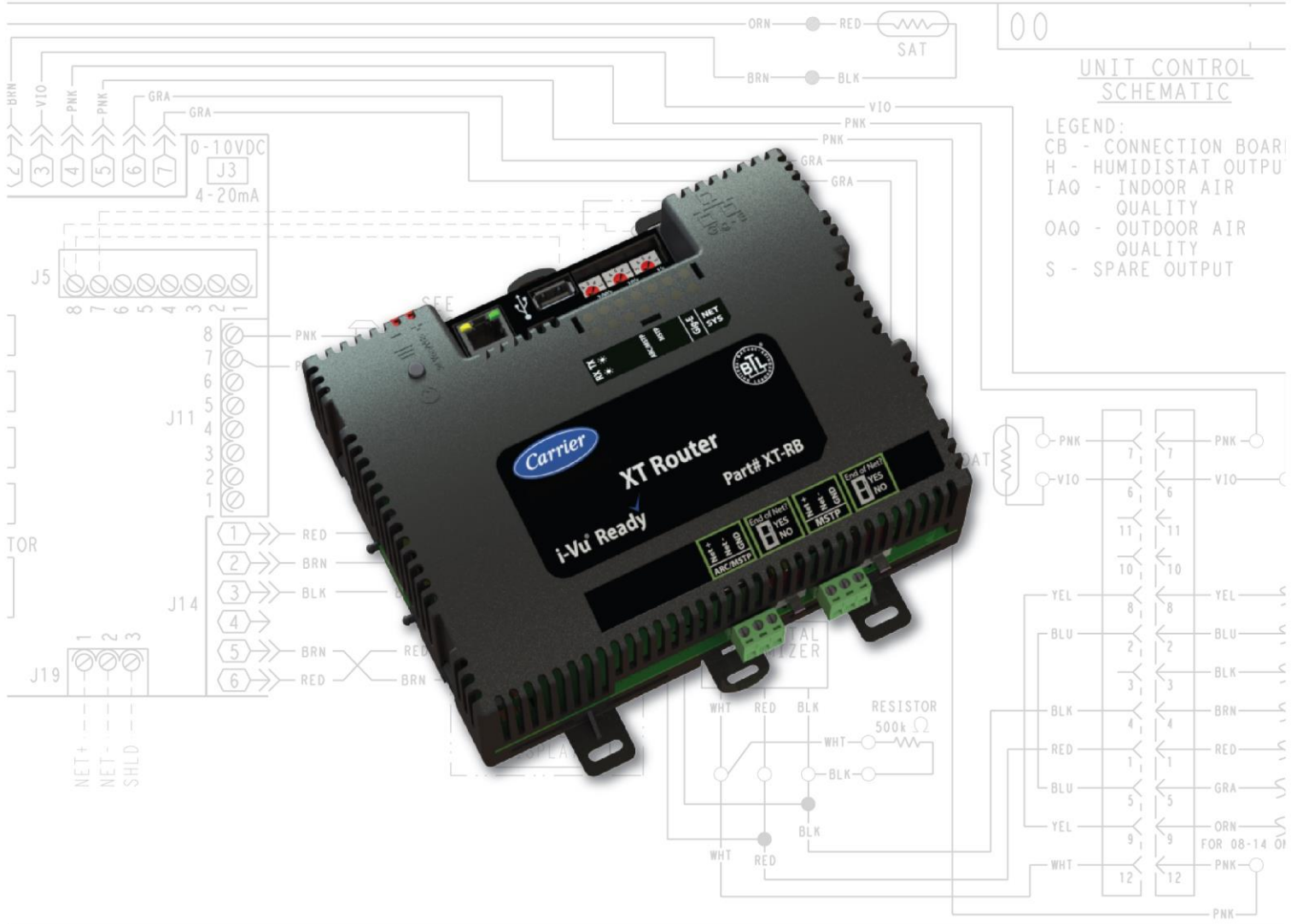


i-Vu® XT Router (drv_fwex)

Installation and Start-up Guide





Verify that you have the most current version of this document from www.hvacpartners.com, the **Carrier Partner Community** website, or your local Carrier office.

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

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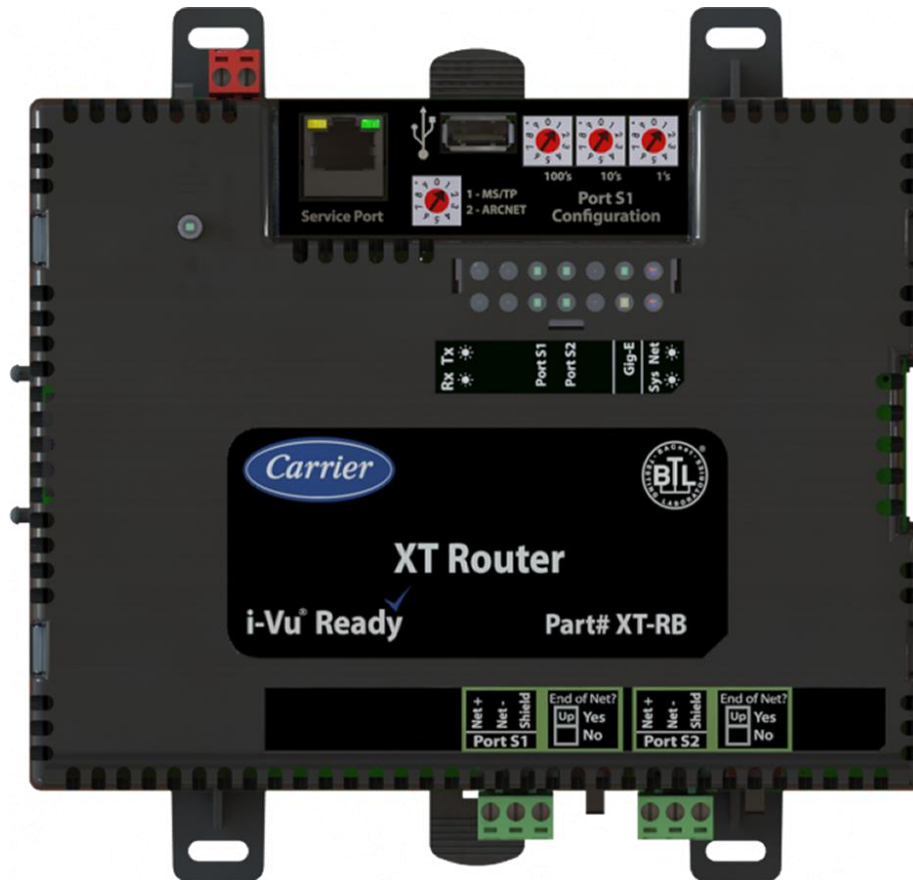
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What is the i-Vu® XT Router?

The i-Vu® XT Router:

- Provides BACnet routing between any supported BACnet communication types
- Supports DHCP IP addressing
- Can serve as a BACnet Broadcast Management Device (BBMD)
- Supports Foreign Device Registration (FDR)
- Works with the i-Vu® v6.5 or later system



What is the i-Vu® XT Router?

The i-Vu® XT Router has 4 physical BACnet communication ports:

Port	Port type	For routing this type of communication...	At...
Gig-E	10/100/1000 Mbps Ethernet	BACnet/IP BACnet/Ethernet	10, 100, or 1000 Mbps (1 Gbps)
S1	High-speed EIA-485 port	BACnet/ARCNET BACnet/MSTP	156 kbps 9.6 to 115.2 kbps
S2	Electrically isolated EIA-485 port	BACnet/MSTP	9.6 to 115.2 Kbps
Service Port	10/100 Mbps Ethernet HTTP/IP	BACnet/IP Service Port	10 or 100 Mbps

i-Vu® XT Router also has a USB port for recovery.

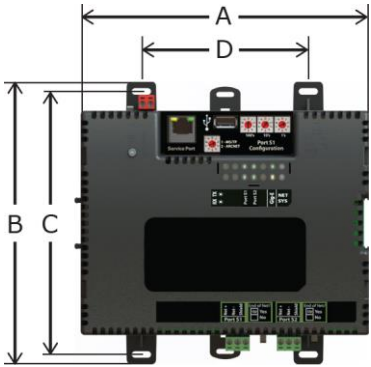
Critical Product Announcement

Due to the global semiconductor supply chain uncertainty, starting July 2022, the i-Vu® XT Router will no longer support communication over the ARCNET network. ARCNET-disabled i-Vu® XT Router routers have a serial number starting with the prefix RT4 and have an updated label. See *To get the i-Vu® XT Router's serial number* (page 40).




The i-Vu® XT Router's driver properties and controller setup pages only show available communication selection options.

Specifications

Driver	drv_fwex_< version >.driverx
Power	24 Vac ±10%, 50–60 Hz, 50 VA 26 Vdc ±10%, 15 W
Gig-E port	10/100/1000 BaseT Ethernet port for BACnet/IP and/or BACnet/Ethernet communication on the Ethernet at 10, 100, or 1000 Mbps, full duplex
Port S1	For communication with either of the following: <ul style="list-style-type: none">• A BACnet ARCNET network at 156 kbps• A BACnet MS/TP network at 9600 to 115200 bps This port's End of Net? switch can be set to Yes to terminate the network segment.
Port S2	For communication with a BACnet MS/TP network at 9600 to 115200 bps. This port's End of Net? switch can be set to Yes to terminate the network segment.

Service Port	Ethernet port at 10 or 100 Mbps for system start-up and troubleshooting
USB port	USB 2.0 host port for device recovery
Microprocessor	32-bit ARM Cortex-A8, 600MHz, processor with multi-level cache memory
Memory	16 GBs eMMC Flash memory (120 MB available for use) and 256 MB DDR3 DRAM. User data is archived to non-volatile Flash memory when parameters are changed, every 90 seconds, and when the firmware is deliberately restarted.
Real-time clock	Real-time clock keeps track of time in the event of a power failure for up to 3 days.
Protection	Device is protected by a replaceable, fast acting, 250 Vac, 2A, 5mm x 20mm glass fuse. The power and network ports comply with the EMC requirements EN50491-5-2. ⚠ CAUTION To protect against large electrical surges on serial EIA-485 networks, place a PROT485 at each place wire enters or exits the building.
LED status indicators	<ul style="list-style-type: none"> • Tricolor NET LED to show network status • Tricolor SYS LED to show system status • A TX (Transmit) and RX (Receive) LED for the following ports: <ul style="list-style-type: none"> • Gig-E • Port S1 • Port S2 <p>See <i>LEDs</i> (page 37).</p>
Environmental operating range	-40 to 158 °F (-40 to 70 °C), 10-95% relative humidity, non-condensing
Physical	Fire-retardant plastic ABS, UL94-5VA
Terminal blocks and connectors	Screw-type terminal blocks. 0.2 in (5.08 mm) pitch connectors
Mounting	35mm DIN rail mounting or screw mounting
	
Overall dimensions	A: 7.1 in. (18.03 cm) B: 6.95 in. (17.65 cm) Depth: 2.09 in. (5.31 cm)
Screw mounting dimensions	C: 6.45 in (16.38 cm) D: 4.1 in. (10.4 cm)
Weight	1 lb. 1 oz. (0.482 kg)

What is the i-Vu® XT Router?

BACnet Support	Conforms to the BACnet Router (B-R-TR) Standard Device Profile as defined in ANSI/ASHRAE Standard 135-2012 (BACnet) Annex L, Protocol Revision 14
Compliance	United States of America: FCC compliant to Title CFR47, Chapter 1, Subchapter A, Part 15, Subpart B, Class A; UL Listed to UL 916, PAZX, Energy Management Equipment
	Canada: Industry Canada Compliant, ICES-003, Class A cUL Listed UL 916, PAZX7, Energy Management Equipment
	Europe:  Mark, UK:  EN50491-5-2:2009; Part 5-2: EMC requirements for HBES/BACS used in residential, commercial and light industry environment RoHS Compliant: 2015/863/EU REACH Compliant
	Australia and New Zealand:  C-Tick Mark, AS/NZS 61000-6-3

To mount the i-Vu® XT Router

The i-Vu® XT Router must be mounted in a metal enclosure or cabinet which is properly rated for the location where it is being installed.

NOTE We recommend screw mounting when installing in a high temperature and high humidity environment.

DIN rail mount

- 1 Push down and pull out the center tabs shown below to clear the din rail trough on the back of the router.



- 2 Place the router on the DIN rail so that the rail is in the trough on the back of the router.



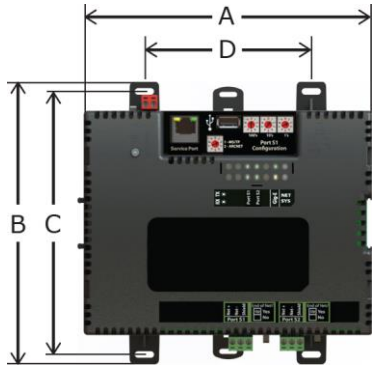
- 3 Push the center tabs towards the router until you hear them click.
- 4 Pull gently on the router to verify that it is locked in place.

To mount the i-Vu® XT Router

Screw Mount


Leave about 2 in. (5 cm) on each side of the router for wiring.

Insert #6 screws through the mounting holes. Use no more than 8 in.lbs. torque to secure plastic tab to mounting surface.



A:	7.1 in. (18.03 cm)
B:	6.95 in. (17.65 cm)
C:	6.45 in. (16.38 cm)
D:	4.1 in. (10.4 cm)
Depth:	2.09 in (5.31 cm)

Wiring for power

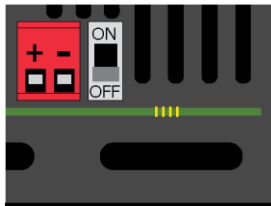
 **WARNING** Do not apply line voltage (mains voltage) to the router's ports and terminals.


 **CAUTIONS**

- The i-Vu® XT Router 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® XT Router's power switch is in the **OFF** position to prevent it from powering up before you can verify the correct voltage.



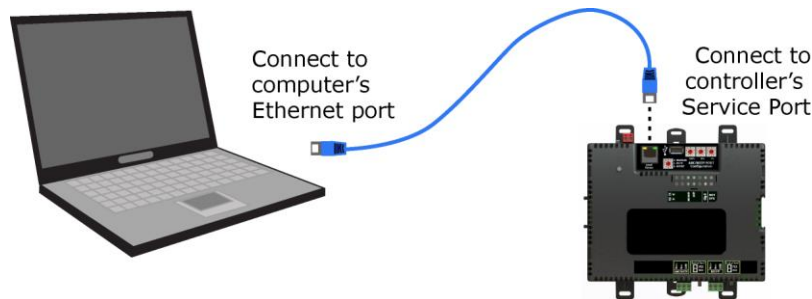
- 2 Remove power from the power supply.
- 3 Pull the red screw terminal connector from the router's power terminals labeled **24 Vac/Vdc (+/-)**.
- 4 Connect the power supply's wires to the red screw terminal connector.
- 5 Connect an 18 AWG or larger wire from the power supply's negative (-) terminal to earth ground. This wire must not exceed 12 in. (30.5 cm).
- 6 Apply power to the power supply.
- 7 Measure the voltage at the red screw terminal connector to verify that the voltage is within the operating range of 20 to 30 Vac or 23.4 to 30 Vdc.
- 8 Insert the red screw terminal connector into the router's power terminals.
- 9 To verify the polarity of the wiring, measure the voltage from the negative terminal of the red screw terminal connector to a nearby ground. The reading should be 0V.
- 10 Turn on the expander's power switch.
- 11 Verify that the  LED on top of the router is on.
- 12 Measure the voltage at the red screw terminal connector to verify that the voltage is within the operating range of 20 to 30 Vac or 23.4 to 30 Vdc.

Addressing the i-Vu® XT Router

Set this port's address ...	In this location...	See...
IP	Service Port	To set the IP address
Port S1	On the router's rotary switches	To set the Port S1 address and baud rate (page 12)
Port S2	Service Port	To set the Port S2 address and baud rate (page 12)

To access the controller setup through the **Service Port**:

- 1 Connect an Ethernet cable from a computer to the router as shown below.



- 2 Turn off the computer's Wi-Fi if it is on.
- 3 If your computer uses a static IP address, use the following settings:
 - o Address: 169.254.1.x, where x is 2 to 7
 - o Subnet Mask: 255.255.255.248
 - o Default Gateway: 169.254.1.1
- 4 If it uses a DHCP address, leave the address as it is.
- 5 Open a web browser on the computer.
- 6 Navigate to <http://local.access> or <http://169.254.1.1> to see the Service Port controller setup pages.

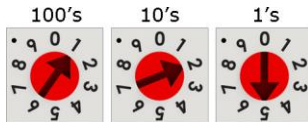
See *To set up the controller through the Service Port* (page 32) for general information on using the controller setup pages.

Rotary switch settings

Rotary switch settings (see example below) are used to determine the following items in your system, so you should plan carefully before setting the switches.

- If you use a **Default IP address**, the final octet is the number created by the three rotary switch settings (must be a unique number from 1 to 253). See *To set the IP address* (page 10).
- If you autogenerate the following:
 - Device Instance**, the number is automatically set to a number equal to the ((IP network number x 100) + rotary switch settings).
 - BACnet Network Number** for the ARC/MSTP port, the number is automatically set to a number equal to the ((IP network number + rotary switch settings) x 10).
 Autogenerating is set up through *the controller setup pages* (page 32).
- The rotary switch settings determine the router number in the i-Vu interface.

EXAMPLE The switches below are set to 125.



CAUTION Do not leave the rotary switches set at 0 (the factory default). The i-Vu® XT Router cannot be discovered if the rotary switches are left at 0.

To set up autobaud

The i-Vu® XT Router can automatically receive or establish the baud rate on a serial network. When you configure a device on the network for autobaud and then power it up, the device detects the incoming baud rate on the network and sets its baud to match.

Autobaud does not work unless there is a device on the network, whether Carrier or third party, that has the baud rate already set. You can manually set the baud rate on more than one device, as long as the rate is the same for every device.

NOTES

- The received baud rate stays intact during power cycles.
- We recommend you set the baud rate manually on the router for the network.

MSTP Autobaud can be configured:

- On the **Service Port** controller setup pages > **BACnet** tab > **Port S1** or **Port S2**
or
- In the i-Vu® interface, right-click the i-Vu® XT Router and select **Driver Properties** > **BACnet Router Properties** > **MS/TP Configuration** on Port S1 or on Port S2. See *BACnet Router Properties* (page 25).

NOTE If you set **Autobaud** or make other changes in the controller setup pages, you must upload the changes to the system database the first time you access the router in the i-Vu® interface. This preserves those settings when you download memory or parameters to the router.

To set the IP address

You must define the i-Vu® XT Router's IP addressing (IP address, subnet mask, and default gateway) in the Service Port controller setup pages so that the router can communicate with the i-Vu Pro Server on the IP network.

Use one of the IP addressing schemes described below with the associated instructions that follow.

Use a...	If...
DHCP IP Address generated by a DHCP server	The IP network uses a DHCP server for IP addressing
Custom Static IP Address from your network administrator	You do not use a DHCP server and the answer to any of the following questions is yes. Will the i-Vu® system: <ul style="list-style-type: none"> • Share a facility's existing IP data network? • Have 254 or more devices with static IP addresses? • Be connected to the Internet? • Have at least one device located on the other side of an IP router? • Have any third-party IP devices?
Default IP Address that your system creates	The answer to all of the above questions is no.

NOTE Carefully plan your addressing scheme to avoid duplicating addresses. If third-party devices are integrated into the system, make sure your addresses do not conflict with their addresses.

To set a DHCP IP address

- 1 On the controller setup pages **Modstat** tab, find the router's **Ethernet MAC address** and write it down.
- 2 On the **Ports** tab under **IP Port**, select **DHCP**.
- 3 Click **Save**.
- 4 Write down the **IP Address**.
- 5 Give the DHCP network administrator the IP address and Ethernet MAC address and ask him to reserve that IP address for the router so that it always receives the same IP address from the DHCP server.

To set a custom IP address

- 1 Obtain the IP address, subnet mask, and default gateway address for the router from the facility network administrator.
- 2 On the controller setup pages **Ports** tab under **IP Port**, select **Custom Static**.
- 3 Enter the **IP Address**, **Subnet Mask**, and **Default Gateway** addresses that the network administrator gave you.
- 4 Click **Save**.

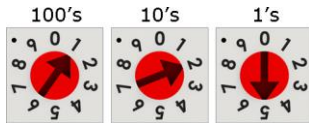
To set a default IP address

Default IP addressing assigns the following to the router:

- IP address = 192.168.168.**x**
where **x** is the setting on the rotary switches in the range from 1 to 253
- Subnet Mask = 255.255.255.0
- Default Gateway = 192.168.168.254

- 1 Set the router's three rotary switches to a unique address on the network. Set the left rotary switch to the hundreds digit, the middle switch to the tens digit, and the right switch to the ones digit.

EXAMPLE The switches below are set to 125.



- 2 On the controller setup pages **Ports** tab under **IP Port**, select **Default IP Address**.
- 3 Click **Save**.



CAUTIONS

- The Default IP address range is 1 to 253. Setting the rotary switches to 0 will set the Default IP address to 1. Setting the switches to 255 will set the Default IP to 253. Do not set the switches to 254.
- If you set the Default IP address controller setup **Ports** tab and then change the rotary switches, you must do one of the following to correct the IP address in the router:
 - Go to the controller setup **Ports** tab and click the **Update IP Address**.
 - Cycle the router's power.

You will then need to correct the IP address in the i-Vu® application using **Find Devices** and **Upload All Content**. See the i-Vu® Help for more information.

NOTE The default address is an intranet address. Data packets from this address are not routable to the Internet.

To set the Port S1 address and baud rate

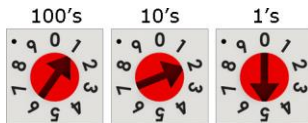
The address should be in one of the following ranges based on the port's use.

- For ARCNET, the range is 1 to 254.
- For MS/TP, the range is 0 to 127.

If Port S1 or Port S2 is your **Home Network**, the Port S1 address is automatically read from the rotary address switches. Otherwise, you enter the address on the controller setup **BACnet** tab under **Port S1 > Address**.

To set the address on the i-Vu® XT Router's three rotary switches, set the left rotary switch to the hundreds digit, the middle switch to the tens digit, and the right switch to the ones digit.

EXAMPLE The switches below are set to 125.



NOTE ARCNET is not supported on Port S2.

For MS/TP, set up autobaud or the port's baud rate

- 1 On the controller setup **BACnet** tab under **Port S1**, select the **MSTP Baud Rate** or select **Yes** for **MSTP Autobaud**. The default is 76,800 bps.

NOTES

- See To set up autobaud for details.
 - If not using autobaud, enter the identical baud rate for all devices on the same MS/TP network segment.
- 2 Click **Save**.

To set the Port S2 address and baud rate

- 1 On the controller setup **BACnet** tab under **Port S2**, type the address in the **MSTP Address** field. The address must be in the range 0 to 127.
- 2 Select the **MSTP Baud Rate** or select **Yes** for **MSTP Autobaud**. The default is 76,800 bps.

NOTES

- See To set up autobaud for details.
 - If not using autobaud, enter the same baud rate for all devices on the MS/TP network.
- 3 Click **Save**.

Configuring BACnet Device Instance and network number

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

Legend

16 = Carrier's BACnet Vendor ID

xxx = i-Vu® XT Router's rotary switch address (See NOTES below.)

yy = Controller's rotary switch address (ARCNET/MSTP MAC address)

For the i-Vu® XT Router:

- BACnet Device Instance Number = (IP network number x 100) + rotary switch address
- BACnet Device Instance Name = the name "device" + the Device Instance
- BACnet IP Network Number = 1600
- BACnet ARC/MSTP Port S1 Network Number = ((IP network number + rotary switch address) x 10)
- Port S1 MSTP MAC Address = 0 by default (user configurable)
- Port S1 ARCNET Address = 254 by default (user configurable)
- BACnet MSTP Port S2 Network Number = ((IP network number + rotary switch address) x 10) + 3
- Port S2 MSTP MAC Address = 0 by default (user configurable)

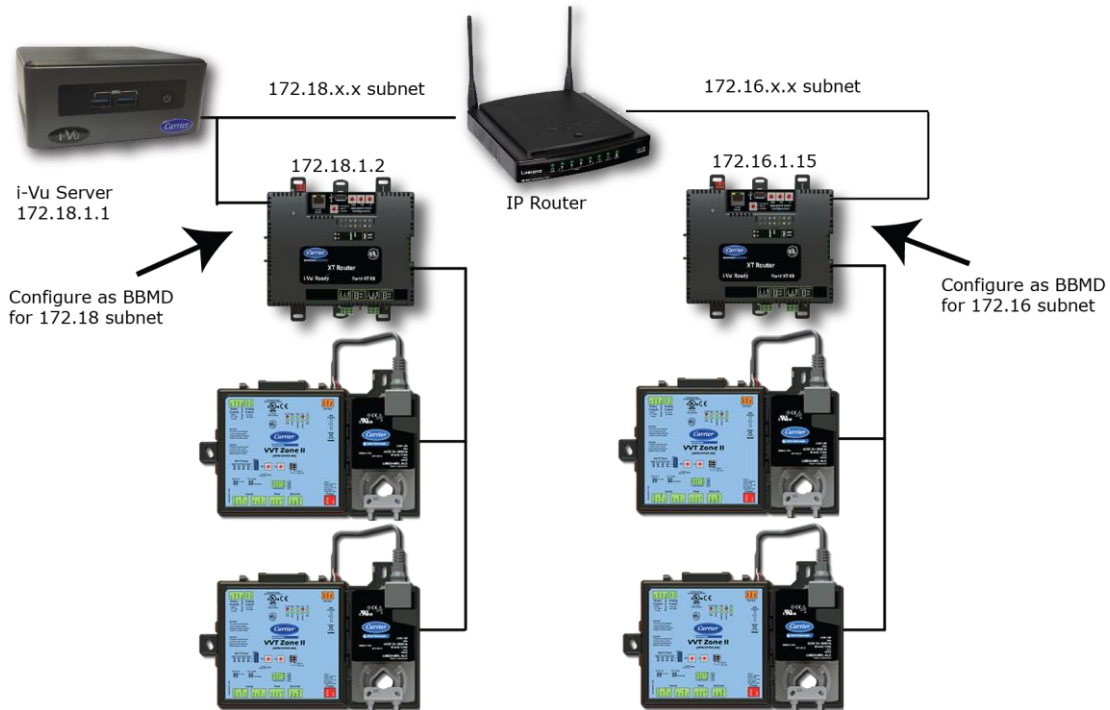
For the Open controllers connected to the i-Vu® XT Router

- BACnet MSTP Device Instance Number = BACnet MSTP Network Number + yy
- BACnet ARCNET Device Instance Number = BACnet ARCNET Network Number + yy
- BACnet MSTP Device Instance Name = the name "device" + Device Instance
- BACnet ARCNET Device Instance Name = the name "device" + Device Instance
- BACnet MSTP or ARCNET MAC Address = yy
- BACnet MSTP Network Number = 161xx (learned from the router, defaults to 16101 if no i-Vu® XT Router is operating)

NOTES

- Do not configure the rotary switches on the i-Vu® XT Router to a number greater than 127 unless Port S1 is enabled for ARCNET. Doing so will not allow the i-Vu® server to discover the i-Vu® XT Router. If you change the i-Vu® XT Router's switches or jumpers, you must cycle its power for the changes to take effect.
- If the BACnet automatic settings need to be changed, see *To communicate through the Local Access port* (page 32).

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

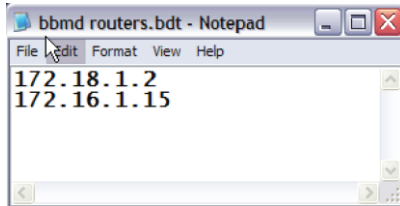
- 1 Assign an IP address, subnet mask, and default gateway for each i-Vu® XT Router on the IP network. See *Addressing the i-Vu® XT Router* (page 8).
- 2 Acquire the **BBMD Configuration Tool** from the Tech Tools USB drive or from either of the *Carrier Control Systems Support Sites* <http://www.hvacpartners.com/>. 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 0xBACO (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)



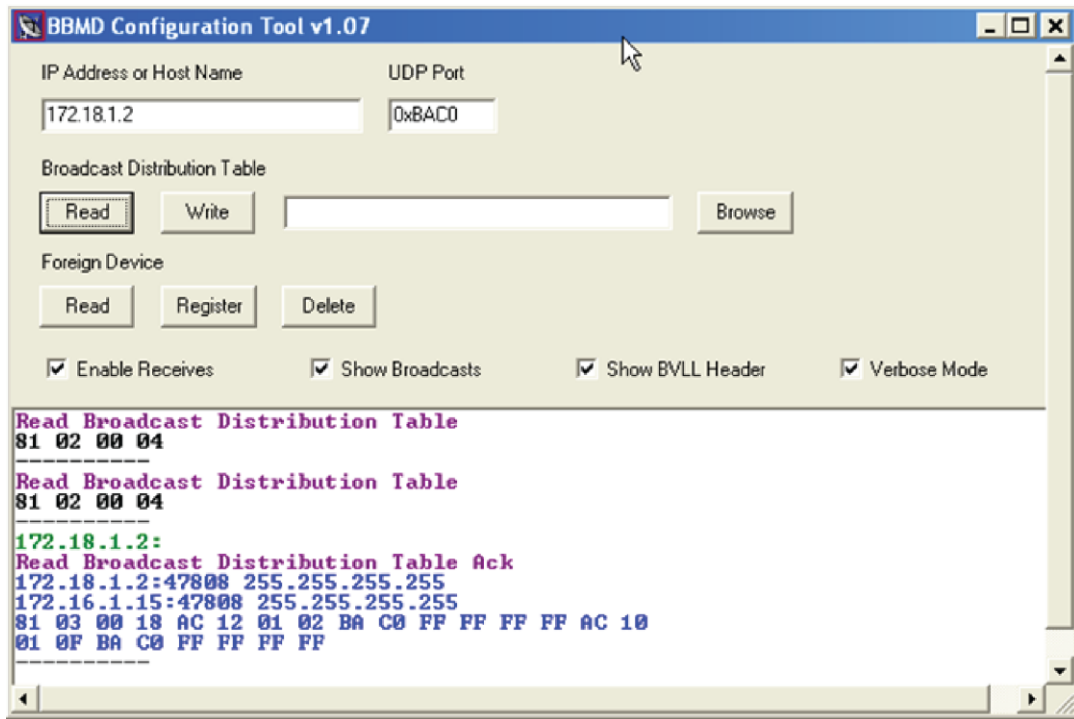
- 5 Save the file to your folder of choice with a .bdt, .bbmd, or .text extension instead of .txt.
- 6 Open the **BBMD Configuration Tool**.
- 7 In the **IP Address** or **Host Name** field, type the IP address of the router that functions as the BBMD (BACnet Broadcast Management Device) for its subnet.
- 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 file, verify that they are valid BBMDs and, if so, add them to your 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 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.

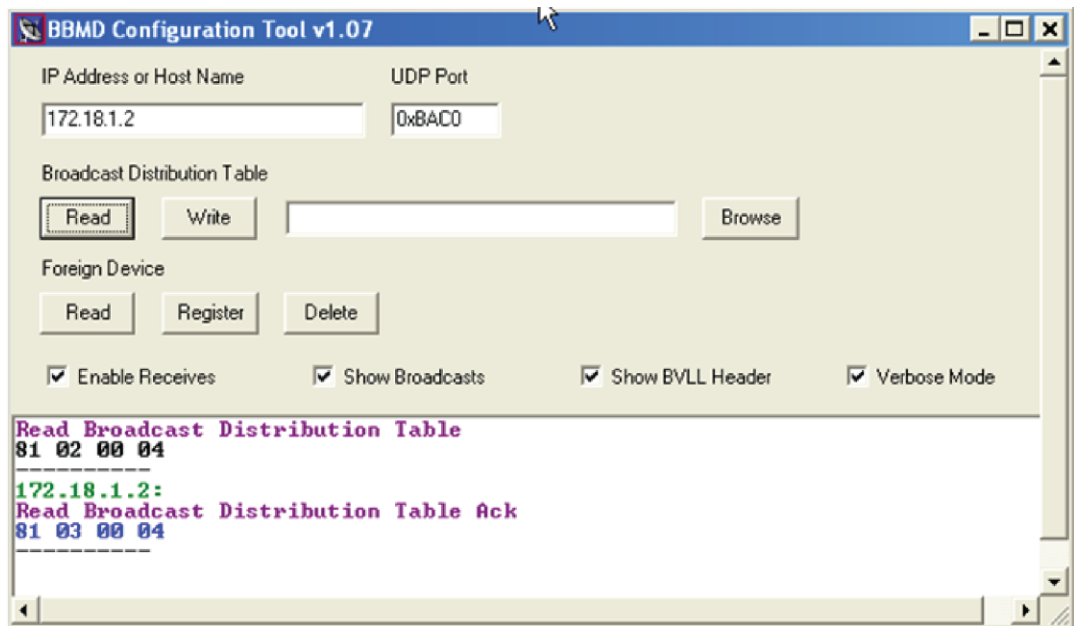
- Click **Read** again to verify that the new file was written to the router. See example below.

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



- Using the next IP address in the 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) file. A cleared BBMD table contains just the router's IP address without entries in the BBMD table, as shown below.



Wiring for communications

The i-Vu® XT Router communicates on the following ports.

Port	Protocol	Port type(s)	Speed(s)
Gig-E	BACnet/IP and/or BACnet/Ethernet	Ethernet	10, 100, or 1000 Mbps (1 Gbps)
Port S1 ¹	BACnet/ARCNET	EIA-485	156 kbps
Port S1 ¹ or Port S2	BACnet/MSTP	EIA-485	9.6 to 115.2 Kbps ²
Service Port ³	HTTP/IP	Ethernet	10 Mbps 100 Mbps
USB Port	USB2.0	USB	

¹ Set the **Port S1 Configuration** rotary switch to:

0 if the port is not used

1 for MS/TP

2 for ARCNET

² Default for MS/TP is 76.8 kbps.

³ See To set up the router through the Service Port.

Wiring specifications

For...	Use...	Maximum Length
Ethernet	Cat5e or higher Ethernet cable	328 feet (100 meters)
ARCNET	22 AWG, low-capacitance, twisted, stranded, shielded copper wire *	2000 feet (610 meters)
MS/TP	22 AWG, low-capacitance, twisted, stranded, shielded copper wire *	2000 feet (610 meters)

* See the *Open Controller Network Wiring Guide*.



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

To connect the i-Vu® XT Router to the Ethernet

Connect an Ethernet cable to the Gig-E Ethernet port.

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).

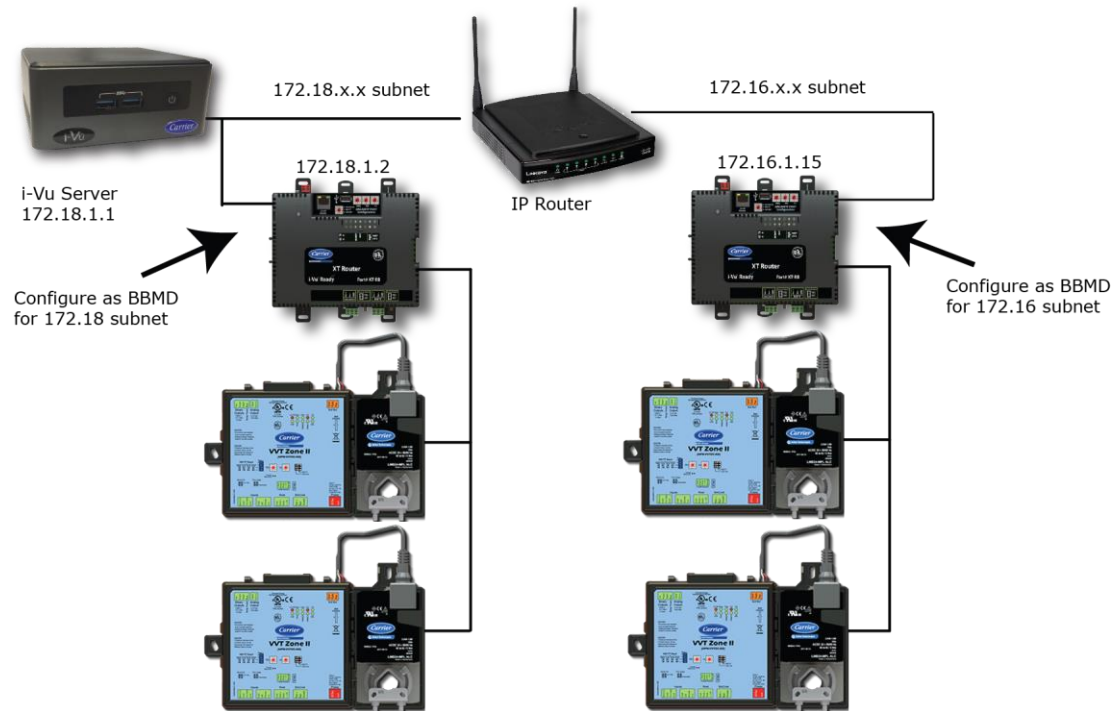
Every subnet with a router must have a BBMD configured in order for broadcasts from routers on that subnet to reach the rest of the routers on the network.

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 wire to a BACnet/ARCNET network

- 1 Turn **off** the i-Vu® XT Router's power.
- 2 Check the communications wiring for shorts and grounds.
- 3 Connect the communications wiring to **Port S1**'s screw terminals labeled **Net +**, **Net -**, and **Shield**.
NOTE Use the same polarity throughout the network segment.
- 4 If the router has a **Port S1 Configuration** rotary switch, set it to 2.
- 5 If the i-Vu® XT Router is at either end of a network segment, set the port's **End of Net** switch to **Yes**.
NOTE The router's **End of Net** switch applies network termination and bias. See the *Open Controller Network Wiring Guide*.
- 6 Turn on the router's power.
- 7 To verify communication with the network, get a Module Status report in the i-Vu® interface for a router on the ARCNET network.
NOTE This step requires that you have discovered and uploaded the router in the i-Vu® application.

To wire to a BACnet MS/TP network

An MS/TP network can be wired to either **Port S1** or **Port S2**.

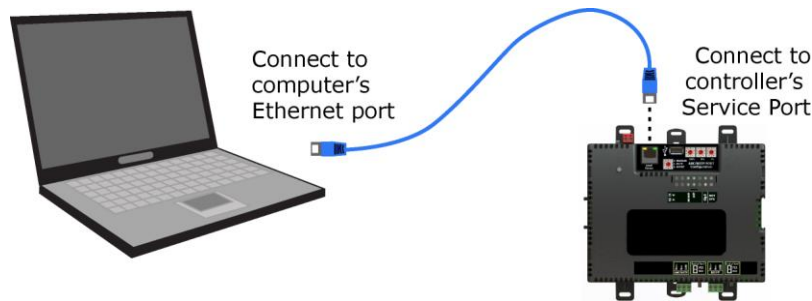
- 1 Turn **on** the i-Vu® XT Router's power.
- 2 Check the communications wiring for shorts and grounds.
- 3 Connect the communications wiring to the **Port S1** or **Port S2** screw terminals labeled **Net +**, **Net -**, and **Shield**.
NOTE Use the same polarity throughout the network segment.
- 4 If you are using **Port S1**, and the controller has a **Port S1 Configuration** rotary switch, set it to 1.
NOTE If **Port S1** is not being used for any network, set this rotary switch to 0.
- 5 If the i-Vu® XT Router router is at either end of a network segment, set the port's **End of Net?** switch to **Yes**.
NOTE The router's **End of Net** switch applies network termination and bias. See the *Open Controller Network Wiring Guide*.
- 6 Turn on the router's power.
- 7 To verify communication with the network, get a Module Status report in the i-Vu® interface for a router on the MS/TP network.
NOTE This step requires that you have discovered and uploaded the router in the i-Vu® application.

To communicate through the BACnet/IP Service Port network

You can connect to the Service Port to access your network through the:

- i-Vu® application
- Carrier touchscreen device

1 Connect an Ethernet cable from a computer to the router as shown below.



2 Turn off the computer's Wi-Fi if it is on.

3 If your computer uses a static IP address, use the following settings:

- Address: 169.254.1.x, where x is 2 to 7
- Subnet Mask: 255.255.255.248
- Default Gateway: 169.254.1.1

4 If it uses a DHCP address, leave the address as it is.

5 Open a web browser on the computer and login to your i-Vu® Pro application.

6 In the i-Vu® Pro interface, on the **System Options** tree, select **Connections**.

7 On the **Properties** page > **Configure** tab, Select **BACnet/IP Service Port Connection** from the drop-down list and click **Add**.

8 If needed, enter the **Service Port Network Number** as follows:

- **0** - the i-Vu® XT Router will communicate only with the computer or TruVu™ ET Display
- **1 to 65534** - the i-Vu® XT Router's network number for network communication
- **65535** - searches for an available network number from 65531 to 65534. If any of these numbers are not available, you will have to assign a network number and enter it.

9 Click **Apply**.

10 On the right of the page, in the **Networks using selected connection** table, click the checkbox next to the network you want to connect to.

11 Click **Apply**.

12 Select the **BACnet/IP Service Port Connection** and click **Start**. The status changes to **Connected**.

13 Click **Accept**.

14 On the navigation tree, right-click the controller that you are connected to and select **Module Status**. If a Modstat report appears, the i-Vu® application is communicating with the controller.

Find and upload in the i-Vu® interface

- 1 In the i-Vu® interface, select the System level in the navigation tree.
- 2 On the **Devices** page > **Manage** tab, click **Find Devices** to discover your routers and their drivers, graphics, and touch files.
- 3 Once routers are found, select one or more routers in the list on the **Manage** tab and click **Upload All Content** to upload to the i-Vu® application. Use **Ctrl+click**, **Shift+click**, or both to select multiple items.
- 4 Click **OK** when you see the message **This will upload all content for the controller. Are you sure you want to do this?** When complete, a check mark under **Status** indicates a successful upload.

NOTES

- If an error message appears, click on the message to view an explanation.
- For details, see the i-Vu® Help.

Adjusting the i-Vu® XT Router driver properties

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

- 1 In the i-Vu® interface, right-click the i-Vu® XT Router in the navigation tree and select **Driver Properties**.
- 2 Adjust the driver as desired.

Driver

On the **Driver** page > **Update** tab, you can:

- Obtain information about the i-Vu® XT Router, get a Modstat and device logs
- Add, update, or delete drivers
- Add, update, or delete screen files for an Equipment Touch

The **Driver** page > **Settings** tab provides the following information plus the items described in the table below:

- The date/time of last parameter change or the last time the database was archived
- If control programs, properties, and schedules were successfully stored in memory
- Undelivered Alarm Status

Controller Clock	
Clock Fall Date and Time	Date and time the router uses when its real-time clock is invalid.
Time Synch Sensitivity (seconds)	When the router receives a time sync request, if the difference between the router's time and the time sync's time is greater than this field's value, the router's time is immediately changed. If the difference is less than this field's value, the router's time is slowly adjusted until the time is correct.
Debug	
Enable Debug Messages	Enable only if directed by Carrier Controls System Support.

Device

The **Device** page provides the following information plus the items described in the table below:

- BACnet device object properties for the i-Vu® XT Router
- Status of the BACnet communication
- The character sets supported by this device for BACnet communication


Configuration	
BACnet System Status	The current state of the router: Operational Download in Progress Download Required Backup in Progress Non-Operational
The following three fields refer to all networks over which the i-Vu® XT Router communicates.	
APDU Timeout	How many milliseconds the device will wait before resending a message if no response is received.
APDU Segment Timeout	How many milliseconds the device will wait before resending a message segment if no response is received.
Number of APDU Retries	The number of times the device will resend a message.
Controller Clock	
Time Broadcaster will synchronize time every ____	If you have third-party BACnet devices on one of the router's networks, you can have the router send a BACnet time sync to those devices at the interval you define in this field.
Time Synchronization Recipients	To define third-party BACnet devices as Time Synchronization Recipients: <ol style="list-style-type: none"> 1 Click Add. 2 Select Device ID or Address in the Recipient Type field. 3 Enter the Device ID or Address information. 4 Click Accept.

Notification Classes

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)

Alarms in the i-Vu® application use Notification Class #1. The i-Vu® application is automatically a recipient of these alarms.

Priorities	NOTE BACnet defines the following Network message priorities for Alarms and Events.										
	<table border="1"> <thead> <tr> <th>Priority range</th> <th>Network message priority</th> </tr> </thead> <tbody> <tr> <td>00–63</td> <td>Life Safety</td> </tr> <tr> <td>64–127</td> <td>Critical Equipment</td> </tr> <tr> <td>128–191</td> <td>Urgent</td> </tr> <tr> <td>192–255</td> <td>Normal</td> </tr> </tbody> </table>	Priority range	Network message priority	00–63	Life Safety	64–127	Critical Equipment	128–191	Urgent	192–255	Normal
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	<p>Specifies whether alarms associated with this Notification Class require a BACnet Acknowledgment for Off-Normal, Fault, or Normal alarms.</p> <p> 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.</p>										
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: <ul style="list-style-type: none"> • 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 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® 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 alarm:

- Controller Halted
- Duplicate Address

Specific alarm:

- Dead Controller Timeout

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

Controller Generated Alarm	
Description	Short message shown on the Alarms page or in an alarm action when this type of alarm is generated.
Events	
Alarm Category and Alarm Template	See <i>Customizing alarms</i> in i-Vu® Help.
Enable	Clear these checkboxes to disable Alarm or Return to normal messages of this type from the i-Vu® XT Router.
Notification Class	In a typical i-Vu® system, the Notification Class is 1; however, if needed, you can associate a different notification class with the alarm. See <i>Notification Classes</i> (page 23) to set up alarm delivery options for a specific Notification Class.

BACnet Router Properties



CAUTION Do not change the settings on this page as it will result in communication failure. Use the *controller setup pages* (page 32) to change settings and then resolve mismatches in the i-Vu® application.

BACnet Firewall

If this IP router is accessible from the Internet, you can increase security by enabling its BACnet firewall. When enabled, this feature prevents the router 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® interface to set up the BACnet firewall.

Network Diagnostics - Statistics

This page shows the network statistics for each of the i-Vu® XT Router's ports that are in use. This same information is provided in a *Module Status report* (page 39).

Click the **Error Rate Trend** or **Packet Rate Trend** link at the bottom of each section to see the statistics displayed as trend graphs. You can also access these trends by clicking on the driver in the network tree, and then selecting **Trends > Enabled Points >** and the desired trend graph.

Click a port's **Reset** button to set all of the numbers to zero so the counting can start over.

Router Statistics	
Error Counters	Dropped Packets —Data packets that could not be delivered.
	Route Not Found —Packets that could not be delivered because the requested network does not exist.
	Route Unreachable —These are routed packets whose destination network is either busy or offline
Network Activity	Shows the number of incoming and outgoing unicast and broadcast packets for each of the i-Vu® XT Router's networks.
Router Sourced Packets	Shows the number of packets initiated by the i-Vu® XT Router that are not in response to a request from another device. The numbers in this table will also appear in the appropriate columns in the Network Activity tab.
Trends	Error Rate Trend —Shows the total number of errors within the trend sampling interval.
	Packet Rate Trend —Shows the total number of packets transmitted and received within the trend sampling interval.
Gig-E Port Statistics	
BACnet/IP Statistics	BACnet/IP Rx Unicast Packets —BACnet/IP packets received from a single BACnet device.
	BACnet/IP Tx Unicast Packets —BACnet/IP packets transmitted to a single BACnet device.
	BACnet/IP Rx Broadcast Packets —BACnet/IP broadcast packets received by the i-Vu® XT Router.
	BACnet/IP Tx Broadcast Packets —BACnet/IP broadcast packets transmitted by the i-Vu® XT Router.
	Whitelist Rejections (if <i>BACnet Firewall</i> (page 25) is enabled)—Messages blocked by the BACnet Firewall because the IP address that sent the message was not in the whitelist.

Ethernet Statistics	<p>Ethernet Rx packets—All packets (including non-BACnet packets such as a ping) received by the i-Vu® XT Router.</p> <p>Ethernet Tx packets—All packets (including non-BACnet packets such as a ping) transmitted by the i-Vu® XT Router.</p> <p>Receive Errors (total)—All errors related to received packets such as CRC errors, FIFO errors, frame errors, length errors, missed errors, and overrun errors.</p> <p>Transmit Errors (total)—All errors related to transmitted packets such as aborted errors, carrier errors, dropped errors, FIFO errors, heartbeat errors, and window errors.</p> <p>Dropped Packets—Packets dropped by the i-Vu® XT Router's Ethernet interface.</p>
Trends	<p>Error Rate Trend—Shows the total number of errors within the interval time.</p> <p>Packet Rate Trend—Shows the total number of packets transmitted and received within the trend sampling interval.</p>
Port S1 Statistics when used for ARCNET	
Error Counters	<p>Node Reconfiguration—The ARCNET reconfigurations initiated by the i-Vu® XT Router.</p> <p>Bus Reconfiguration—An ARCNET reconfiguration not generated by the i-Vu® XT Router (such as when a controller connects to the network).</p> <p>Excessive NACK—Excessive NACKs received by the i-Vu® XT Router's ARCNET chip. Excessive NACKs are usually the result of a station which is unable to process a steady stream of packets due to buffer overflows or slow responses.</p> <p>Dropped Packets—Dropped receive and transmit frames. These may be dropped due to buffer allocation failures, length errors, or NACKed transmit packets.</p>
Activity Counters	<p>BACnet/ARCNET Rx Packets—BACnet/ARCNET data packets received by the i-Vu® XT Router.</p> <p>BACnet/ARCNET Tx Packets—BACnet/ARCNET data packets transmitted by the i-Vu® XT Router.</p>
Latency	<p>Average Value (milliseconds)—The average time from when a packet is queued to be transmitted until it is actually transmitted on the bus.</p> <p>Maximum Value (milliseconds)—The maximum time from when a packet is queued to be transmitted until it is actually transmitted on the bus.</p>
Trends	<p>Error Rate Trend—Total number of errors within the interval time on this network, including break errors, framing errors, etc..</p> <p>Packet Rate Trend—BACnet/ARCNET data packets transmitted through router, not the total utilization.</p>

Port S1 Statistics when used for MSTP or Port S2 Statistics	
Error Counters	<p>UART Errors—UART receive and transmit errors such as break errors, framing errors, parity errors, and overrun errors.</p> <p>Invalid Frames—Received MS/TP frames that contain an error such as CRC.</p> <p>Dropped Packets—Dropped receive and transmit frames. These may be dropped due to buffer allocation failures, length errors, or APDU timeouts (in the case of transmit frames)</p> <p>Dropped Tokens—Dropped tokens that have been retransmitted.</p> <p>No responses—Messages that did not receive a response from the destination device.</p>
Activity Counters	<p>BACnet/MSTP Rx Packets—BACnet/MSTP data packets received by the i-Vu® XT Router.</p> <p>BACnet/MSTP Tx Packets—BACnet/MSTP data packets transmitted by the i-Vu® XT Router.</p>
Latency	<p>Average Value (milliseconds)—The average time from when a packet is queued to be transmitted until it is actually transmitted on the bus.</p> <p>Maximum Value (milliseconds)—The maximum time from when a packet is queued to be transmitted until it is actually transmitted on the bus</p>
Trends	<p>Error Rate Trend—Total number of errors within the interval time on this network, including break errors, framing errors, etc.</p> <p>Packet Rate Trend—Percentage of total bus bandwidth used to transmit data packets.</p> <p>NOTE This is for all bus traffic, not just traffic generated by the i-Vu® XT Router.</p>

Network Diagnostics - Packet Capture

This page allows you to capture network communication on a port and then download the capture file for troubleshooting. Choose one of the following capture options:

- **Start/Stop** - Define the start and stop criteria, and then click **Start** and **Accept** to begin the capture. When the capture stops, the capture file is generated.
 - NOTE** If a Start/Stop capture is running on any other port, the **Get capture file** button will be disabled until all Start/Stop captures have completed.
 - **Start capture:** - When you check **At (mm/dd/yyyy hh:mm AM/PM)**, enter the time and date, and click **Start**, the packet capture begins at the date and time you specified.
 - NOTE** The hours field is validated from 0 to 12, and minute field is validated from 0 to 59.
 - **Continuous** - Click **Start** and **Accept** to begin the capture. Click **Save** to momentarily stop the capture and create the capture file. The capture will automatically resume. Click on the **Start/Stop** option to end the **Continuous** capture.
 - If the port is set up for MS/TP, select an option in the **Capture** section.

▼ Port S1 Packet Capture

Start/Stop

Start capture: Now

At (mm/dd/yyyy hh:mm AM/PM): */*/* [calendar icon] 12:00 AM

Stop capture: After (hh:mm) 00:00 or when file size reaches 25 MBs or when you click Stop

Continuous Stores the most recent 5 MBs of captured data

Capture:

Only BACnet data packets

All packets (includes tokens)

Click **Start** and **Accept** to begin capture
 Downloads Device Log Archive that includes capture file

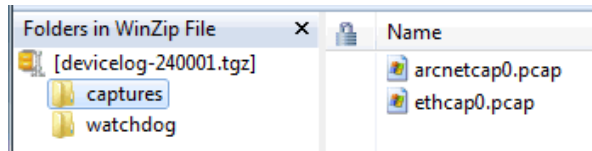
To download the capture file

Capture files are Wireshark files that are added to the Device Log Archive .tgz file. Do the following to view the files.

- 1 If you do not have Wireshark installed on your computer, download the latest version from the *Wireshark website* (<http://www.wireshark.org>).
- 2 Run the install program, accepting all defaults. Include WinPcap in the installation.
- 3 On the i-Vu® **Packet Capture** page, click **Get capture file** to download the .tgz file. The message appears "Retrieving the file, this may take a little while". Click **OK**.

NOTE If the size of the .tgz is large, there could be a considerable delay (for example, over 2 minutes) after you click **Get capture file** until your browser begins the download.

- 4 Open the .tgz file. The files are in the **captures** folder.



Capture file names are based on the ports.

NOTES

- If you have an MSTP capture file for both Port S1 and Port S2, the file names will be:
mstpcap0 for Port S1
mstpcap1 for Port S2
 - Clicking **Get capture file** generates the port's .pcap file. If the port has a .pcap file from a previous capture, that file will be overwritten.
- 5 Extract the .pcap file from the .tgz file.
 - 6 Open the .pcap file in Wireshark.

Communication Status

Protocol Status shows the status of the protocols currently running on the i-Vu® XT Router.

To set up Network Statistic trends

PREREQUISITE To view Network Statistic trends, you must have a i-Vu® v6.5 or later system with the latest cumulative patch.

To view the *Network Statistics* (page 26) as trend graphs, select the controller in i-Vu®'s navigation tree and go to one of the following:

- On the **Driver Properties > Network Diagnostics > Statistics** page, click a **Trend** link at the bottom of each section.
- Click the **Trends** drop-down button, select **Enabled Points** and then the graph you want.

You can define:

- How the graph looks on the trend's **Configure** tab.
- How you want trend samples to be collected on the **Enable/Disable** tab. See table below.

Field	Notes
Sample every _:__:_ (hh:mm:ss)	(Recommended method) To record the value at a regular time interval, enter hh:mm:ss in this field.
Sample on COV (change of value)	To record the value only when the value changes by at least the amount of the COV Increment , set the Sample every field to 0:00:00 and enter a value in the COV Increment field.
Max samples	Network Statistic trends have a non-configurable maximum trend log buffer size of 1440. NOTE Trending consumes memory in the router. Click Reset to delete all samples currently stored in the router.
Stop When Full	Check this field to stop trend sampling when the maximum number of samples is reached.
Enable trend log at specific times only	Collects trend data for the specific period of time you define in the time and date fields.
Enable Trend Historian	Archives trend data to the system database.
Store Trends Now	Writes all trend data in the router to the system database without having to enable trend historian.
Write to historian every __ trend samples	Writes all trend data in the router to the system database each time the router collects the number of samples that you enter in this field. This number must be greater than zero and less than the number entered in the Max samples field. The number of trends specified must be accumulated at least once before the historical trends can be viewed. NOTE Any trends not stored in the historian will be lost if the router loses power.
Trend samples accumulated since last notification	Shows the number of samples stored in the router since data was last written to the database.
Last Record Written to Historian	Shows the number of trend samples that were last written to the database.
Keep historical trends for __ days	This is based on the date that the sample was read. Select the first option to use the system default that is defined on the System Options > System Settings > General tab. Select the second option to set a value for this trend only.

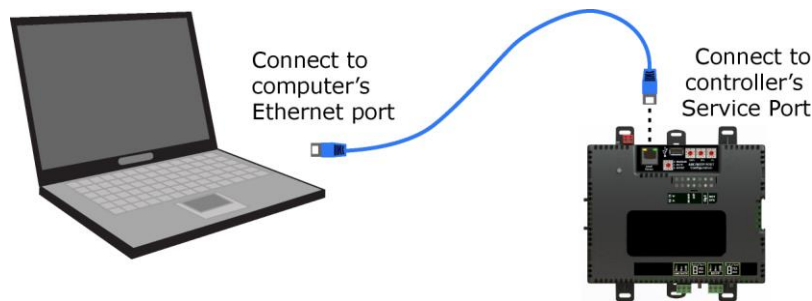
To set up the controller through the Service Port

To set up the controller through the Service Port

Using a computer and an Ethernet cable, you can communicate with the i-Vu® XT Router through a web browser to:

- View the router's Module Status report
- View/change router and network settings. Changes take effect immediately.
- Troubleshoot
- Use BACnet/IP Service Port to access the i-Vu® application or a touchscreen device. See *To communicate through the BACnet/IP Service Port network* (page 20).

- 1 Connect an Ethernet cable from a computer to the router as shown below.



- 2 Turn off the computer's Wi-Fi if it is on.
- 3 If your computer uses a static IP address, use the following settings:
 - Address: 169.254.1.x, where x is 2 to 7
 - Subnet Mask: 255.255.255.248
 - Default Gateway: 169.254.1.1
- 4 If it uses a DHCP address, leave the address as it is.
- 5 Open a web browser on the computer.
- 6 Navigate to <http://local.access> or <http://169.254.1.1> to see the Service Port controller setup pages.

NOTE The first time you access the router in the i-Vu® interface after you have changed settings through the Service Port, be sure to upload the changes to the system database. This will preserve those settings when you download memory or parameters to the router.

ModStat tab

This tab provides the router's Module Status report that gives information about the router and network communication status. See *Appendix - Module Status field descriptions* (page 44).

Device tab

BACnet Object	
Device Instance	<p>Autogenerated—(Default) The Device ID is automatically set to a number equal to the (IP network number) x 100 + rotary switch address.</p> <p>Assigned—Lets you enter a specific number that is unique on the BACnet network.</p>
Device Name	<p>Autogenerated—(Default) The Device Name is automatically set as the word device + the Device Instance. For example, device2423911.</p> <p>Assigned—Lets you enter a specific name that is unique on the BACnet network.</p>
Device Location	You can enter an intuitive location for the device in the i-Vu® interface.
Device Description	You can enter an intuitive description for the device in the i-Vu® interface.
Configuration	
APDU Timeout	How many milliseconds the device will wait before resending a message if no response is received.
APDU Segment Timeout	How many milliseconds the device will wait before resending a message segment if no response is received.
APDU Retries	The number of times the device will resend a message.
Controller Information	
Clear Counts/Logs	Clears Reset counters and the three message history fields from the Module Status.
Data Backup and Restore	
Backup	Displays time of the last backup. Click button to backup the controller's control programs, properties, and schedules.
Restore	Displays time of the last restore. Click button to restore the most recent backup of the controller's control programs, properties, and schedules.

To set up the controller through the Service Port

Ports tab

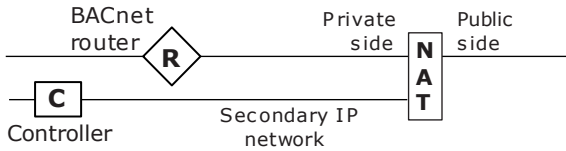
IP Port	
IP Addressing	Select the type of addressing the router is to use. See <i>Addressing the i-Vu® XT Router</i> (page 8).
Port S1	
End of Network	Indicates status of the router's End of Net? switch.
Active Protocol	Indicates status of the router's Port S1 Configuration rotary switch. 0=Disabled 1=MS/TP 2=ARCNET
MAC Address	The address that is set on the three rotary switches. See <i>To set the Port S1 address and baud rate</i> (page 12).
Port S2	
End of Network	Indicates status of the router's End of Net? switch.
Active Protocol	The protocol that has been enabled for Port S2 on the BACnet tab.

BACnet tab

IP Port	
BACnet Network Number	Disable Routing —Select if the IP port is not used. Autogenerated —The BACnet/IP network number is automatically set to 1600. Assigned —Lets you enter a specific number.
BACnet UDP Port	The port that the i-Vu® application will use for BACnet communication.
Enable NAT Routing	For future use. Check if the i-Vu® XT Router is behind a NAT router (firewall).
Global NAT IP Address	For future use. Public IP address of the NAT router.
Global NAT BACnet UDP Port	For future use. Port number assigned to the NAT router's public interface.

BACnet Secondary IP Net Number If the i-Vu® XT Router has two BACnet/IP networks communicating on the Gig-E port, enter the second IP network number in this field.

If the i-Vu® XT Router is behind a NAT router and there is a second network with BACnet/IP devices behind the NAT router, enter the second network number in this field to logically connect the i-Vu® XT Router to the devices on the second network.



BACnet Secondary UDP Port If the i-Vu® XT Router has two BACnet/IP networks communicating on the Gig-E port, enter the port number that the i-Vu® application will use for BACnet communication. This port must be different than the **BACnet UDP Port**.

Ethernet Port

MAC Address A factory assigned Ethernet MAC Address for the **Gig-E** port.

BACnet Network Number Specify a number for the BACnet/Ethernet network or set to 0 if the port is not used.

Port S1

End of Network Indicates status of the router's **End of Net?** switch.

Active Protocol Indicates status of the router's Port S1 rotary switch.
 0=Disabled
 1=MS/TP
 2=ARCNET

Address If Port S1 or Port S2 is your **Home Network**, the Port S1 address is automatically read from the rotary address switches. Otherwise, enter the address. See *To set the Port S1 address and baud rate* (page 12).


ARCNET Baud Rate 156000

MSTP Autobaud Select **Yes** to enable this slave device to automatically receive its baud rate from a master on the network that has the fixed baud rate.

MSTP Baud Rate Set this to a baud rate that all other devices on the MS/TP network are set to.


MSTP Max Master To increase MS/TP performance, enter the highest address used on the MS/TP network for a master controller. This number must be less than or equal to 127.

MSTP Max Info Frames This is the maximum number of information messages a controller may transmit before it must pass the token to the next controller. Valid values are 1 to 255.

 **TIP** Set **Max Info Frames** to a number in the range 20 to 100 so that the router does not become a bottleneck for traffic being routed from a high-speed network to the slower MS/TP network.

BACnet Network Number Select:
Disable Routing if Port S1 is not used.
Autogenerated to have the network number for Port S1 automatically set to a number equal to ((IP network number + rotary switch address) x 10).
Assigned to enter a specific number.

To set up the controller through the Service Port

Port S2	
End of Network	Indicates status of the router's End of Net? switch.
Active Protocol	Shows one of the following: <ul style="list-style-type: none">• BACnet/MSTP if you enter a BACnet Network Number below for an MS/TP network• Disabled if neither of the above have been done
Address	Enter the router's unique address on the MS/TP network.
MSTP Autobaud	Select Yes to enable this slave device to automatically receive its baud rate from a master on the network that has the fixed baud rate.
MSTP Baud Rate	Set this to a baud rate that all other devices on the MS/TP network are set to.
MSTP Max Master	To increase MS/TP performance, enter the highest address used on the MS/TP network for a master controller. This number must be less than or equal to 127.
MSTP Max Info Frames	This is the maximum number of information messages a controller may transmit before it must pass the token to the next controller. Valid values are 1 to 255.  TIP Set Max Info Frames to a number in the range 20 to 100 so that the router does not become a bottleneck for traffic being routed from a high-speed network to the slower MS/TP network.
BACnet Network Number	Select: Disable Routing if Port S2 is not used. Autogenerated to have the network number for Port S2 automatically set to a number equal to ((IP network number + rotary switch address) x 10) + 3. Assigned to enter a specific number.
Home Network	This is typically the network that is communicating with the building automation system's application. This sets the BACnet Address of the Device object.

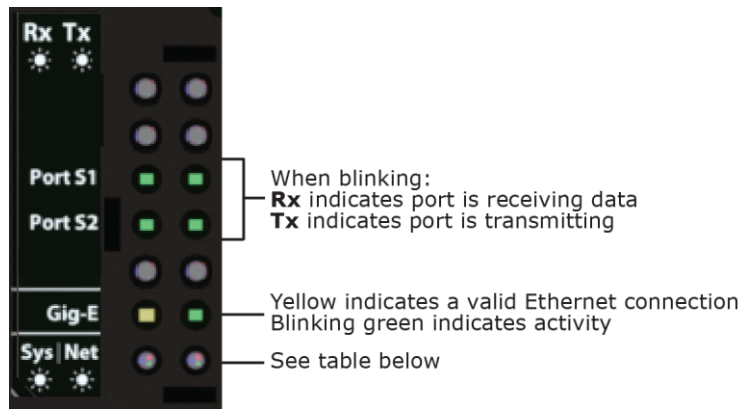
Security tab

BACnet Firewall	If your BACnet Firewall configuration in the i-Vu® interface did not include the i-Vu® server IP address, thus blocking communication with the i-Vu® server, you can disable the router's BACnet Firewall on the controller setup Security tab. NOTE You can enable the BACnet Firewall only in the i-Vu® interface.
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Troubleshooting

If you have problems mounting, wiring, or addressing the i-Vu® XT Router, contact Carrier Controls System Support.

LEDs



NET (Network Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solutions
Red	On	Ethernet connection problem	No Ethernet Link	<ul style="list-style-type: none"> Connect Ethernet Cable Check other network components
Red	1 blink	One of the following BACnet/IP (Ethernet) DLL reporting issue: <ul style="list-style-type: none"> Unable to create tasks Unable to open socket for BACnet port 	BACnet/IP error	Cycle power
Red	2 blink	Current default IP address does not match the current rotary switch setting	Default IP address mismatch	<ul style="list-style-type: none"> Use the controller setup Ports tab to set the IP address Cycle power to accept new IP address Change rotary switches to match current default IP address

NET (Network Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solutions
Blue	On	One of the following issues: <ul style="list-style-type: none"> Port communication firmware did not load properly Port communication firmware is not running Invalid protocol selected 	ARCNET/MSTP firmware error	<ul style="list-style-type: none"> Change rotary switch to select valid protocol Cycle power
Blue	1 blink	Invalid address selected for protocol	Invalid address selection for ARCNET/MSTP	Change rotary switch to valid address
Blue	2 blink	Router has same MAC address as another connected device	Duplicate address on ARCNET/MSTP	Change rotary switch to unique address
Blue	3 blink	Router is the only device on the network	No other devices detected on ARCNET/MSTP	<ul style="list-style-type: none"> Check that network cable is connected properly Check that baud rate is correct
Blue	4 blink	Excessive errors detected over 3 second period	Excessive communication errors on ARCNET/MSTP	<ul style="list-style-type: none"> Check that network cable is connected properly Check that baud rate is correct
Blue	5 blink	ARCNET traffic overload possibly due to circular router or excessive COVs (change of values)	Event System Error - FPGA RX FIFO full	<ul style="list-style-type: none"> Check the network configuration for a circular route Increase the time between COVs to reduce excessive COV traffic
Green	On	All enabled networks are functioning properly	No errors	No action required

SYS (System Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solution
Red	2 blink	Restarting after an abnormal exit	Auto restart delay due to system error on startup	After 5 minute delay has expired, if condition occurs again then cycle power
Red	4 blink	Firmware image is corrupt	Firmware error	Download driver again
Red	Fast blink	Firmware error has caused the firmware to exit and restart	Fatal error detected	No action required
Green	1 blink	No errors	Operational	No action required
Green	2 blink	Download of driver is in progress	Download in progress	No action required

SYS (System Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solution
Green	3 blink	BACnet Device ID is not set	Download required	Download the router
Green	Fast blink	Installation of recently downloaded driver is occurring	N/A	No action required
Blue	On	Router is starting up	N/A	No action required
Blue	Slow blink	Linux (operating system) is starting up	N/A	No action required
Blue	Fast blink	Linux is running but it could not start the firmware application	N/A	Download driver

To get a Module Status report

A Module Status report provides information about the router and verifies proper network communication with the router. You can get this report:

- In the i-Vu® application—Right-click the router on the navigation tree, then select **Module Status**.
- In the i-Vu® application—Select the router on the navigation tree. On the **Properties** page, click **Module Status**.
- On the *controller setup* (page 32) **ModStat** tab.

See *Appendix - Module Status field descriptions* (page 44).

To get a Device Log

If Carrier Controls System Support instructs you to get the router's Device Log containing diagnostic information for troubleshooting:

- 1 Select the i-Vu® XT Router in the i-Vu® navigation tree.
- 2 On the **Properties** page, click **Device Log**.

NOTE You can click **Device Log Archive** to download a file containing multiple Device Logs to your computer. This also contains any network packet captures that have been run from the *Network Diagnostics - Packet Captures* (page 29) driver page.


To get the i-Vu® XT Router's serial number

If you need the router's serial number when troubleshooting, the number is on:

- A Module Status report (Modstat).
- A laser-etched number and QR code on the circuit board inside the router.
- Some routers have a sticker on the front with the serial number, MAC address, and a QR code.

See *To get a Module Status report* (page 39).

To replace the i-Vu® XT Router's fuse

If you turn on the router's power switch and the  LED is not lit, the fuse that protects the router may be blown. Remove the fuse and use a multimeter to check it.

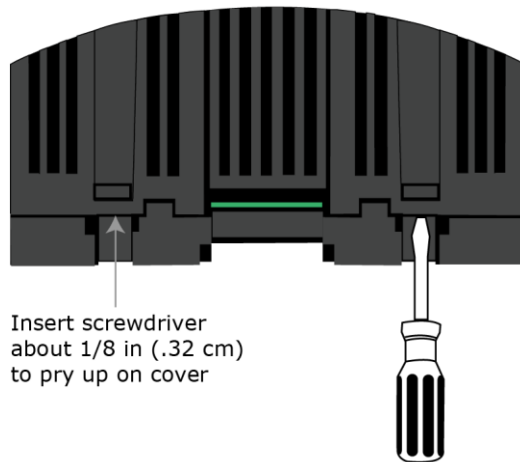
The fuse is a fast acting, 250Vac, 2A, 5mm x 20mm glass fuse that you can purchase from one of the following vendors:

Manufacturer	Mfr. Model #
Littelfuse	0217002.HXP
Bussmann	S500-2-R
Belfuse	5SF 2-R
Optifuse	FSD-2A

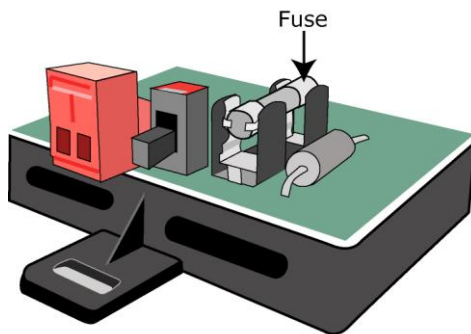
Before replacing the fuse, try to determine why the fuse blew. Check the power wiring polarity of the i-Vu® XT Router and any other devices that share the power supply. Use the same polarity for all of them.


To replace the fuse:

- 1 Turn off the router's power.
- 2 Remove the red power connector.
- 3 On both ends of the router, insert a small flathead screwdriver as shown below, and then gently pry up the cover until it is released from the base.



- 4 Remove the cover from the base.
- 5 The fuse labeled **F1** is located near the power connector. Use a fuse puller to remove the fuse.



- 6 Use the fuse puller to snap the new fuse into the fuse holder.
- 7 Replace the router's cover.
- 8 Replace the power connector.
- 9 Turn on the router's power switch.
- 10 Verify that the  LED on top of the router is on.

To take the i-Vu® XT Router out of service

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

- 1 On the i-Vu® navigation tree, select the i-Vu® XT Router.
- 2 On the **Properties** page, check **Out of Service**.
- 3 Click **Accept**.

Compliance

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1 This device may not cause harmful interference.
- 2 This device must accept any interference received, including interference that may cause undesired operation.

NOTE 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 it is not installed and used in accordance with this document, it 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 Any modifications made to this device that are not approved by Carrier will void the authority granted to the user by the FCC to operate this equipment.

CE and UKCA Compliance



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

Industry Canada Compliance

This Class A digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

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 - Module Status field descriptions

Field	Description
Date/Time	Date and time the Modstat was run
CM	The controller's rotary switch address (MAC address)
Model Name	Model Name identifies the Product Type
Device Instance	A unique ID assigned to the controller
Driver built	When the driver was built
Downloaded by	When and where the last download was performed
Data Partition Version	Data Partition identifies the clipping used when the product was manufactured. NOTE This field will say None except for a Carrier product from the factory. If a Carrier product is subsequently downloaded in the field, then this field will say None .
# PRGs initialized # PRGs running	If applicable, the number of control programs that were downloaded vs. the number that are running. If these numbers are not the same, the controller has a problem such as lack of memory.
Driver version	The name, version, and date of the driver, as well as all the bundles and versions.
Reset Counters:	The number of times each of the following events have occurred since the last time the controller was commanded to clear the reset counters. See NOTE below this table.
Power failures	Interruption of incoming power
Commanded boots	Includes commands issued from the i-Vu® interface such as the zap manual command, plus commands issued during a memory download.
System errors	Error in the controller's firmware or hardware
S/W Watchdog timeouts	Watchdog is firmware that monitors the application firmware for normal operation. If the watchdog firmware detects a problem, it restarts the application firmware.
H/W Watchdog timeouts	H/W Watchdog will restart the controller if it detects a severe problem with the controller's operating system
System status	Gives the current status of the controller's operation. See <i>LEDs</i> (page 37) for all possible conditions.
Network status	Gives the current status of the controller's networks. See <i>LEDs</i> (page 37) for all possible conditions.
System error message history	High-severity errors since the last memory download. Shows the most recent 10 messages. See NOTE below this table.
Warning message history	Low-severity errors and warning messages since the last memory download. Shows the most recent 10 messages. See NOTE below this table.

Field	Description
Information message history	Information-only messages since the last memory download. Shows the most recent 10 messages. See NOTE below this table.
ARC156 reconfigurations during the last hour	An ARCNET network normally reconfigures itself when a controller is added to or taken off the network. The Total field indicates the number of reconfigurations in the last hour. Initiated by this node indicates the number of reconfigurations initiated by this controller. Typical sources of the problem could be this controller, the controller with the next lower rotary switch address, any controller located on the network between these two controllers, or the wiring between these controllers. An excessive number in these fields indicates a problem with the network.
Core and Base board hardware	Gives the following information about the controller's boards: <ul style="list-style-type: none"> Type and board numbers that are used internally by Carrier. The manufacture date and serial number.
Number of BACnet Objects	Indicates the number of BACnet objects that were created in the device and the number of those objects that are network visible
Database Partition	Non-Volatile partition (16 MB maximum) contains data that needs to be preserved through a power cycle and archived to flash such as parameters and trend data. Volatile partition (6 MB maximum) contains data that does not need to be preserved through a power cycle such as status values that are calculated during runtime.
IP Networks - BBMDs	Shows the following information for each active IP network: BBMD Active shows whether the BACnet Broadcast Management Device is currently active (1) or inactive (0). BBMD Entries —the number of entries in the BBMD table (500 maximum). FDT Entries —the number of entries in the Foreign Device Table (500 maximum).
Third party integration points	Shows number of points used.
Network Information	The various network addresses for the controller. The Current and Assigned addresses will be the same unless the Enable IP configuration changeover on the BACnet Router Properties page is being implemented.
Statistics and Network Activity	Shows network communication statistics to assist with troubleshooting. See <i>Network Diagnostics - Statistics</i> (page 26) for more information.
Route Information Port Number	BACnet networks that a router is currently routing traffic to. The list changes as BACnet routers are added or removed from the system.

NOTE If you want to clear the Reset counters and the three message history fields, click the **Clear Counts/Logs** button on the controller's **Properties** page in the i-Vu® application or in the controller setup **Device** tab.

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*
6/9/22	Critical Product Announcement	New topic	X-PM-DD-E-BM
	Wiring for communications	Changed RS485 port to EIA-485	X-D
	Compliance > CE and UKCA Compliance	Added UKCA compliance	X-PM-AB-R-BH
	Specifications		
	To set up BACnet Broadcast Management Devices (BBMDs)	Added .bbmd and .text as allowable file extensions, removed .bdt-specific instructions	X-TS-OC-O
1/25/22	Specifications	Updated EU Compliance	X-PM-BM-E
9/20/21	Specifications	Changed Real time clock specification to "up to 3 days" from "at least 3 days". Changed EU RoHS compliance code.	X-PM-BM-O
8/2/21	Addressing the i-Vu® XT Router > To set the Port S1 address and baud rate	Changed from not being able to change the default addresses for ARCNET and MS/TP, to showing the range of allowable addresses. Clarified that if Port S1 or Port S2 is your Home Network, the Port S1 address is automatically read from the rotary address switches. Otherwise, enter the address on the BACnet tab.	C-TS-OC-O
6/11/21	To communicate through the BACnet/IP Service Port network	Removed statement that you can access your network using a touchscreen connected to the Service Port. Updated procedure for connecting to BACnet/IP Service Port for i-Vu® v8.0 interface	X-PM-BM-E
2/18/21	Configuring BACnet Device Instance and network number	Changed BACnet Device Instance Number formula to (IP network number x 100) + rotary switch address	C-TS-OC-E
	Specifications	Changed Real Time Clock spec to "at least 3 days" from "up to 3 days"	X-PM-BM-E
9/17/20	Specifications	Expanded Environmental operating range	X-TS-KC-E-KC
4/22/20	To set up the controller through the Service Port > BACnet tab	Added autobaud information.	X-PM-KC-O
	Addressing the i-Vu® XT Router > To set the Port S2 address and baud rate	Added autobaud information. Addressing now on the BACnet tab instead of the Ports tab.	
	Addressing the i-Vu® XT Router > To set the Port S1 address and baud rate	Added autobaud information. Addressing now on the BACnet tab instead of the Ports tab.	
	Addressing the i-Vu® XT Router > To set up autobaud	New topic	
	To set up the controller through the Service Port > Device tab	Added Data Backup and Restore.	
	To communicate through the BACnet/IP Service Port network	New topic.	
	To set up the controller through the Service Port	Added ability to access i-Vu® application or a touchscreen device through BACnet/IP Service Port. Corrected the static IP address settings.	
	What is the i-Vu® XT Router?	Added BACnet/IP Service Port to the ports table.	
	To get the i-Vu® XT Router's serial number	A sticker is on the top of the controller and there is a laser-etched number and QR code on the inside circuit board.	X-D

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

Date	Topic	Change description	Code*
	Specifications	Changed BACnet support to Rev 14	X-PM-KC-E
	Configuring BACnet Device Instance and network number	Changed Port S1 MSTP MAC Address and Port S1 ARCNET Address from fixed to user configurable	X-PM-KC-O
4/12/19	Specifications To mount the i-Vu® XT Router	Changed Depth dimension from 7.09 cm to 5.31 cm.	X-D
	Configuring BACnet Device Instance and network number	New topics	
	To set up BACnet Broadcast Management Devices (BBMDs)		
	Driver	Added that you can add, update, or delete screen files for an Equipment Touch.	
	BACnet firewall	Changed "controller from receiving" to "controller from responding to".	
	Network Diagnostics - Statistics	Changed names of Trend links at the bottom of each section. Added Latency under Port S1 Statistics	
10/2/18	Entire document	Major changes due to: - Controller label changes - New and revised controller setup pages - Driver pages revisions	
4/20/18	Network Diagnostics (2 topics) and To set up Network Statistics trends	New topics	C-D
1/12/18	To set the ARC/MSTP port address and baud rate	Correction - default address for ARCNET is 254.	C-TS-CI-E
10/24/17	Rotary switch settings	New topic	C-TS-CI-F
7/27/17	Specification	Added BACnet support specification.	X-D-LG
	BACnet Compliance	New topic	

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