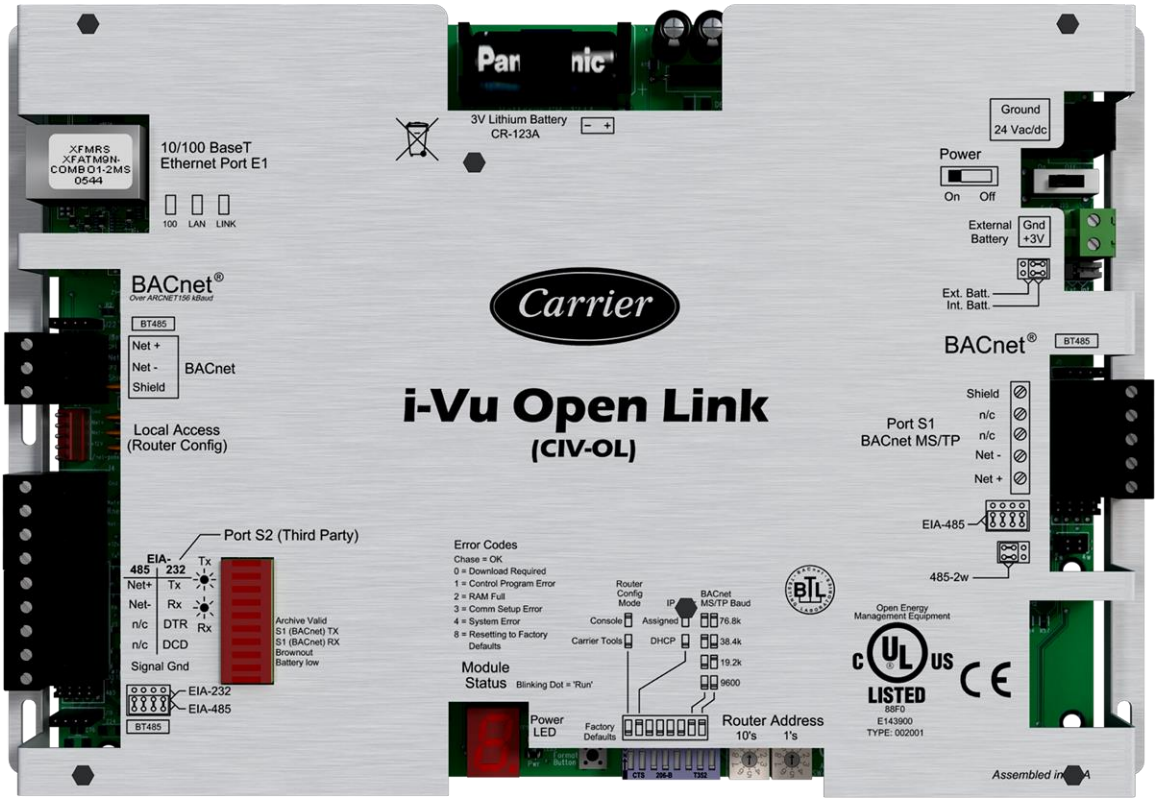
Contents

Introduction

What is a i-Vu® Open Link?

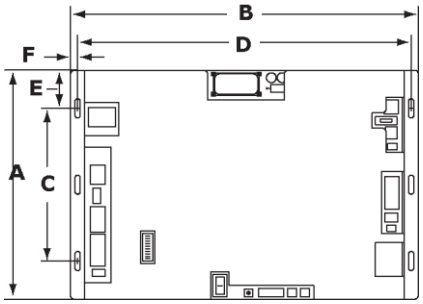
The i-Vu® Open Link is a BACnet device router that acts as a gateway between the BACnet IP network and a BACnet MS/TP network. The i-Vu® Open Link increases the capacity of an Open system, allowing individual MS/TP networks (with up to 60 Open controllers each) to be connected via a common BACnet/IP backbone.

The i-Vu® Open Link can also integrate third-party equipment, supporting BACnet MS/TP, BACnet/IP, Modbus RTU, Modbus/IP, and LON FT-10 protocols. The i-Vu® Open Link has one EIA-485 port for connecting to the Open or third-party MS/TP bus, and one jumper-configurable EIA-232/EIA-485 port for connecting to a Modbus or LonWorks network. It also has one 10/100 Base-T Ethernet port for connecting to the building LAN and integrating to third-party IP control networks.



Specifications

Driver	drv_ivuopenlink_std
Maximum number of Open controllers supported	60
Maximum number of control programs	199
Maximum number of third-party integration points using Snap*†	500
* Depends on available memory † BACnet third-party integration points are not counted.	
Power	24 Vac ±10%, 50–60 Hz 24 VA power consumption 26 Vdc (25 V min, 30 V max) Single Class 2 source only, 100 VA or less
Port E1 (10/100 BaseT Ethernet)	For Ethernet LAN, BACnet/IP, and Modbus TCP/IP communication at 10 or 100 Mbps, half duplex Both **Assigned** (default) and **DHCP** IP addressing are supported and DIP switch selectable
Port S1 (BACnet MS/TP)	For communication with the controller network using BACnet MS/TP at 9600 bps, 19.2 kbps, 38.4 kbps, or 76.8 kbps (DIP switch selectable). Default is 76.8k bps.
BACnet	For communication with the controller network using ARC156 (156 kbps)
Port S2	Configurable EIA-485/EIA-232 port for third-party network connections, including: • Modbus (RTU) - 9600 bps, 19.2 kbps, 38. 4 kbps • LonWorks (requires SLTA-10 adapter)
Local Access (Router Config)	For system start-up and troubleshooting using Field Assistant
Real time clock	Battery-backed real-time clock keeps track of time in event of power failure
Battery	10-year Lithium CR123A battery ensures the following data is retained for a maximum of 720 hours during power outages: • Time • Graphics • Control programs • Editable properties • Schedules • Trends To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns. A low battery is indicated by the **Battery Low** LED or a low battery alarm in the i-Vu® or Field Assistant application, a touchscreen device, and Field Assistant.

Protection	Built-in surge and transient protection for power and communications in compliance with EN61000-6-1. Incoming power and network connections are protected by non-replaceable internal solid-state polyswitches that reset themselves when the condition that causes a fault returns to normal. The power and network connections are also protected against transient excess voltage/surge events lasting no more than 10 msec. **CAUTION** To protect against large electrical surges on serial EIA-485 networks, place a PROT485 at each place wire enters or exits the building.
Status indicators	LED status indicators for **Port S1** and **S2** communication, **Ethernet Port E1** communication, and low battery status. Seven segment status display for running, error, power status, archive valid, and brownout.
Environmental operating range	-20 to 140°F (-29 to 60°C), 10–90% relative humidity, non-condensing
Storage temperature range	-24 to 140°F (-30 to 60°C), 0 to 90% relative humidity, non-condensing
Physical	Rugged aluminum cover, removable screw-type terminal blocks
	
Overall dimensions	A: 7-1/2 in. (19.1 cm) B: 11-5/16 in. (28.7 cm)
Mounting dimensions	C: 5 in. (12.7 cm) D: 10-7/8 in. (27.6 cm) E: 1-1/4 in. (3.2 cm) F: 1/4 in. (.6 cm) Mount with 6-32 by 1/2 in. mounting screws
Depth	1-1/4 in. (3.2 cm)
Weight	1.4 lbs (0.64 kg)
BACnet support	Conforms to the BACnet Building Controller (B-BC) Standard Device Profile as defined in ANSI/ASHRAE Standard 135-2012 (BACnet) Annex L, Protocol Revision 9
Listed by	UL916 (Canadian Std C22.2 No. 205-M1983, CE, FCC Part 15 - Subpart B - Class A

Safety considerations

WARNING Disconnect electrical power to the i-Vu® Open Link before wiring it. Failure to follow this warning could cause electrical shock, personal injury, or damage to the controller.

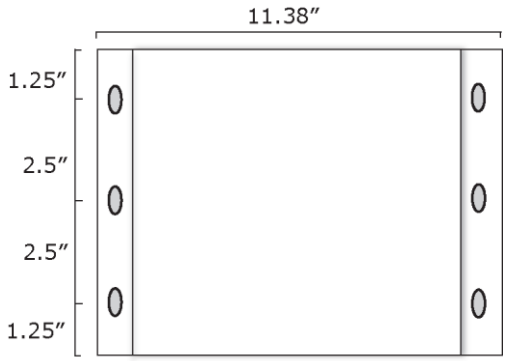
Installing the i-Vu® Open Link

Mounting the i-Vu® Open Link

WARNING

When you handle the i-Vu® Open Link:
- Do not contaminate the printed circuit board with fingerprints, moisture, or any foreign material.
- Do not touch components or leads.
- Handle the board by its edges.
- Isolate from high voltage or electrostatic discharge.
- Ensure that you are properly grounded.

Screw the i-Vu® Open Link into an enclosed panel using the mounting slots on the cover plate. Leave about 2 in. (5 cm) on each side of the controller for wiring.



Wiring the i-Vu® Open Link for power

WARNING Do not apply line voltage (mains voltage) to the controller's ports and terminals.

CAUTIONS

- The i-Vu® Open Link is powered by a Class 2 power source. Take appropriate isolation measures when mounting it in a control panel where non-Class 2 circuits are present.
- Carrier controllers can share a power supply as long as you:
  - Maintain the same polarity.
  - Use the power supply only for Carrier controllers.

To wire for power

1. Make sure the i-Vu® Open Link's power switch is in the **OFF** position to prevent it from powering up before you can verify the correct voltage.
2. Remove power from the power supply.
3. Pull the screw terminal connector from the router's power terminals labeled **24 Vac/Vdc** and **Ground**.
4. Connect the transformer wires to the screw terminal connector.
5. Apply power to the power supply.
6. Measure the voltage at the i-Vu® Open Link's power input terminals to verify that the voltage is within the operating range of 21.6 – 26.4 Vac or 23.4 - 28.6 Vdc.
7. Insert the screw terminal connector into the i-Vu® Open Link's power terminals.
8. Turn **on** the i-Vu® Open Link's power.
9. Verify that the Run LED (a dot in the lower right corner of the **Module Status** LED) begins blinking. The **Module Status** LED will display **8** for about 5 seconds and then reverts to **0,** until controllers have been found and downloaded. There is a chase pattern when the router is running with no errors.

Addressing the i-Vu® Open Link

i-Vu Open Control hardware, when used in conjunction with i-Vu Open routers (i-Vu® Open Link and i-Vu® Open Router), has a convenient feature of automatic addressing. To address the i-Vu® Open Link for third-party integration, using i-Vu® or Field Assistant, go to **Driver Properties** > **Protocols** > **Properties** tab. Refer to the appropriate protocol *Integration Guide* for further details.

The i-Vu® Open Link needs two addresses, one for the Open network and one for the IP Network.

The i-Vu® Open Link needs...	**That is unique on the...**	**Notes**
A router address	Open network	You set the i-Vu® Open Link address on the controller's rotary switches. (1 - 99) **NOTE** The i-Vu® Open Link address is also used to auto-generate the BACnet device instance/name for the router and the MS/TP network number for the connected Open network. See *Configuring BACnet device instance and network number*.
An IP address	IP Network	Set the **IP Addr** DIP switch to choose one of the following: • **DHCP —** to obtain an IP address from a DHCP server If there is no DHCP server, the following are the default IP settings: ○ 192.168.168.xx, where xx = router address ○ subnet mask = 255.255.255.0 ○ default gateway = 192.168.168.254 • **Assigned** — a **custom** IP address

To set the i-Vu® Open Link address on the Open network

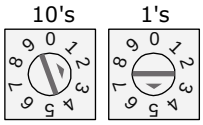
CAUTION The i-Vu® Open Link address must be unique on the IP and Open network.

1 If wired for power, turn off the power.

NOTE The i-Vu® Open Link only reads the rotary switch positions during power up or upon reset.

2 Use the rotary switches to set the address. Set the **Tens** (**10's**) switch to the tens digit of the address, and set the **Ones** (**1's**) switch to the ones digit. Valid addresses are 1 - 99.

EXAMPLE If the controller's address is 25, point the arrow on the **Tens** (**10's**) switch to 2 and the arrow on the **Ones** (**1's**) switch to 5.



3 Turn on the i-Vu® Open Link's power.

CAUTION The factory default setting is **00** and must be changed to successfully install your i-Vu® Open Link.

To choose an IP addressing scheme

Carefully plan your addressing scheme to avoid duplicate IP addresses.

- If there is a DHCP server on the network, and, if you have a single i-Vu® Open Link or multiple i-Vu® Open Links that exist on the SAME subnet, use DHCP addressing. Skip to the section *To obtain an IP address using DHCP* (page 7).
- If you have multiple i-Vu® Open Links that reside on different subnets, you cannot use DHCP addressing. Instead, give each i-Vu® Open Link an assigned IP address. Skip to the section *To assign a custom IP address* (page 8).

  NOTE This network configuration also requires that you configure IP Broadcast Management Devices (BBMDs). See *To set up BACnet Broadcast Management Devices.* (page 17)

To obtain an IP address using DHCP

1 Turn the i-Vu® Open Link's power off.

2 Set the **IP Addr** DIP switch **DHCP** to **On**.

3 Turn the i-Vu® Open Link's power on. The DHCP server assigns an IP address to the i-Vu® Open Link.

CAUTION If the DHCP server is not found, the following default IP address settings will be used:

- IP address = 192.168.168.xx, where xx = i-Vu® Open Link address (rotary switch settings)
- Subnet Mask = 255.255.255.0
- Default Gateway = 192.168.168.254

To assign a custom IP address

1 Obtain the IP address, subnet mask, and default gateway address for the router from the facility network administrator.

2 Turn the i-Vu® Open Link's power off.

3 Set the i-Vu® Open Link's **IP Addr** DIP switch **Assigned** to **On**.

4 Configure the i-Vu® Open Link by setting the **Router Config Mode** DIP switch **Console** to **On** using a terminal program such as PuTTY or Hyperterminal.

5 Turn the i-Vu® Open Link's power on.

PREREQUISITES

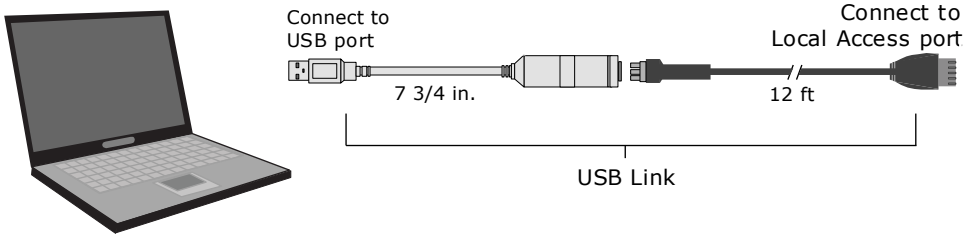
- A computer with a USB port
- A USB Link cable — See *To communicate through the Local Access port with a USB Link* (page 13)

CAUTION If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller's ground and the computer's AC power ground could damage the USB Link and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link. Purchase a USB isolator online from a third-party manufacturer.

Using PuTTY

1 Download and install PuTTY from the *PuTTY website* (*http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html*).

2 Connect the laptop to the local access port of the router, ZS sensor, or an SPT sensor using the USB Link cable(s).



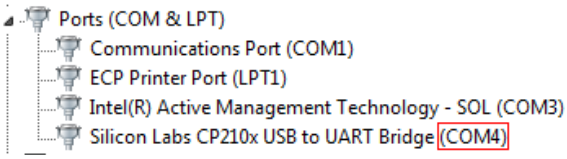
NOTE If using a USB isolator, plug the isolator into your computer's USB port, and then plug the USB Link cable into the isolator.

3 To change a router's IP address, subnet mask, or default gateway, set its **IP Address** DIP switch to **Assigned**.

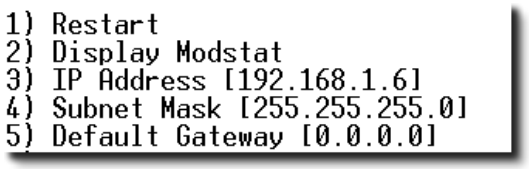
4 Start PuTTY.

5 Under **Category** > **Connection**, select **Serial**.

6 Under **Options controlling local serial lines**, enter the following settings:

Field	Value
Serial line to connect to	Replace X with the computer's port number that the USB Link cable is connected to. **NOTE** To find the port number, select **Start** > **Control Panel** > **System** > **Device Manager** > **Ports (Com & LPT)**. The COM port number is beside **Silicon Labs CP210x USB to UART Bridge**. 
Speed (baud)	115200
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

7 Click **Open**. A window similar to the one below appears.



8 Do one of the following:

- To change a property value:
  a. Type the number of the property, then press **Enter**.
  b. Type the new value, then press **Enter**.
- To take an action, type number of the action, then press **Enter**.

9 If you changed a value, type `1`, then press **Enter** to restart the controller.

10 Close PuTTY.

11 Verify that you can communicate with the i-Vu® Open Link by issuing a PING command to the IP address specified in step 12.

NOTE Your computer must be on the same subnet as the i-Vu® Open Link for the PING command to work.

12 When finished, set the i-Vu® Open Link's **Router Config Mode** DIP switch to **OFF** to restore normal functionality to the Local Access port.

13 Cycle the i-Vu® Open Link's power to accept the **Router Config Mode** changes.

Wiring for communications

The i-Vu® Open Link has multiple ports. See table below for port descriptions.

Port	Protocol	Port type(s)	Baud rate(s)	Use for
Ethernet Port E1	BACnet/IP	Ethernet	10 Mbps 100 Mbps	LAN connection
BACnet	ARC156	EIA-485 (2-wire)	156 kbps	Open network connection
S1	BACnet MS/TP	EIA-485 (2-wire)	DIP Switch selectable: • 9600 bps • 19.2 kbps • 38.4 kbps • 76.8 kbps (default)	Open network connection
S2*	Modbus LonWorks	EIA-485 EIA-232	DIP switch selectable	Third-party communication
Local Access	N/A	Rnet	115.2 kbps	• Router configuration • System start-up and troubleshooting

* The **Router Config Mode** DIP switch **Console** must be **Off** (down position) to use Port S2.

Ethernet, BACnet MS/TP, and ARC156 wiring specifications

For...	Use...	Maximum Length
Ethernet	CAT5e or higher Ethernet cable	328 feet (100 meters)
BACnet MS/TP* BACnet ARC156*	22 or 24 AWG, low-capacitance, twisted, stranded, shielded copper wire	2000 feet (610 meters)

*For details see the *Open Controller Network Wiring Guide*.

WARNING Do not apply line voltage (mains voltage) to the controller's ports and terminals.

To connect the i-Vu® Open Link to the Ethernet

Connect an Ethernet cable to the **Ethernet Port E1**.

To wire the BACnet MS/TP network

1. Turn the i-Vu® Open Link's power off.
2. Check the communications wiring for shorts and grounds.
3. Verify that the **Port S1** jumpers are set to **485-2w**.
4. Set the MS/TP baud rate DIP switches **7** and **8** to match the baud rate of the Open network. The default is 76.8k.
5. Connect the i-Vu® Open Link's **Port S1** to the Open MS/TP network. Use the same polarity throughout the network segment.

Wire the Port S1 terminal...	To this Open controller terminal...
Shield (Pin 1)	**Shield**
Net- (Pin 4)	**Net-**
Net+ (Pin 5)	**Net+**

6. Turn the i-Vu® Open Link's power on.

To wire to a BACnet ARC156 network

1. Turn **off** the i-Vu® Open Link's power.
2. Check the communications wiring for shorts and grounds.
3. Connect the communications wiring to the controller's screw terminals labeled **Net +**, **Net -**, and **Shield** on the **BACnet** port.

   NOTE Use the same polarity throughout the network segment.
4. If the i-Vu® Open Link is at either end of a network segment, connect a BT485 to the i-Vu® Open Link.
5. Turn **on** the i-Vu® Open Link's power.
6. Verify communication with the network by viewing a Module Status report in the i-Vu® or Field Assistant interface.

To wire Modbus or LonWorks devices

1. Turn off the i-Vu® Open Link's power.
2. Check the communications wiring for shorts and grounds.
3. Set the **Router Config Mode** DIP switch **Console** to **Off** (down position).
4. Wire the i-Vu® Open Link's Port S2 to the third-party device, then set the S2 jumper. See table and notes below.
5. Turn on the i-Vu® Open Link's power.

For...	Use i-Vu® Open Link port...	Wire Carrier terminal...	...to third-party device terminal	Set the port's jumper(s) on i-Vu® Open Link
EIA-232	S2	TX Rx Signal Ground	Rx Tx Gnd	EIA-232
EIA-485, 2-wire	S2	Net+ Net-	+ -	EIA-485 2-wire

NOTES

- If you cannot determine the media type or connections of the third-party device, contact your third-party representative.
- Use the same polarity throughout the network segment.
- Repeaters are required for more than 31 devices. See your third-party device manufacturer's recommendations.
- To reduce communication and data errors, terminate each end of an EIA-485 network with a resistor whose value equals the network's characteristic impedance. Some third-party manufacturers provide a built-in resistor that you enable or disable with a jumper. Make sure that only devices at the end of a network have termination enabled.

  EXAMPLE If an EIA-485 2-wire network's characteristic impedance is 120 Ohms, terminate one pair by placing a 120 Ohm resistor across the **Net+** and **NET-** connectors of the i-Vu® Open Link. Terminate the other pair by placing a 120 Ohm resistor across the **+** and **-** connectors of the furthest third-party controller.
- A solid receive light on the i-Vu® Open Link indicates a wiring or polarity problem.

Communicating through the Local Access port with a USB Link

Using a computer and a USB Link, you can communicate locally with the i-Vu® Open Link to download or to troubleshoot.

CAUTIONS

- Maintain polarity when controllers share power.
- Failure to maintain polarity while using the USB Link on a computer that is grounded via its AC adapter may damage the USB Link and the controller.
- If multiple controllers share power but polarity was not maintained when they were wired, the difference between the controller's ground and the computer's AC power ground could damage the USB Link and the controller. If you are not sure of the wiring polarity, use a USB isolator between the computer and the USB Link. Purchase a USB isolator online from a third-party manufacturer. Plug the isolator into your computer's USB port, and then plug the USB Link cable into the isolator.

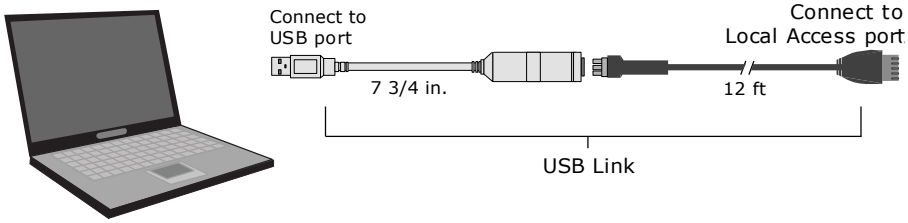
PREREQUISITES

- For the i-Vu® or Field Assistant application to communicate with the controller, the controller must have been downloaded with at least its driver.
- Laptop with USB port
- USB Link (Part #USB-L)

Using a USB Link

1 The USB Link driver is installed with an i-Vu® or Field Assistant v5 or later system. But if needed, you can get the latest driver from *http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx*. Install the driver before you connect the USB Link to your computer.

2 Connect the laptop to the controller or sensor using the appropriate USB Link cable(s).



NOTE If using a USB isolator, plug the isolator into your computer's USB port, and then plug the USB Link cable into the isolator.

3 Set the controller's **Router Config Mode** DIP switch.

To communicate in...	Set switch to...
The i-Vu® or Field Assistant application	Off
PuTTY	On
NOTE See *To communicating using PuTTY* (page 14)	

4 Turn the controller's power off, then on again.

To communicate using PuTTY

You can connect a computer to a controller's Local Access port and use PuTTY, a free open source terminal emulation program, to:

- Set the baud rate for Port S1 on the i-Vu® Open Link
- Set controller properties, such as IP address and network information
- Retrieve a Modstat

PREREQUISITES

- A computer with a USB port
- A USB Link cable
  NOTE The USB Link driver is installed with an i-Vu® or Field Assistant v5 or later system. But if needed, you can get the latest driver from *http://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx*. Install the driver before you connect the USB Link to your computer.

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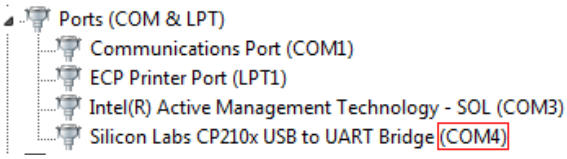
Using PuTTY

1. Download and install PuTTY from the *PuTTY website* (*http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html*).
2. Connect the laptop to the controller or sensor using the appropriate USB Link cable(s), as described above.
3. To change a router's IP address, subnet mask, or default gateway, set its **IP Address** DIP switch to **Assigned**.
4. Start PuTTY.
5. Under **Category** > **Connection**, select **Serial**.

6 Under **Options controlling local serial lines**, enter the following settings:

Field	Value
Serial line to connect to	Replace X with the computer's port number that the USB Link cable is connected to. **NOTE** To find the port number, select **Start** > **Control Panel** > **System** > **Device Manager** > **Ports (Com & LPT)**. The COM port number is beside **Silicon Labs CP210x USB to UART Bridge**. 
Speed (baud)	115200
Data Bits	8
Stop Bits	1
Parity	None
Flow Control	None

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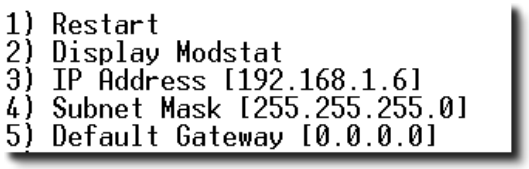

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- To change a property value:
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  b. Type the new value, then press **Enter**.
- To take an action, type number of the action, then press **Enter**.

9 If you changed a value, type `1`, then press **Enter** to restart the controller.

10 Close PuTTY.

Configuring BACnet Device Instance and network number

All BACnet Open controllers must have a unique Device Instance and Name. These BACnet addresses are automatically generated and usually do not require modification. However, sometimes you need to override the automatic addressing assignments.

Autogenerated addressing scheme:

The i-Vu® Open Link's rotary address setting determines the automatic BACnet addressing scheme for the connected Open network.

Legend

16 = Carrier's BACnet Vendor ID
xx = i-Vu® Open Link's rotary switch address (BACnet Device Instance address)
yy = Open controller's rotary switch address (MS/TP MAC address)

For the i-Vu® Open Link:

- BACnet Device Instance Number = 1600xx
- BACnet Device Instance Name = device1600xx
- BACnet IP Network Number = 1600
- BACnet MS/TP Network Number = 161xx
- BACnet ARC156 Network Number = 163xx
- Port S1 MS/TP MAC Address = 0 (fixed)

For the Open controllers connected to the i-Vu® Open Link

- BACnet MS/TP Device Instance Number = 161xxyy
- BACnet ARC156 Device Instance Number = 163xxyy
- BACnet MS/TP Device Instance Name = device161xxyy
- BACnet ARC156 Device Instance Name = device163xxyy
- BACnet MS/TP or ARC156 MAC Address = yy
- BACnet MS/TP Network Number = 161xx (learned from the router, defaults to 16101 if no i-Vu® Open Link is operating)

If the BACnet automatic settings need to be changed, launch the **Router Configuration** utility using a terminal program. See *To assign a custom IP address* (page 8) for instructions on connecting to and using a terminal program.

To change the BACnet settings:

1 Enter the BACnet selection# from the menu. Type the new setting and click **Enter**. The new setting will appear on the **Router Configuration** screen.

2 Cycle power to the router for the new settings to take effect.

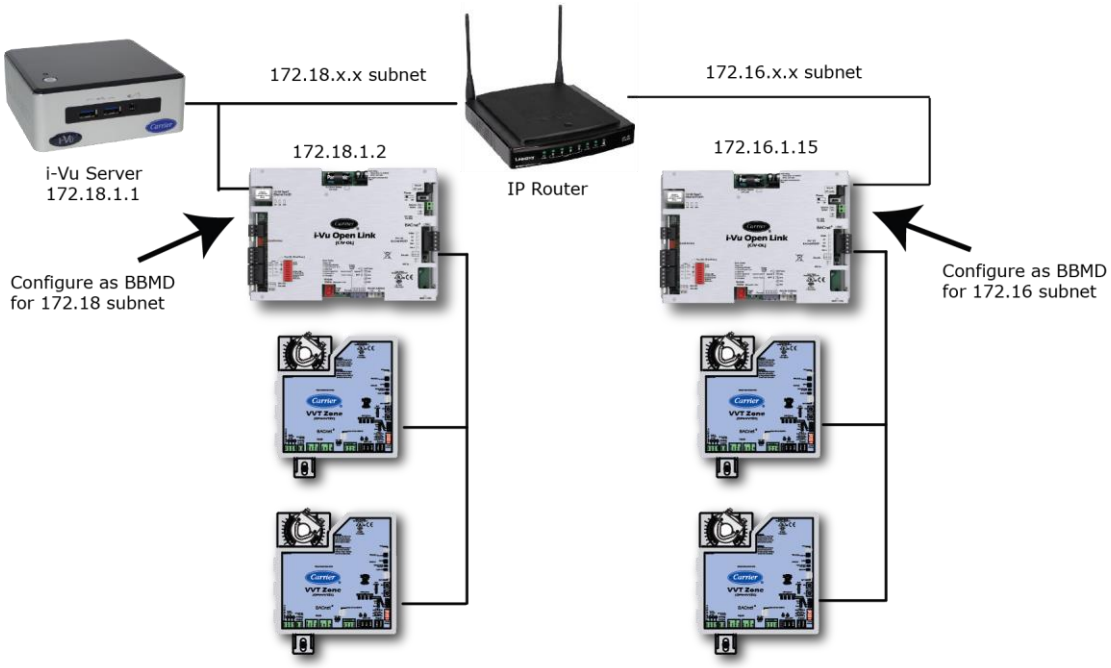
NOTE If the BACnet MS/TP or ARC156 network number of the router is assigned and not auto-generated, and the Open controllers connected to that router are set such that their BACnet settings are auto-generated, then the Open controller BACnet settings will be auto-generated based on the assigned MS/TP network number in the router:

Example A router's BACnet MS/TP or ARC156 network has been assigned to 200.

If the connected Open controllers are using autogenerate, then their settings will be:

- BACnet MS/TP Network Number = 200
- BACnet Device Instance Number = 200yy
- BACnet Device Instance Name = device200yy
- BACnet MS/TP MAC Address = yy

To set up BACnet Broadcast Management Devices (BBMDs)



If your system has multiple routers that reside on different IP subnets, you must set up one router on each IP subnet as a BACnet/IP Broadcast Management Device (BBMD).

Every subnet with a router must have a BBMD configured in order for broadcasts from routers on that subnet to reach the rest of the routers on the network.

NOTES

- The i-Vu® Standard or Plus application - If the i-Vu® web server is on a separate subnet than the rest of the routers, the internal router must be assigned a routable IP address and configured as a BBMD.
- The i-Vu® Pro application - If the i-Vu® Pro server is on a separate subnet than the rest of the routers, you must register it as a foreign device to a router acting as a BBMD device.

Use the **BBMD Configuration Tool** to:

- Write/read the **Broadcast Distribution Table** (BDT) of each BBMD device
- Allow controllers on one subnet to communicate with controllers on other subnets
- Enable the i-Vu® application to see, upload, or configure controllers on different subnets

To set up BBMDs using the BBMD Configuration Tool

1 Assign an IP address, subnet mask, and default gateway for each i-Vu® Open Link on the IP network. See *Addressing the i-Vu® Open Link* (page 6).

2 Acquire the **BBMD Configuration Tool** from the Tech Tools USB drive or from either of the *Carrier Control Systems Support Sites http://www.hvacpartners.com/*, *https://accounts.ivusystems.com/*. This is a stand-alone executable file and no installation is necessary.

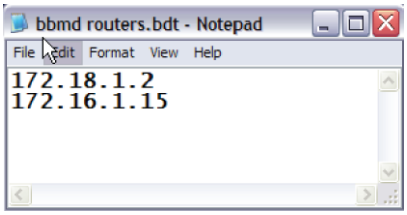
3 Make a list of the IP addresses for each router that will function as a BBMD in your system.

In the above illustration, the Carrier router, address 172.18.1.2, must be configured as a BBMD for the 172.18 subnet, while the Carrier router, address 172.16.1.15, must be configured as a BBMD for the 172.16 subnet.

CAUTIONS

- Define only one BBMD per subnet. Multiple BBMDs on an IP subnet disrupt network communications.
- Unless explicitly modified, the UDP Port for BACnet/IP is 0xBAC0 (47808). Do not change this parameter unless you made a change in the router.

4 In a text editor such as Notepad, create a list of the routers that will be BBMDs. List each IP address on a separate line. (Maximum of 50 IP addresses per file)



5 Save the file to your folder of choice with a .bdt extension instead of .txt.

NOTE ".bdt" is a **Broadcast Distribution Table** file.

6 Open the **BBMD Configuration Tool**.

7 In the **IP Address** or **Host Name** field, type the IP address of the router that functions as the BBMD (BACnet Broadcast Management Device) for its subnet.

8 To check if the router has an existing BBMD table, click the **Broadcast Distribution Table Read** button.

9 If the **Broadcast Distribution Table** contains IP addresses that are not in your .bdt file, verify that they are valid BBMDs and, if so, add them to your .bdt file.

NOTES

- The BDTs in each BBMD should be identical. Repeat this entire process whenever a BBMD is added.
- If needed, disable the checkbox next to **Show Broadcast** to limit the amount of scrolling text that is displayed.

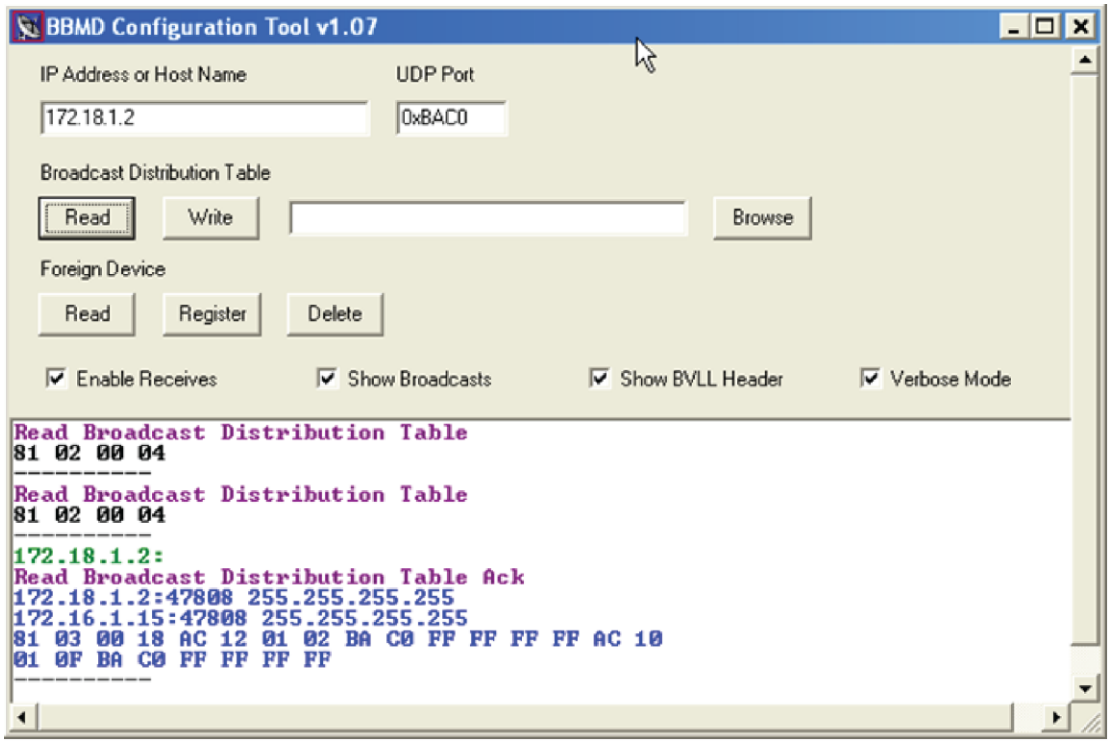
10 Click the **Broadcast Distribution Table Browse** button and select the .bdt file that you made in step 4.

11 Verify that the appropriate IP address is still in the **IP Address** or **Host Name** field.

12 Click the **Broadcast Distribution Table Write** button.

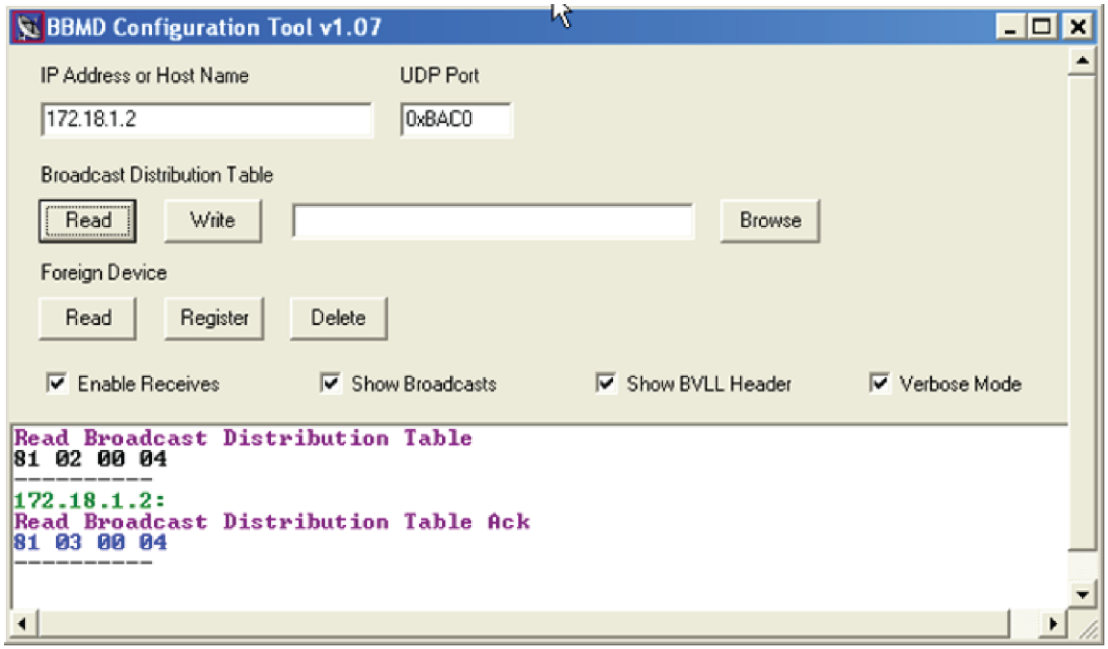
13 Click **Read** again to verify that the new .bdt file was written to the router. See example below.

NOTE If you have a large BDT, you may have to re-size the **BBMD Configuration Tool** window to see the **Broadcast Distribution Table**.



14 Using the next IP address in the .bdt file, repeat steps 7 through 14 until every file has been updated.

NOTE To clear the BBMD entries from a router, follow the steps above using an empty (blank) .bdt file. A cleared BBMD table contains just the router's IP address without entries in the BBMD table, as shown below.



Adjusting the i-Vu® Open Link driver properties

After you find and upload the i-Vu® Open Link in the i-Vu® or Field Assistant interface, you may want to customize the i-Vu® Open Link's settings for your applications. You can change settings on the **Driver Properties** page.

1 In the i-Vu® or Field Assistant interface, right-click the i-Vu® Open Link in the navigation tree and select **Driver Properties**.

2 Adjust the driver as desired.

Driver

On the **Driver** page, you can change the following properties:

- Backup battery conservation settings. See table below.
- Module clock synchronization and failure. See table below.
- Network Input microblock communication properties.

Backup Battery	
Turn off internal backup battery after ___ days to conserve battery life (shutoff date/time)	How long backup battery should run after power loss. **TIP** Downloading activates the battery backup. To conserve battery life when you know the i-Vu® Open Link will be without power for an extended period after downloading (for example, during shipment): 1 Verify the **Archive Valid** LED is lit, then set this field to 0. 2 After you install the i-Vu® Open Link and apply power, enter a number greater than 0.
BACview Control	
Keypad inactivity timeout (minutes)	Log out the user (if a user-level password is required), turn off the backlight, and display the standby screen after this period of inactivity.
Keypad user-level password	Numeric password user must enter to access system through a BAC*view*® device.
TouchScreen Control	
TouchScreen Schedule Edit Enable	Check this field to allow a user to edit this controller's schedules from an Equipment Touch or System Touch Schedules screen. **NOTE** Schedules edited on an Equipment Touch or System Touch are not uploaded to the i-Vu® or Field Assistant application. This could result in the controller operating on a schedule that differs from the one you see in the i-Vu® or Field Assistant interface.

Module Clock	
Clock Fail Date and Time	Date and time the control program uses when controller's real-time clock is invalid. **TIP** Use an occupied date and time (such as a Tuesday at 10 a.m.) so the equipment does not operate in unoccupied mode if the controller loses power during occupancy.
Time Synch Sensitivity (seconds)	When the controller receives a time sync request, if the difference between the controller's time and the time sync's time is greater than this field's value, the controller's time is immediately changed. If the difference is less than this field's value, the controller's time is slowly adjusted until the time is correct.
BACnet COV Throttling	
Enable COV Throttling	Under normal circumstances, COV Throttling should be enabled to prevent excessive network traffic if an object's COV Increment is set too low. See EXCEPTION below. When enabled, if an object generates excessive COV broadcasts (5 updates in 3 seconds), the driver automatically throttles the broadcasts to 1 per second. Also, if the object's value updates excessively for 30 seconds, an alarm is sent to the i-Vu® or Field Assistant application listing all objects that are updating excessively. A Return-to-normal alarm is sent only after all objects have stopped updating excessively. EXCEPTION: In rare circumstances, such as process control, a subscribing object may require COV updates more frequently than once per second. For these situations, clear this checkbox, but make sure that your network can support the increased traffic. You will also need to disable the **Excessive COV** alarms under the driver's **Common Alarms**.

Device

On the **Driver** > **Device** page, you can change the following properties:

- BACnet device object properties for the i-Vu® Open Link
- i-Vu® Open Link communication

Configuration	**NOTE** The three APDU fields refer to all networks over which the i-Vu® Open Link communicates.
Max Masters and Max Info Frames	**Max Masters** - defines the highest MS/TP Master MAC address on the MS/TP network. For example, if there are 3 master nodes on an MS/TP network, and their MAC addresses are 1, 8, and 16, then Max Masters would be set to 16 (since this is the highest MS/TP MAC address on the network). This property optimizes MS/TP network communications by preventing token passes and "poll for master" requests to non-existent Master nodes. In the above example, MAC address 16 knows to pass the token back to MAC address 1, instead of counting up to MAC address 127. Each MS/TP master node on the network must have their Max Masters set to this same value. The default is 127. **Max Info Frames** - defines the maximum number of responses that will be sent when the i-Vu® Open Link receives the token. The default is 10 and should be ideal for the majority of applications. In cases where the i-Vu® Open Link is the target of many requests, this number could be increased as high as 100 or 200.

Notification Classes

Alarms in the i-Vu® application use Notification Class #1. A BACnet alarm's Notification Class defines:

- Alarm priority for Alarm, Fault, and Return to Normal states
- Options for BACnet alarm acknowledgment
- Where alarms should be sent (recipients)

Priorities	**NOTE** BACnet defines the following Network message priorities for Alarms and Events.	
	Priority range	**Network message priority**
	00–63	Life Safety
	64–127	Critical Equipment
	128–191	Urgent
	192–255	Normal
Priority of Off-Normal	BACnet priority for Alarms.	
Priority of Fault	BACnet priority for Fault messages.	
Priority of Normal	BACnet priority for Return-to-normal messages.	
Ack Required for Off-Normal, Fault, and Normal	Specifies whether alarms associated with this Notification Class require a BACnet Acknowledgment for Off-Normal, Fault, or Normal alarms. **TIP** You can require operator acknowledgment for an Alarm or Return-to-normal message (stored in the i-Vu® database). In the i-Vu® interface on the **Alarm** > **Enable/Disable** tab, change the acknowledgment settings for an alarm source or an alarm category.	
Recipient List		
Recipients	The first row in this list is the i-Vu® application. Do not delete this row. Click **Add** if you want other BACnet devices to receive alarms associated with this Notification Class.	
Recipient Description	Name that appears in the **Recipients** table.	
Recipient Type	Use **Address** (static binding) for either of the following: • Third-party BACnet device recipients that do not support dynamic binding • When you want alarms to be broadcast (you must uncheck **Issue Confirmed Notifications**). This use is rare.	
Days and times	The days and times during which the recipient will receive alarms.	
Recipient Device Object Identifier	Type the **Device Instance** from the network administrator for third-party devices) in the **#** field.	
Process Identifier	Change for third-party devices that use a BACnet Process Identifier other than 1. The i-Vu® application processes alarms for any 32-bit Process Identifier.	
Issue Confirmed Notifications	Select to have a device continue sending an alarm message until it receives delivery confirmation from the recipient.	
Transitions to Send	Uncheck the types of alarms you do not want the recipient to get.	

Calendars

Calendars are provided in the driver for BACnet compatibility only. Instead, use the **Schedules** feature in the i-Vu® or Field Assistant interface.

Common and Specific Alarms

On these pages, you can enable/disable, change BACnet alarm properties, or set delays for the following BACnet alarms:

Common alarms:

- All Programs Stopped
- Control Program
- Duplicate Address
- Excessive COV
- Locked I/O
- Module Halted
- Program Stopped

Specific Alarms:

- Dead Module Timeout
- Low Battery Alarm

NOTE To set up alarm actions for controller-generated alarms, see *Set up alarm actions* in i-Vu® Help.

Controller-generated Alarm	
Description	Short message shown on i-Vu®'s Alarm page or in an alarm action when this type of alarm is generated.
Events	
Enable	Clear these checkboxes to disable Alarm or Return to normal messages of this type from this controller.
Notification Class	Do not change this field.

BACnet router properties

On the **BACnet router properties** page, you can change the following properties:

- BACnet routing settings
- Color and prime variable caching settings

BACnet Router Options	
Ignore all Reject-Message-to-Network, Reason=1 messages	Clear to delete and redownload a router if a network's router indicates that the network is no longer present (reason=1). Select to continue routing messages to a network even if its router indicates that the network is no longer present.
Color/Prime Variable Caching	
Disable Color Cache	Clear (enable) to improve responsiveness in retrieving colors. Select (disable): • To reduce network traffic to third-party (non-color-supporting) devices • If using the i-Vu® Open Link on the controller network, but not as a router **NOTE** Selecting this checkbox also disables dead controller alarms.
Dead Module Timeout	After this period (minutes:seconds) of non-response from an Open controller, the router sends an alarm to the server.

BACnet firewall

Requires v6-02 or later driver

If this IP controller is accessible from the Internet, you can increase security by enabling its BACnet firewall. When enabled, this feature prevents the controller from responding to BACnet messages from unidentified sources and allows communication only with IP addresses that you define. These can be all private IP addresses and/or a list of IP addresses. Follow the instructions in the i-Vu® or Field Assistant interface to set up the BACnet firewall.

Alarm Store/Forward

On the **Alarm Store and Forward** page, you can change alarm delivery settings for the i-Vu® Open Link used to store and forward alarms from a remote dial-up site.

Configuring Properties using the Equipment Touch

View or configure the i-Vu® Open Link using the Equipment Touch touchscreen device. Refer to the Equipment Touch *Installation and Setup Guide* for details.

Troubleshooting

If you have problems mounting, wiring, or addressing the i-Vu® Open Link, contact Carrier Control Systems Support.

NOTE To help you troubleshoot, obtain a Module Status (Modstat) from the controller and review the System Error and Warning details.

Communication LED's

The **Module Status** LED can display the following error codes. Verify the LED patterns by cycling power to the controller and noting the lights and flashes.

Error Code...	Indicates...	Possible solutions
0	The control program or driver has not been downloaded.	Download All Content to the i-Vu® Open Link.
1	A control program error	Obtain a Module Status Report (Modstat) and look for error messages. See i-Vu® or Field Assistant Help for instructions on obtaining a Modstat. If you cannot determine the error from the Modstat, contact Carrier Control Systems Support.
2	The controller's memory is full	In the i-Vu® or Field Assistant interface, reduce the amount of trend data and/or control programs stored in the controller.
3	A setup error	Verify: • The address has been set on the rotary switches. See Addressing the i-Vu® Open Link. • The address is unique on the network • DIP switches are set correctly
4	A system error	Obtain a Module Status Report (Modstat) and look for error messages. See i-Vu® or Field Assistant Help for instructions on obtaining a Modstat. If you cannot determine the error from the Modstat, contact Carrier Control Systems Support.
8	Factory defaults are being restored	The number 8 should display only during the short restoring period. If this number displays continuously or flashes intermittently with another number, try each of the following: • Turn the i-Vu® Open Link's power off, then on. • Restore factory defaults. See Restore factory defaults. • Download the controller. • Replace the i-Vu® Open Link.

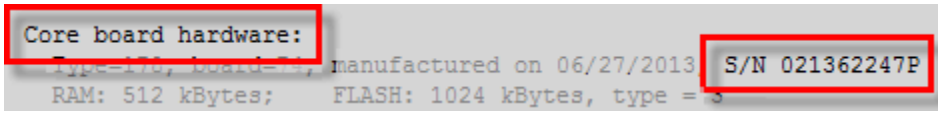
Other LED's show the status of certain functions.

If this LED is on...	Status is...
Power	The i-Vu® Open Link has power.
Link	The i-Vu® Open Link is connected to the Ethernet
LAN	The Ethernet port is transmitting or receiving data
100	The connection speed is 100 Mbps. If LED is not lit, the connection speed is 10 Mbps.
S2 Tx	The i-Vu® Open Link is transmitting data on the Port S2 network
S2 Rx	The i-Vu® Open Link is receiving data from the Port S2 network
Archive Valid	The i-Vu® Open Link's memory backup is valid
S1 (BACnet) Tx	The i-Vu® Open Link is transmitting data to the MS/TP (Open) network
S1 (BACnet) Rx	The i-Vu® Open Link is receiving data to the Open network
Brownout	Low-level incoming power
Battery low	The battery is low

To get the serial number

If you need the i-Vu® Open Link's serial number when troubleshooting, the number is on:

- A laser-etched number and QR code on the inside circuit board
- a sticker on the back of the main controller board (prior to 2019)
- a Module Status report (Modstat) under **Core** (or **Main**) **board hardware**



To obtain a modstat in the i-Vu® or Field Assistant interface:

1 Select the i-Vu® Open Link in the navigation tree.

2 Right-click and select **Module Status**.

To restore factory defaults

CAUTION This erases all archived information and user-configuration settings. You will have to reconfigure all custom settings. We highly recommend that you restore the factory defaults only under the guidance of Carrier Control Systems Support.

To erase volatile memory data and restore factory default configuration settings:

1. Turn off the i-Vu® Open Link's power switch.
2. Make sure the address switches are not set to 0, 0.
3. Hold down the controller's **Factory Defaults** button while you turn its power on.
4. Continue to hold down the **Factory Defaults** button until the controller displays **8** and then the chase pattern, then release the button.
5. Turn on the i-Vu® Open Link's power switch.

To take the i-Vu® Open Link out of service

If needed for troubleshooting or start-up, you can prevent the i-Vu® or Field Assistant application from communicating with the i-Vu® Open Link by shutting down communication from the i-Vu® Open Link to the i-Vu® or Field Assistant application. When **Out of Service**, i-Vu® or Field Assistant no longer communicates properties, colors, trends, etc.

1. On the i-Vu® or Field Assistant navigation tree, select the i-Vu® Open Link.
2. On the **Properties** page, check **Out of Service**.
3. Click **Accept**.

To replace the i-Vu® Open Link's battery

The i-Vu® Open Link's 10-year Lithium CR123A battery retains the following data for a maximum of 720 hours during power outages: time, control programs, editable properties, schedules, and trends.
To conserve battery life, you can set the driver to turn off battery backup after a specified number of days and depend on the archive function to restore data when the power returns.
A low battery is indicated by the **Battery low** LED or a low battery alarm in the i-Vu® or Field Assistant application.
You can purchase replacement batteries from any retailer that sells a CR-123A battery.

1. Verify that the i-Vu® Open Link's power is on.
2. Using a small flathead screwdriver, pry up each side of the black battery clip until it is free and you can remove it.
3. Remove the battery from the controller, making note of the battery's polarity.
4. Insert the new battery into the controller, matching the polarity of the battery you removed.
5. Push the black clip back onto the battery until you hear both sides click in place.
6. Download the i-Vu® Open Link.

Compliance

FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CAUTION Changes or modifications not expressly approved by the responsible party for compliance could void the user's authority to operate the equipment.

CE Compliance

WARNING This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

BACnet Compliance

Compliance of listed products to requirements of ASHRAE Standard 135 is the responsibility of BACnet International. BTL® is a registered trademark of BACnet International.

Appendix A: BACnet Protocol Implementation Conformance Statement

The PIC statements are updated regularly. Please refer to the *BACnet website http://www.bacnetinternational.net/catalog/index.php?m=28* for the latest information.

Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
1/24/19	BACnet firewall	Changed "prevents the controller from receiving BACnet messages" to "prevents the controller from responding to BACnet messages".	X-PM-KC-O
	Specifications	Added surge CAUTION to Protection specification.	X-TS-AK-E-CC
10/29/18	Specifications	Reworded Protection specification and added first paragraph.	X-H-JS-O
2/6/17	BACnet firewall	New topic	C-D-RD-BL
1/16/17	To communicate using PuTTY	Screen capture updated	C-FW-DE-O
	To wire a BACnet/ARC156 network	New topic	C-D
	Ethernet, BACnet MS/TP, and ARC156	Added BACnet ARC156. Changed wiring guide to Open Controller Network Wiring Guide	C-D
	Wiring for communications	Added BACnet ARC156.	C-D
	Specifications	Added BACnet ARC156 connection.	C-D
	Cover What is the i-Vu® Open Link?	Changed to latest controller image.	C-D
9/16/16	Communication LED's	Corrected 0, added 8.	C-D
6/6/16	Wiring for communications To wire Modbus or LonWorks devices on Port S2	Added note to set the Router Config Mode DIP switch for Console to off when using Port S2.	C-D-LJ-E-RD
6/2/16	To take the i-Vu® Open Link out of service	New topic	C-D-LJ
	To assign a custom IP address	Updated for PuTTY and v6.5	C-D-TS-E-RR
	Notification Class #1	Updated for i-Vu® v6.5	C-D-LJ
1/15/16	Specifications	Correction. Environmental Operating Temperature changed from 0 to 140°F to -20 to 140°F	C-D-LJ-RD
8/6/14	Specifications	Power - BACview references removed Battery - Expanded information on the archive function, low battery, and touchscreen added Protection - surge events defined as "lasting no more than 10 msec" BACnet support - Conformance standards listed	C-D-LJ
	To assign a custom IP address	BACview reference removed	C-D-LJ
	Configuring i-Vu® Open Link Driver Properties > Driver	Added new driver property: Touchscreen Schedule Edit Enable	C-D-LJ
	Restore factory defaults	Added information on using the Factory Defaults button	C-D-LJ-E-RD

* For internal use only

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