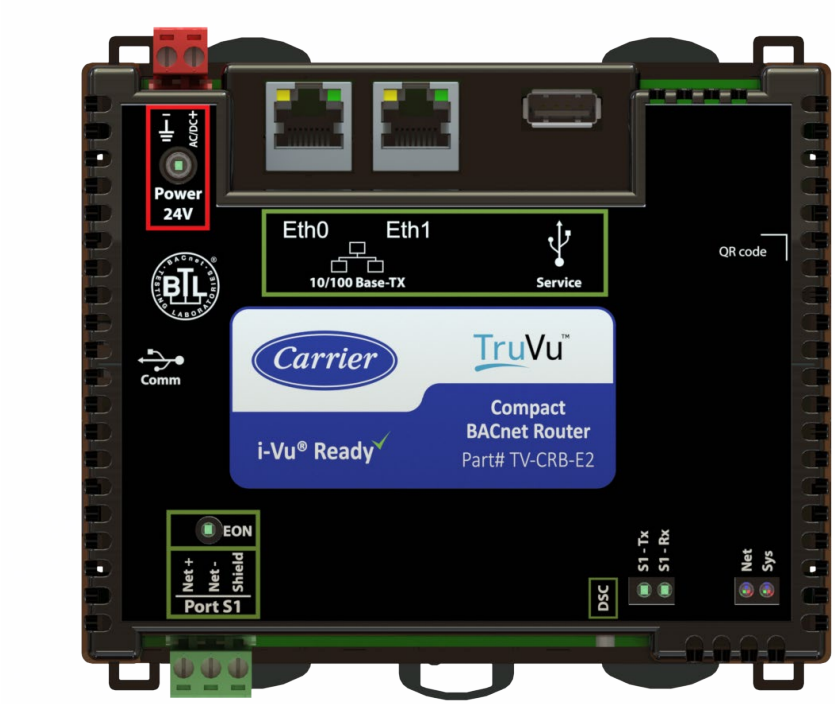
TruVu™ Compact BACnet Router (part no. TV-CRB-E2)

Installation and Start-up Guide



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

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Contents

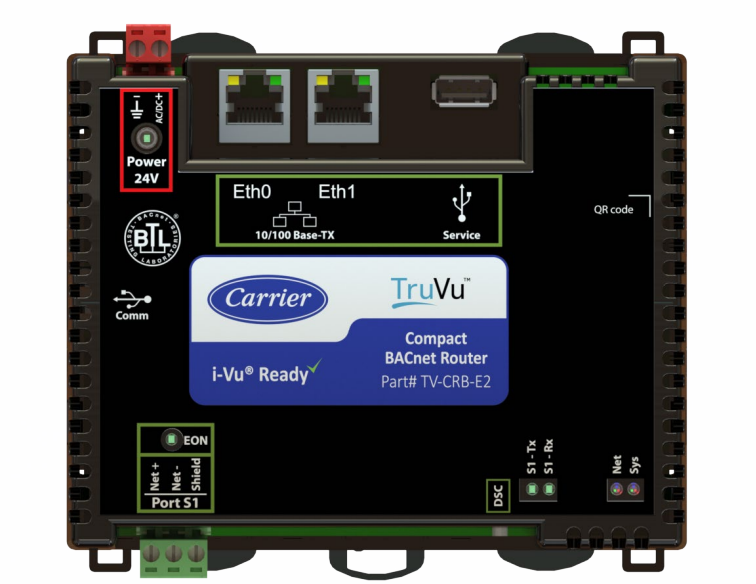
What is the TruVu Compact BACnet Router (part no. TV-CRB-E2)? **1**
Specifications 2
To mount the TV-CRB-E2 ..... **4**
Wiring for power **5**
To wire for power 5
Addressing the TV-CRB-E2 through the USB Service Port **6**
To set up autobaud 7
To set the IP address 8
Configuring BACnet device instance and network number 9
Addressing a network of controllers using the controller setup Local Network Tab **11**
Method 1: To address when you know the serial numbers 11
Method 2: To address when you do not know the serial numbers 12
Wiring for communications **14**
Wiring specifications 14
To connect the TV-CRB-E2 to the Ethernet 15
To wire to a BACnet MS/TP network 16
Find and upload in the i-Vu® interface **17**
Adjusting the TV-CRB-E2 driver properties **18**
Driver 18
Device 20
Notification Classes 21
Calendars 22
Common and Specific Alarms 22
BACnet Router Properties 23
BACnet Firewall 23
Network Diagnostics - Statistics 24
Network Diagnostics - Packet Capture 26
Communication Status 27
To set up Network Statistic trends 28
To set up the router through the Service Port **30**
Modstat tab 31
Device tab 31
Ports tab 32
BACnet tab 33
Security tab 33
Local Network tab 33
To communicate through the BACnet/USB Service Port network **37**
Troubleshooting **38**
LEDs 38
To get a Module Status report 41
To get a Device Log 41
To get the TV-CRB-E2's serial number 41
To replace the TV-CRB-E2's fuse 42
To take the TV-CRB-E2 out of service 43
To revert to default settings 43
Compliance **44**
FCC Compliance 44
CE and UKCA Compliance 44
Industry Canada Compliance 44

BACnet Compliance 44
Appendix - Module Status field descriptions **45**
Document revision history **47**

What is the TruVu Compact BACnet Router (part no. TV-CRB-E2)?

The TruVu™ Compact Link BACnet Router (part no. TV-CRB-E2)

- Provides BACnet routing between any supported BACnet communication types
- Can serve as a BACnet Broadcast Management Device (BBMD) on each of the BACnet/IP networks
- Supports Foreign Device Registration (FDR)
- Supports DHCP IP addressing
- Has built-in network diagnostic capture functionality for troubleshooting
- Has network statistics that can be viewed numerically or as trend graphs
- Works with the i-Vu® v8.0 or later system
- Can serve as both an IP and a serial gateway for third-party protocols



The TV-CRB-E2 has 3 physical ports for communication with BACnet and/or third-party protocols. For more information on using third-party protocols, see the specific protocol's integration guide.

Port	Port type	For routing this type of communication...	At...
Eth0, Eth1	10/100 Mbps Ethernet	BACnet/IP, BACnet/Ethernet	10,100 Mbps
S1	High-speed EIA-485	BACnet/MSTP	9.6 to 115.2 kbps
Service Port	USB	BACnet/IP Service Port	

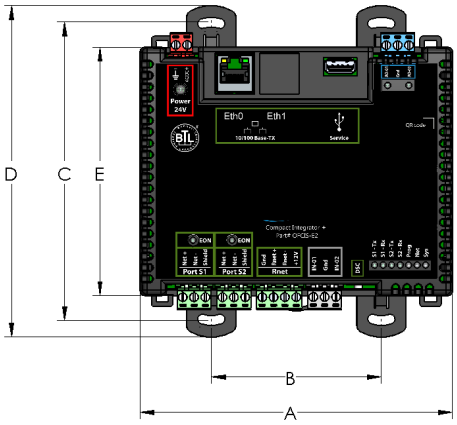
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Specifications

Driver	drv_fwex 107-xx-xxx or later
Power	24 Vac ± 10%, 50-60 Hz, 50 VA 24 Vdc ± 10%, 18 W
Eth0, Eth1	10/100 BaseT, full duplex, Ethernet ports with built-in fail safe. Supports direct connection or daisy chain topology natively using BACnet/IP and/or BACnet Ethernet communication. Under normal operation, network traffic not destined for this router is repeated to the other Ethernet port.
Port S1	For communication with a BACnet MS/TP network at 9600 to 115200 bps. **NOTE** For communication with third-party protocols, see the specific protocol's integration guide. This port's **End of Network Command** can be set to **Yes** to terminate the network segment.
Service Port	USB 2.0 host port for setting up the router and troubleshooting through a local connection to a computer, connecting to the TruVu™ Equipment Touch, or the Carrier USB Wireless service adapter.
USB Communication Port	USB 2.0 host port supports communicating expansion modules.
Microprocessor	32-bit ARM Cortex-A8, 600MHz, processor with multi-level cache memory
Memory	16 GBs eMMC Flash memory and 512 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. **NOTE** When you change a parameter, you must wait 30 seconds before turning the power off, in order for the change to be saved.
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, 3A, 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	• Tricolor **NET** LED to show network status • Tricolor **SYS** LED to show system status • **POWER** LED • **S1 EON** LED • A **TX** (Transmit) and **RX** (Receive) LED for the following ports: ○ Port S1 See *LEDs* (page 38).

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Environmental operating range	-40 to 158°F (-40 to 70°C), 10-95% relative humidity, non-condensing The TV-CRB-E2 is suitable for installation inside or outside the building envelope. It should be placed in a UL Listed enclosure. If installed outside, the enclosure must be suitable for the environmental conditions.
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: 5.51 in. (14 cm) D: 5.88 in. (14.93 cm) E: 4.41 in (11.20 cm) Depth: 2.01 in. (5.11 cm)
Screw mounting dimensions	B: 3.00 in. (7.62 cm) C: 5.29 in. (13.44 cm)



Weight	0.75 lb. (0.3402 kg)
BACnet support	Conforms to the BACnet Router (B-RTR) and BACnet Broadcast Management Device (B-BBMD) Standard Device Profile as defined in ANSI/ASHRAE Standard 135-2016 (BACnet) Annex L, Protocol Revision 15
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: CE Mark, UK: UKCA EN50491-5-2:2009; Part 5-2: EMC requirements for HBES/BACS used in residential, commercial and light industrial environments RoHS Compliant: 2015/863/EU REACH Compliant
	Australia and New Zealand: C-Tick Mark, AS/NZS 61000-6-3

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To mount the TV-CRB-E2

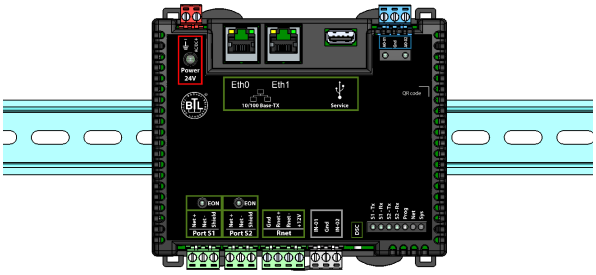
The TV-CRB-E2 can be mounted on a DIN rail or screwed to a surface.

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

DIN rail mount

1 In the trough on the back of the TV-CRB-E2, hook the edge of the DIN rail under the router's two mounting flanges.

2 Push the router toward the DIN rail until you hear it click and the spring-loaded latch secures the router to the DIN rail..

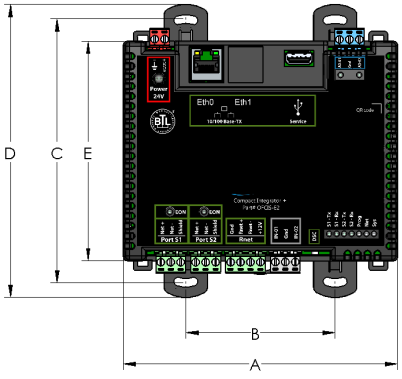


Screw Mount

Leave about 2 in. (5 cm) on each side of the TV-CRB-E2 for wiring.

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

Overall dimensions	A: D: E: Depth:	5.51 in. (14 cm) 5.88 in. (14.93 cm) 4.41 in (11.20 cm) 2.01 in. (5.11 cm)
Screw mounting dimensions	B: C:	3.00 in. (7.62 cm) 5.29 in. (13.44 cm)



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Wiring for power

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

CAUTIONS

- The TV-CRB-E2 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. Remove power from the power supply.
2. Pull the red screw terminal connector from the router's power terminals labeled **24 Vac/Vdc** (**+/-**).
3. Connect the power supply's wires to the red screw terminal connector.
4. 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).
5. Apply power to the power supply.
6. Measure the voltage at the red screw terminal connector to verify that the voltage is within the operating range of 20.4 to 28.8 Vac or 21.6 to 28.8 Vdc.
7. Insert the red screw terminal connector into the router's power terminals.
8. 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.
9. Verify that the LED on top of the router is on.
10. Measure the voltage at the red screw terminal connector to verify that the voltage is within the operating range of 20.4 to 28.8 Vac or 21.6 to 28.8 Vdc.

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Addressing the TV-CRB-E2 through the USB Service Port

The TV-CRB-E2 is addressed using the router setup pages. The **Local Network** tab allows you to discover all i-Vu® XT or TruVu™ devices on a single network and configure them from that page.

You can connect the TV-CRB-E2 to a computer using either the Carrier wireless service adapter or a USB cable.

NOTES

- You cannot access the Service port by plugging an Ethernet cable into Eth0 or Eth1.

To connect the TV-CRB-E2 to a computer using the Carrier wireless service adapter:

1 Insert the Carrier wireless service adapter (part# USB-W) into the router's USB Service Port to communicate with a Wi-Fi-compatible computer.

NOTE USB extension cable must be attached to one end of the USB-W with the other end plugged into the Service Port.

2 Open your computer's wireless network display to view your available wireless networks.

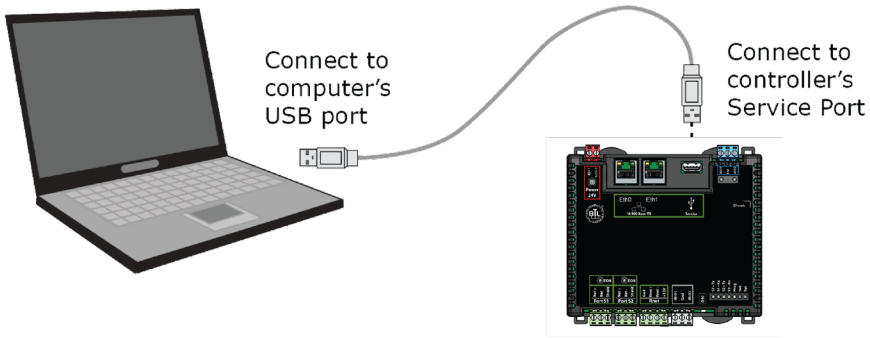
NOTE USB-W Wireless Adapter only supports the 5 GHz band and not the 2.4 GHz band.

3 Connect to the wireless network using the network SSID and password that are printed on the Carrier wireless service adapter.

4 Open a web browser on the computer and navigate to http://local.access or http://169.254.1.1 to see the router setup pages.

To connect the TV-CRB-E2 to the computer using a USB cable.

1 Connect a USB Type-A Male to Male USB cable from a computer to the router's USB Service Port, as shown below.



2 A new Ethernet connection will appear on your computer.

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

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

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

4 Open a web browser on the computer

5 Navigate to http://local.access or http://169.254.1.1 to see the router setup pages.

See *To set up the router through the Service Port* (page 30) for detailed information.

To set up autobaud

The TV-CRB-E2 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** router setup pages > **BACnet** tab > **Port S1**

or

- The i-Vu® interface, right-click your TV-CRB-E2 on the **Navigation** tree, and select **Driver Properties** > **BACnet Router Properties** > **MS/TP Configuration** on **Port S1**. See *BACnet Router Properties* (page 23).

NOTE If you set **Autobaud** or make other changes in the router 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.

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To set the IP address

You must define the TV-CRB-E2's IP addressing (IP address, subnet mask, and default gateway) in the Service Port router setup pages so that the router can communicate with the i-Vu® 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: • 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?

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 router setup 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 **router setup Ports tab, under IP Port, select Custom Static.**
3. Enter the **IP Address**, **Subnet Mask**, and **Default Gateway** addresses given to you by the network administrator.
4. Click **Save**.

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Configuring BACnet device instance and network number

The TV-CRB-E2 router 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 TV-CRB-E2's home network address setting determines the automatic BACnet addressing scheme for the connected open network.

Legend

16 = Carrier's BACnet Vendor ID
xxx = TV-CRB-E2's rotary switch address (See **NOTES** below.)
yy = Router's rotary switch address (ARCNET/MSTP MAC address)

ID*:* It uses two digits, 24 for ALC/OEM and **16 for Carrier channel.**

Network ID: ((Sum of all four octet of Network address) MOD 80) + 10, 10 is added here to make device id unique when older product (with rotary switch) are used along with new product (w/o rotary switch).

Host Number: IP Address & ~(Subnet Mask) , E.g Host Number = 110, for 192.168.168.110/24

NOTE The host number, being dependent on the subnet mask, can have a wide range of values. For a Class A Network, with a subnet mask of 255.0.0.0, the range can be from 1 to 16,777,214. For a Class C Network, with a subnet mask of 255.255.255.0, the range can be from 1 to 254.

NOTE The host number is restricted for auto-generation purposes to 1 -127 or 254. Depending on which network is being auto-generated. The auto-generation scheme will fail to produce a network number is outside the range for that network.

IPNetwork# = (ID * 100).

Maximum allowed **MAC address** for MSTP is 127.

Maximum allowed **MAC address** for ARCNET is 254.

Router upstream **Network#** = 16101 for CAR, 24101 for ALC/OEM

P = Port number, 0, 3, or 6. 0 – Port S1/IP, 3 – Port S2, or 6 - Other (Please note that this only applies to Routers without rotary switches)

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For the TV-CRB-E2

- BACnet Device Instance Number = (((**IPNetwork#** + **Network ID**) * 100) + **Host Number**).
- BACnet Device Instance Name = the name "device" + the Device Instance.
- BACnet IP Network Number = 1600. (Which is the Network ID)
- BACnet ARC/MSTP Port S1 Network Number = ((**IPNetwork#** + **Host Number**) * 10) + **P**.
  NOTE The Host number is restricted to 1 – 127 for MSTP and 1 – 254 for ARC.
- Port S1 MSTP MAC Address = 1 by default (user configurable).
- Port S1 ARCNET Address = 254 by default (user configurable).
- BACnet MSTP Port S2 Network Number = ((**IPNetwork#** + **Host Number**) * 10) + **P**.
  NOTE The Host number is restricted to 1 – 127 for MSTP and 1 – 254 for ARC.
- Port S2 MSTP MAC Address = 1 by default (user configurable).
  NOTE: Auto Generation will fail if the host number is not in the correct range for the Network.
-

For the Open controllers connected to the TV-CRB-E2

- 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" + the Device Instance.
- BACnet ARCNET Device Instance Name = the name "device" + the Device Instance.
- BACnet MSTP or ARCNET MAC address = yy.
- BACnet MSTP Network Number = 161xx (learned from the router, defaults to 16101 if no TV-CRB-E2 is operating).

  NOTE Do not configure the home network address of the TV-CRB-E2 to a number greater than 127 or 254 depending on the networks. The downstream network numbers will have to be manually set.

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Addressing a network of controllers using the controller setup Local Network Tab

You can use the controller setup **Local Network** tab to discover Carrier i-Vu® XT or TruVu™ devices on a single network. You can configure them and assign addresses to each one using one of the methods described below.

NOTE For this discovery tool to work, the controllers must reside on the same subnet and be downloaded with drv_fwex.

Method 1: To address when you know the serial numbers

1. Connect to the Service Port of one Carrier i-Vu® XT or TruVu™ device on the IP network. For details, see *Addressing the TV-CRB-E2 through the Service Port* (page 6).

   NOTE This controller is referred to as the connected controller.

2. Browse to the Service Port address (http://local.access or http://169.254.1.1).
3. On the **Ports** tab, set the device's **IP Address**, **Subnet Mask**, and **Default Gateway**.
4. On the controller setup **Local Network** tab, verify that the device's address information is displayed at the top of the page.
5. On the **Local Network** tab, click the **Clear All** button to erase the **Local Devices** table if there is information in it.
6. Click **Discover**. The table finds and lists the first 256 unconfigured devices on the same subnet. The table is sorted by serial number.

   NOTE A maximum of 256 i-Vu® XT or TruVu™ controllers can be discovered and displayed in the **Local Devices** table. If you have more than 256 controllers on your network, configure some or all the controllers in the table and click **Clear**. Check **Only Unconfigured** and click **Discover** again. A count appears above the table to report the total number of controllers and the discovered number.

7. To configure devices:
   - One at a time - Enter the IP **Address** and **Location** or name (optional) of each device you wish to configure. When you enter the IP address, that device inherits the original device's subnet mask and default gateway.
   - Multiple devices simultaneously - **Select** the devices you want to address, enter the starting IP address in the field under the **Address** heading, and then click **Assign**. The selected devices are automatically assigned sequential IP addresses.

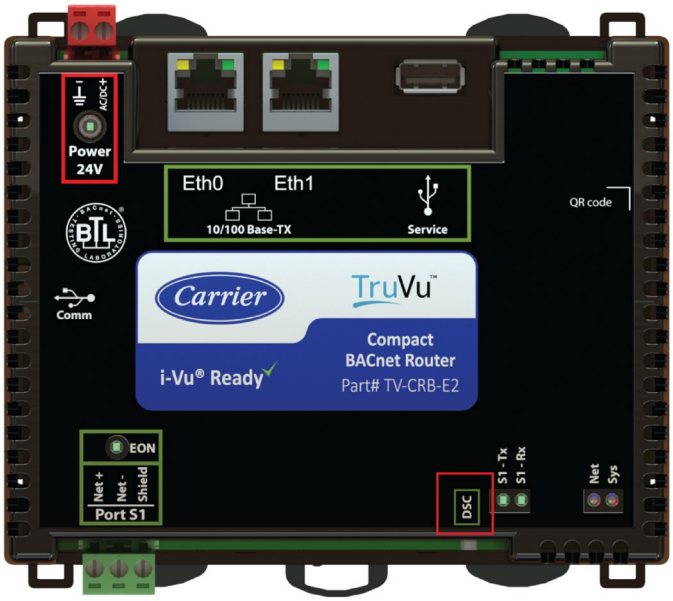
     NOTE To change the IP Address, the device's **Mode** must be **Custom Static**.

For more information on discovering and configuring your devices, see *To set up the router through the Service Port* (page 30) and *Local Network tab* (page 33).

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Method 2: To address when you do not know the serial numbers

You must have physical access to each device to press the DSC button on the bottom right of the TV-CRB-E2. This allows you to identify the device on the controller setup Local Network page.



1 Connect to the Service Port of one Carrier i-Vu® XT or TruVu™ IP device on the network. For details, see *Addressing the TV-CRB-E2 through the USB Service Port* (page 6).

2 Browse to the service port address (http://local.access or http://169.254.1.1).

3 On the **Ports** tab, set the device's **IP Address**, **Subnet Mask**, and **Default Gateway**.

NOTES The other devices that you configure inherit this device's subnet mask and default gateway.

4 On the **Local Network** tab, click the **Clear All** button to erase any pre-existing data in the **Local Devices** table.

5 On the controller you want to address, press the DSC button on the bottom right. When pressed, a row appears in the **Local Devices** table on the **Local Network** tab. The row has a blue dot to indicate which controller has just had the button pressed.

6 In the row for the identified controller, enter the **Address** and **Location** (optional).

7 Repeat steps 3 and 4 for each controller that you want to address.

8 For more details about discovering and configuring your devices, see **Local Network** tab.

NOTE To physically identify a device displayed on the **Local Devices** table, click the **Blink** button to trigger the device's **Net** and **Sys** LEDs to flash light blue for 10 seconds.

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The following are two possible methods used to identify and assign a network of controllers' addresses after following steps 1-4 above:

- Two technicians can work together if they are communicating throughout the process. The first technician physically travels around the building to each controller, tells his co-worker exactly where he is, and then presses the DSC button. The second technician, who is sitting at a computer connected to the controller, watches for the blue dot to show up on the **Local Devices** table on the **Local Network** tab, where he can enter the appropriate addressing and identifying information.
- One technician alone can address the controllers on a mobile device showing the Local Network page by plugging the Carrier wireless service adapter into a controller's Service Port. Then, with the computer, move to each controller within 100 ft. of the adapter. Pressing the DSC button on the controller displays a blue dot in the table where the addressing information can be entered.

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Wiring for communications

The TV-CRB-E2 communicates on the following ports.

Port	Protocol	Port type(s)	Speed(s)
Eth0	BACnet/IP	Ethernet	10 or 100 Mbps
Eth1	BACnet/Ethernet		
Port S1 [1]	BACnet/MSTP	EIA-485	9.6 to 115.2 Kbps [2]
Service Port[2]	USB	USB	
USB Port	USB2.0	USB	

[1] Default for MS/TP is 76.8 kbps.

[2] See *To set up the router through the Service Port* (page 30).

Wiring specifications

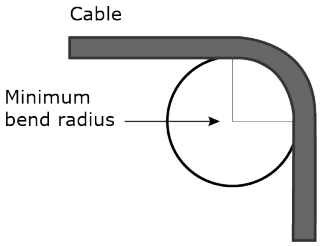
For...	Use...	Maximum Length
Ethernet - not daisy chained	Cat5e or higher Ethernet cable	328 feet (100 meters)
Ethernet - a daisy chain configuration	Cat5e or higher Ethernet cable	164 feet (50 meters)
MS/TP [1]	22 AWG, low-capacitance, twisted, stranded, shielded copper wire	2000 feet (610 meters)

[1]For details, see the *Open Controller Network Wiring Guide*.

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WARNINGS

- Do not apply line voltage (mains voltage) to the router's ports and terminals.
- Do not exceed the minimum bend radius of the Cat5e or Cat6e Ethernet cable. Refer to Ethernet cable manufacturer specifications for minimum bend radius.



To connect the TV-CRB-E2 to the Ethernet

Connect an Ethernet cable from the building BAS system or another TV-CRB-E2 router to the Eth0 Ethernet port. If necessary, connect another Ethernet cable from the Eth1 port to the next controller in a daisy chain.

The TV-CRB-E2 has a fail-safe Ethernet relay that bypasses a daisy chained controller in the event of an internal disruption, such as a power loss. When a failure occurs and the switch is bypassing a controller, the network connection on both sides of the controller are electrically connected, which continues the signal and passes it to the next controller.

NOTE If your system has controllers on different IP subnets separated by an IP router, you must configure one controller on each subnet as a BACnet Broadcast Management Device (BBMD). Do not configure more than one BBMD per subnet as this may cause circular routes. See "Setting up BACnet Broadcast Management Devices (BBMDs)" in the i-Vu® Help.

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To wire to a BACnet MS/TP network

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

1. Remove power from the TV-CRB-E2.
2. Check the communications wiring for shorts and grounds.
3. Connect the communications wiring to the **Port S1** screw terminals labeled **Net +**, **Net -**, and **Shield**.

   NOTE Use the same polarity throughout the network segment.
4. If the TV-CRB-E2 is at either end of a network segment, set the port's **End of Network Command**
5. to **Yes**.

   NOTE The router's **End of Net?** termination applies network termination and bias. If the router is at the end of a network segment that includes a DIAG485 that has its **Bias** jumper in the ON position, set the **End of Net?** termination to **No** and connect a 120 ohm termination resistor to the **Net+** and **Net-** terminals. See *DIAG485 Technical Instructions* for more information.
6. Restore power to the router.
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 you to discover and upload the router in the i-Vu® interface.

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Find and upload in the i-Vu® interface

- In the i-Vu® interface, select the **System** level in the navigation tree.
- On the **Devices** page > **Manage** tab, click **Find Devices** to discover your routers and their drivers, graphics, and touch files.
- 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 and/or Shift+click to select multiple items.
- Click **OK** when you see the message "This will upload all content for the router. 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.

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Adjusting the TV-CRB-E2 driver properties

The driver properties pages are the same controller setup interface that you access by connecting to the Service Port.

NOTE Some properties, such as the home network settings, cannot be changed through the i-Vu® driver interface. This prevents losing communication to the router. You can change those settings by connecting directly through the Service Port.

After you find and upload the TV-CRB-E2 in the i-Vu® interface, you may want to customize the TV-CRB-E2's settings for your applications. You can change settings on the **Driver Properties** page.

- In the i-Vu® interface, right-click the TV-CRB-E2 in the navigation tree and select **Driver Properties**.
- Adjust the driver as desired.

Driver

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

- Obtain information about the TV-CRB-E2, 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

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® application. This could result in the controller operating on a schedule that differs from the one you see in the i-Vu® interface.
Controller Clock	
Clock Fail Date and **Time**	Date and time the controller uses when its real-time clock is invalid.
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

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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® 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**.
Trend Sampling	
Collect a daily midnight sample for all points in this controller that are sampling on COV	For values that change infrequently, select to verify at midnight daily that the point is still able to communicate trend values.
Local Network Configuration	
Allow Local Network Configuration from other devices on the local network for 24 hours	You can unlock a device for 24 hours to make IP address changes.
Debug	
Enable Debug Messages	Enable only if directed by Carrier Control Systems.

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Device

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

- BACnet device object properties for the TV-CRB-E2
- 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 fields refer to all networks over which the TV-CRB-E2 communicates.	
APDU Timeout	How many milliseconds the device waits before resending a message if no response is received.
APDU Segment Timeout	How many milliseconds the device waits before resending a message segment if no response is received.
Number of APDU Retries	The number of times the device resends a message.
Network Time Protocol	
	To define an NTP server to use for time synchronization: 1. Click **Enable**. 2. Define **NTP Server** by one of the folowing: ○ **IP Address** ○ **Host name** ○ **Fully qualified domain name** Click **Save**.
Controller Clock	
Local Time and Date	Display current time and time of controller.
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.

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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.	
	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.	

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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 alarms:

- All Programs Stopped
- Excessive COV
- Program Stopped
- Locked I/O
- Controller Halted
- Control Program
- 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.

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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 *Setting up an alarm source in the i-Vu® interface* in i-Vu® Help.
Enable	Clear these checkboxes to disable Alarm or Return to normal messages of this type from the TV-CRB-E2.
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 *Notification Classes* (page 21) 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 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.

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Network Diagnostics - Statistics

This page shows the network statistics for each of the TV-CRB-E2's ports that are in use. This same information is provided in a *Module Status report*.

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**—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 TV-CRB-E2's networks.
Router Sourced Packets	Shows the number of packets initiated by the TV-CRB-E2 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.
Eth0/Eth1 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 TV-CRB-E2. **BACnet/IP Tx Broadcast Packets**—BACnet/IP broadcast packets transmitted by the TV-CRB-E2. **Whitelist Rejections** (if *BACnet Firewall* is enabled)—Messages blocked by the BACnet Firewall because the IP address that sent the message was not in the whitelist.

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Ethernet Statistics	**Ethernet Rx packets**—All packets (including non-BACnet packets such as a ping) received by the TV-CRB-E2. **Ethernet Tx packets**—All packets (including non-BACnet packets such as a ping) transmitted by the TV-CRB-E2. **Receive Errors (total)**—All errors related to received packets such as CRC errors, FIFO errors, frame errors, length errors, missed errors, and overrun errors. **Transmit Errors (total)**—All errors related to transmitted packets such as aborted errors, carrier errors, dropped errors, FIFO errors, heartbeat errors, and window errors. **Dropped Packets**—Packets dropped by the TV-CRB-E2's Ethernet interface.
Trends	**Error Rate Trend**—Shows the total number of errors within the interval time. **Packet Rate Trend**—Shows the total number of packets transmitted and received within the trend sampling interval.
Port S1 Statistics	
Error Counters	**UART Errors**—UART receive and transmit errors such as break errors, framing errors, parity errors, and overrun errors. **Invalid Frames**—Received MS/TP frames that contain an error such as CRC. **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) **Dropped Tokens**—Dropped tokens that have been retransmitted. **No responses—**Messages that did not receive a response from the destination device.
Activity Counters	**BACnet/MSTP Rx Packets**—BACnet/MSTP data packets received by the TV-CRB-E2. **BACnet/MSTP Tx Packets**—BACnet/MSTP data packets transmitted by the TV-CRB-E2.
Latency	**Average Value (milliseconds)**—The average time from when a packet is queued to be transmitted until it is actually transmitted on the bus. **Maximum Value (milliseconds)**—The maximum time from when a packet is queued to be transmitted until it is actually transmitted on the bus
Trends	**Error Rate Trend**—Total number of errors within the interval time on this network, including break errors, framing errors, etc. **Packet Rate Trend**—Percentage of total bus bandwidth used to transmit data packets. **NOTE** This is for all bus traffic, not just traffic generated by the TV-CRB-E2.

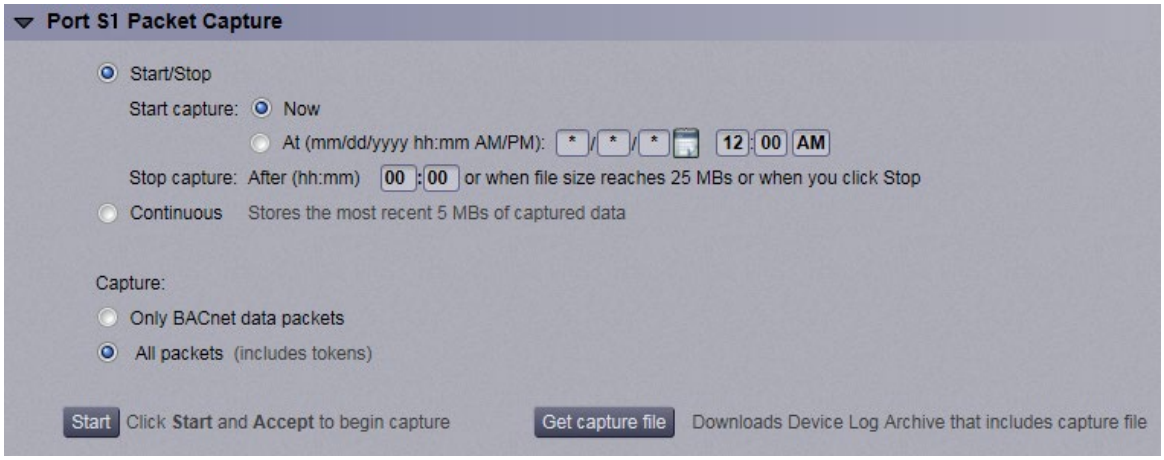
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Network Diagnostics - Packet Capture

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 is 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.



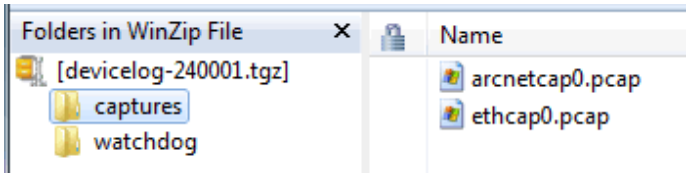
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To download the capture file

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

- If you do not have Wireshark installed on your computer, download the latest version from the *Wireshark website* (*http://www.wireshark.org*).
- Run the install program, accepting all defaults. Include WinPcap in the installation.
- 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.
- 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 Port S1, the file names will be:
    mstpcap0 for Port S1
  - 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.

- Extract the .pcap file from the .tgz file.
- Open the .pcap file in Wireshark.

Communication Status

The **Communication Status** page shows the status of the protocols currently running on the TV-CRB-E2's ports.

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To set up Network Statistic trends

PREREQUISITE To view Network Statistic trends, you must have a i-Vu® v8.0 or later system with the latest cumulative patch.

To view the Network Statistics as trend graphs, select the router 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.

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Field	Notes
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.

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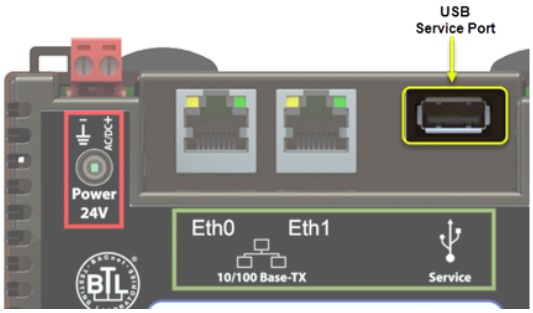
To set up the router through the Service Port

You can communicate with the TV-CRB-E2 through a web browser by connecting a computer to the router's Service Port using either the Carrier wireless service adapter or a USB cable.

NOTE You cannot access the Service Port by plugging an Ethernet cable into Eth0 or Eth1.

Once you are connected to the network, you can:

- Access the router setup pages
- Address and configure controllers
- View the router's Module Status report
- View/change router and network settings. Changes take effect immediately.
- Troubleshoot
- Use BACnet/USB Service Port to access the i-Vu® application or a touchscreen device. See *To communicate through a BACnet/USB Service Port network*.



To access the router setup pages and use the **Local Network** tab, you must first connect to and manually address one TV-CRB-E2. For instructions on connecting, see *Addressing the TV-CRB-E2 through the USB Service Port*.(page 6). Navigate to http://local.access or http://169.254.1.1 to access the pages. Then set up the address on your selected TV-CRB-E2 on the **Ports** tab.

NOTE The first time you access the router in the i-Vu® interface, after you have changed settings through the USB 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.

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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*.

Device tab

The information on the **Devices** tab is typically defined in the i-Vu® interface and then downloaded to the router. However, you should set the information on the router setup **Device** tab if the router is stand-alone without a i-Vu® system.

BACnet Object	
Device Instance	**Assigned**—Lets you enter a specific number that is unique on the BACnet network.
Device Name	**Assigned**—Lets you enter a specific name that is unique on the BACnet network.
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.
Network Time Protocol	
	To define an NTP server to use for time synchronization: 3. Click **Enable**. 4. Define **NTP Server** by one of the folowing: ○ **IP Address** ○ **Host name** ○ **Fully qualified domain name** 5. Click **Save**.
Controller Information	
Clear Counts/Logs	Clears Reset counters and the three message history fields from the Module Status.

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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.

Network Factory Defaults	
Reset	Resets the router to network factory default settings.

Ports tab

IP Port	
IP Addressing	Select the type of addressing the controller is to use. See *Addressing the TV-CRB-E2 through the service port* (page 6).
Ethernet Port	
Address	A factory assigned Ethernet MAC Address for the **Eth0** and **Eth1** ports.

Port S1	
End of Network	Indicates status of the controller's **End of Network Command.**.
End of Network Command	Selection for End of Network termination.
Protocol	Select BACnet MSTP
Active Protocol	Indicates the active protocol on **Port S1 Configuration**.

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BACnet tab

NOTE The TV-CRB-E2 can be configured for only one BACnet communication type.

On the **BACnet** tab, you can choose to run **BACnet Over IP** or **BACnet Over Ethernet** on the **Eth0** and **Eth1** ports. If you choose **BACnet Over IP**, you can edit the **BACnet UDP Port**.

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 controller's BACnet Firewall on the controller setup **Security** tab. **NOTE** You can enable the BACnet Firewall only in the i-Vu® interface.

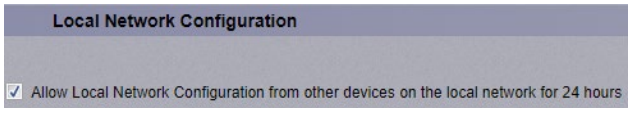
Local Network tab

Use the **Local Network** tab to:

- Discover 253 i-Vu® XT or TruVu™ devices on a single network at a time.
- Discover both configured or unconfigured devices on this router's network.
- See the number of devices discovered and the total number on the network.
- Identify the i-Vu® XT or TruVu™ controller that has had its DSC button pressed.
- Export the **Local Devices** that are present in the table (limited to 100) to a .csv file.
- Set a device's **Mode**, **Address**, and **Location**.
- Assign IP addresses to multiple devices at one time.
- Prompt an LED to flash on a device.
-

A device that is new from the factory or has not been previously configured with an IP address, can always be configured using the **Local Devices** table. However, once you have assigned a valid IP address, you have up to 24 hours to make any other changes. After 24 hours, the fields are not editable and the device is **Locked**.

You can unlock a device for 24 hours by either pressing the DSC button on the TV-CRB-E2 router or by using the i-Vu® application. In the i-Vu® navigation tree, right-click the TV-CRB-E2, select **Driver Properties** and go to **Driver** > **Settings** tab > **Local Network Configuration**. Check **Allow Local Network Configuration from other devices on the local network for 24 hours** and click **Accept**.



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To discover devices on a network

- To address a network of devices, you must first select one i-Vu® XT or TruVu™ controller and set the **IP Address**, **Subnet Mask**, and **Default Gateway** on the **Ports** tab.

  NOTE This controller is referred to as the connected controller.

- On the **Local Network** tab, at the top of the page, verify that the connected controller's **Mode**, **IP Address**, **Subnet Mask**, and **Default Gateway** are accurate.
- Use the following settings to define the devices that you want to discover in the **Local Devices** table.

Local Devices	
Only Unconfigured	When checked, only discovers devices that do not have an IP address and are linked to the connected controller's network. When unchecked, discovers both configured and unconfigured devices.
Clear All	Erases all information in the table.
Export	Creates .csv file of the data in the table, limited to 253 devices.

- Click **Discover** to populate the table with your i-Vu® XT or TruVu™ devices that are on a single network communicating with the connected i-Vu® XT or TruVu™ controller.

To auto-assign IP addresses to multiple devices at one time

- Follow the above steps to **Discover** devices.
- In the **Select** column, click the checkbox for the devices you want to assign addresses to.

  NOTE To change the IP Address, the device's **Mode** must be **Custom Static**.

- Enter the starting IP address under **Address** and click **Assign** to automatically assign sequential IP addresses.

There are different workflows for using the **Local Devices** table to address your devices, depending on the information you have from the installation. See *To address when you know the serial numbers* (page 11) or *To address when you do not know the serial numbers* (page 12).

Local Devices table	
Select	Check to select devices for: • Changing the Mode • Resolving a Mismatch • Auto-assigning an IP Address **NOTE** You cannot select devices with a lock symbol.
MAC	Ethernet MAC address of device
Serial#	The discovered devices are in order by serial number. **NOTE** To change how the rows are sorted, click a different column heading.

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Local Devices table	
Mode	To change the **Mode:** **1** Select the devices you want to change. **2** Select one of the following IP addressing modes: ○ **Default IP** - Devices with rotary switches that are used when autogenerating the address (if applicable) ○ **Custom Static** - A permanent IP addresses which does not change and is usually obtained from the network administrator ○ **NOTE** Selecting this automatically sets the device's subnet and default gateway to match the connected controller. ○ **DHCP** - Allows the DHCP server to automatically assign an IP address **1** Click the **Set** button.
Address	Displays the IP address of the device, if assigned. You can edit the address only if the connected controller is set to **Custom Static**. To auto-assign multiple sequential addresses, select the devices, enter the beginning address, and click **Assign**.
Location	You can describe the location of the device or any other helpful information.
Mismatch	A **Mismatch** occurs when the connected controller's mode is set to **Custom Static** and a discovered device's subnet and default gateway do not match the connected controller. The incorrect addresses are shown with **SN** for subnet and **GW** for default gateway. To resolve a mismatch, select the device(s) by clicking the **Select** checkbox and then clicking the **Resolve** button. The subnet mask and default gateway addresses of the selected devices change to match the connected controller.
Status	The following are the results of changing **Mode**, **Address**, **Location**, or pressing **Blink**: • **Success** - Successful operation • **No Response** - Device is not communicating • **Device Locked** - Device must be unlocked before you can make any changes using the **Local Devices** table. You can unlock the TV-CRB-E2 by pressing the DSC button on the device or by using the i-Vu® application. (See instructions above.) **NOTE** The status of a device changes to locked 24 hours after unlocking it. • **Failure** - A conflict between the device and the information entered
Blue dot	A blue dot appears for the most recent device to have the: • **Blink** button clicked in the table • **Address** or **Location** entered • DSC button pressed on the device **NOTE** If the device is not already listed in the table, pressing the DSC button immediately adds it to the table and displays a blue dot. **TIP** You can build a table of devices in the order that you've pressed the DSC buttons. Clear the table and then press each DSC button in turn. The devices will be listed in the table in the order in which the button was pressed, but only the most recent one will show the blue dot.

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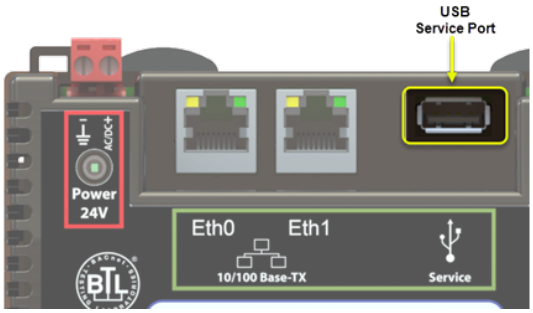
Local Devices table	
Blink	Click the **Blink** button to prompt an LED to blink on a device you have checked in the **Select** column, allowing you to verify the physical location. The **Sys** and **Net** LEDs blink white, once per second for 10 seconds, and then stop. **NOTES** • The blue dot appears when you **Blink** a device. • You can **Blink** a locked device.

NOTE If a device's IP address is the loopback address (127.0.0.1), it is considered unconfigured and unlocked. The IP address, subnet mask, and default gateway fields are blank in the **Ports** and **Local Network** tabs. You can configure it in the **Local Devices** table.

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To communicate through the BACnet/USB Service Port network

You can communicate with the TV-CRB-E2 Service Port through i-Vu® or Field Assistant using either the Carrier wireless service adapter or a USB cable.



See *Addressing the TV-CRB-E2 through the USB Service Port* (page 6) to set up your connection to the web browser if you haven't already.

1. Open a web browser on the computer and launch your i-Vu® application.
2. In the i-Vu® interface, on the **System Options** tree, select **Connections.**
3. On the **Configure** tab, select **BACnet/IP Service Port Connection** from the drop-down list and click **Add** then click **Apply**.
4. Select **BACnet/IP Service Port Connection**.
5. If needed, enter the **Service Port Network Number** as follows then click **Accept**:
   - **0** - the TV-CRB-E2 will communicate only with the computer or TruVu™ ET Display
   - **1** to **65534** - the TV-CRB-E2'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.
6. 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.
7. Click the **Start** button. The status changes to **Connected**.

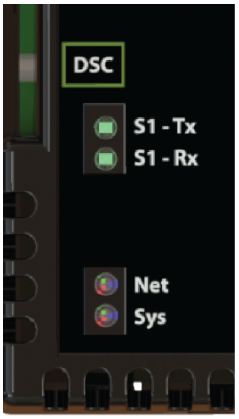
To connect using Field Assistant

1. Launch Field Assistant.
2. On the **Field Assistant Launch, select BACnet/IP Service Point.**
3. **Click on the Green Play icon to start Field Assistant.**

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Troubleshooting

LEDs



When blinking:
Rx indicates port is receiving data
Tx indicates port is transmitting

See table below

NET (Network Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solutions
Red	On	Ethernet connection problem	No Ethernet Link	• Connect Ethernet Cable • Check other network components
Red	1 blink	One of the following BACnet/IP (Ethernet) DLL reporting issue: • Unable to create tasks • Unable to open socket for BACnet port	BACnet/IP error	Cycle power
Blue	On	One of the following issues: • Port communication firmware did not load properly • Port communication firmware is not running Invalid protocol selected	MSTP firmware error	• Change protocol using USB Service Port • Cycle power

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NET (Network Status) Tricolor LED

Color	Pattern	Condition	Message in Module Status	Possible Solutions
Red	On	Ethernet connection problem	No Ethernet Link	• Connect Ethernet Cable • Check other network components
Red	1 blink	One of the following BACnet/IP (Ethernet) DLL reporting issue: • Unable to create tasks Unable to open socket for BACnet port	BACnet/IP error	Cycle power
Blue	On	One of the following issues: • Port communication firmware did not load properly • Port communication firmware is not running Invalid protocol selected	MSTP firmware error	• Change protocol using USB Service Port • Cycle power
Blue	1 blink	Invalid address selected for protocol	Invalid address selection for MSTP	Change MAC address to unique address using USB Service Port
Blue	2 blink	• Controller has same MAC address as another connected device	Duplicate address on MSTP	Change MAC address to a unique value using USB Service Port to valid address
Blue	3 blink	Controller is the only device on the network	No other devices detected on MSTP	• 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 MSTP	• Check that network cable is connected properly • Check that baud rate is correct
Green	On	All enabled networks are functioning properly	No errors	No action required
Magenta		Operating system changes are downloading **WARNING** This process could take several minutes. Do NOT power off the router during the download.	N/A	No action required
Light Blue	1 blink on both the Net and Sys LED	The Blink button on the router setup Local Network page has been pressed	N/A	No action required

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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
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
Magenta		Operating system changes are downloading **WARNING** This process could take several minutes. Do NOT power off the router during the download.	N/A	No action required
Light Blue	1 blink on both the Net and Sys LED	The Blink button on the router setup Local Network page has been pressed	N/A	No action required

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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 or Field Assistant—Right-click the router on the **Navigation** tree, then select **Module Status**.
- In the router setup interface through the Service Port—Click on the **Modstat** tab.

See *Appendix Module Status field descriptions* (page 47).

To get a Device Log

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

1 Select the TV-CRB-E2 in the i-Vu® **Navigation** tree.

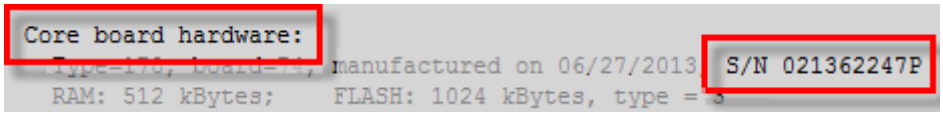
2 On the **Properties** page, click **Device Log**.

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 driver page.

To get the TV-CRB-E2's serial number

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

- A Module Status report (Modstat) under **Core** (or **Main**) **board hardware**.



- A QR code, serial number, and MAC address printed on a sticker on the cover.
- A laser-etched number and QR code on the inside on the circuit board.

See *To get a Module Status report* (page 41).

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To replace the TV-CRB-E2's fuse

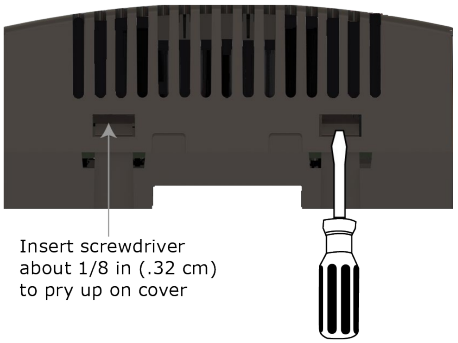
The TV-CRB-E2 has one fuse. If the TV-CRB-E2's power LED is not lit, this could be due to a blown power fuse.

If you suspect a fuse is blown, remove the fuse as described below, and use a multimeter to check it. If the fuse is blown, try to determine why it blew before you replace it. Check the power wiring polarity of the TV-CRB-E2 and any other devices that share the power supply. Use the same polarity for all of them.

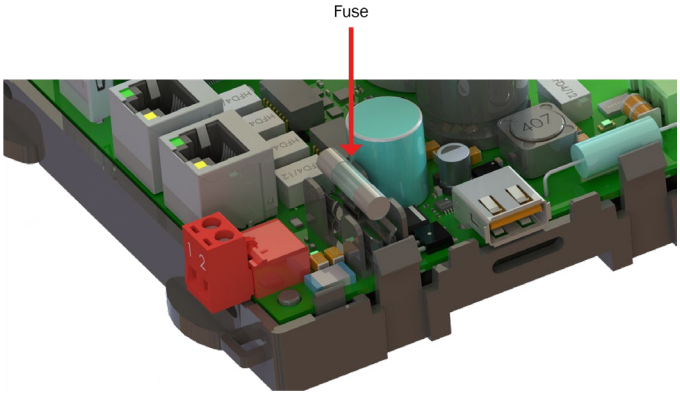
You can purchase the 3A, fast-acting, 5mm x 20mm glass fuse from Littelfuse, mfr part #0235003.MXP

To replace the fuse:

1. Remove the red power connector.
2. 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.



3. Remove the cover from the base.
4. The fuse labeled **F1** is located near the power connector. Use a fuse puller to remove the fuse.
5. Use the fuse puller to snap the new fuse into the fuse holder.



6. Replace router's cover.
7. Replace the power connector.
8. Verify that the LED on top of the router is lit.

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To take the TV-CRB-E2 out of service

If needed for troubleshooting or start-up, you can stop communication between the i-Vu® application and the TV-CRB-E2.

1 On the i-Vu® **Navigation** tree, select the TV-CRB-E2.

1 On the **Properties** page, check **Out of Service**.

2 Click **Accept**.

To revert to default settings

WARNING This erases all archived information and user-configured settings. When recovery is complete, you must connect locally to the TV-CRB-E2 and manually reconfigure all BACnet, IP, and firewall information. We highly recommend that you revert the default settings only under the guidance of Carrier Technical Support.

1 Copy the newest driver and archive file to the root directory of a FAT32-formatted USB flash drive.

NOTE To verify that you have the latest files, go to the Carrier Partner Community website. Compare the latest version to the TV-CRB-E2's driver in i-Vu®.

2 Remove power from the TV-CRB-E2.

3 Plug the USB drive into the router's USB port.

4 Press the DSC button and apply power to the TV-CRB-E2.

NOTES

- The **Sys** and **Net** LEDs change to magenta after the boot sequence.
- The **Sys** LED blinks faster when recovery is in progress.
- When the **Sys** LED turns solid green, the process is complete.

5 Remove power from the TV-CRB-E2.

6 Remove the USB drive from the USB port.

7 Apply power to the TV-CRB-E2.

NOTE The router is now running the new version of the firmware and is in the default state.

8 In the Service Port setup pages, configure the Device Instance, Network Number, and address so that the router can communicate with the server.

9 To recover the router's previous parameters and programs, click **Download all content** from the i-Vu® **Downloads** page.

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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.

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Appendix - Module Status field descriptions

Field	Description
ADDRESS BINDING	The router's: • Device Instance • Network number • MAC address See *To set up the router through the Service Port* (page 30).
Date/Time	Date and time the Modstat was run
Model name	Identifies the Product Type
Device instance	A unique ID assigned to the router
Driver built	When the driver was built
Downloaded by	When and where the last download was performed
Application software version	The application software version that is in the BACnet device.
Data Partition Version	Not applicable to this device.
# 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 router 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 router 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 router'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 router if it detects a severe problem with the router's operating system
System status	Gives the current status of the router's operation. See *LEDs* (page 38) for all possible conditions.
Network status	Gives the current status of the router's networks. See *LEDs* (page 38) for all possible conditions.

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Field	Description
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.
Information message history	Information-only messages since the last memory download. Shows the most recent 10 messages. See **NOTE** below this table.
Core and Base board hardware	Gives the following information about the router's boards: • Type and board numbers that are used internally by Carrier. The manufacture date and serial number.
Number of BACnet objects	• 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 router. 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.

NOTE To clear the Reset counters and the three message history fields, click the **Clear Counts/Logs** button on the router's **Properties** page in the i-Vu® application. To delete all logs, including current logs, click the **Delete All** button in the **Home** > **Diagnostics** tab under **Logs**.

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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*
		No changes yet	

* For internal use only

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