# USB-Cascading Solution

## Guide
Release 3.1



USBcascade-0D-v3.1-E

March 2015

255-80-0012-00 RoHS

# Safety Guidelines

**WARNING!** Read and understand all sections in this guide before installing or operating this product.

**WARNING!** Connect this product to an AC power source whose voltage is within the range specified on the product's nameplate. Operating this product outside the nameplate voltage range may result in electric shock, fire, personal injury and death.

**WARNING!** Connect this product to an AC power source that is current limited by a suitably rated fuse or circuit breaker in accordance with national and local electrical codes. Operating this product without proper current limiting may result in electric shock, fire, personal injury and death.

**WARNING!** Connect this product to a protective earth ground. Never use a "ground lift adaptor" between the product's plug and the wall receptacle. Failure to connect to a protective earth ground may result in electric shock, fire, personal injury and death.

**WARNING!** This product contains no user serviceable parts. Do not open, alter or disassemble this product. All servicing must be performed by qualified personnel. Disconnect power before servicing this product. Failure to comply with this warning may result in electric shock, personal injury and death.

**WARNING!** Use this product in a dry location. Failure to use this product in a dry location may result in electric shock, personal injury and death.

**WARNING!** Do not rely on this product's receptacle lamps, receptacle relay switches or any other receptacle power on/off indicator to determine whether power is being supplied to a receptacle. Unplug a device connected to this product before performing repair, maintenance or service on the device. Failure to unplug a device before servicing it may result in electric shock, fire, personal injury and death.

**WARNING!** Only use this product to power information technology equipment that has a UL/IEC 60950-1 or equivalent rating. Attempting to power non-rated devices may result in electric shock, fire, personal injury and death.

**WARNING!** Do not use a Raritan product containing outlet relays to power large inductive loads such as motors or compressors. Attempting to power a large inductive load may result in damage to the relay.

**WARNING!** Do not use this product to power critical patient care equipment, fire or smoke alarm systems. Use of this product to power such equipment may result in personal injury and death.

**WARNING!** If this product is a model that requires assembly of its line cord or plug, all such assembly must be performed by a licensed electrician and the line cord or plugs used must be suitably rated based on the product's nameplate ratings and national and local electrical codes. Assembly by unlicensed electricians or failure to use suitably rated line cords or plugs may result in electric shock, fire, personal injury or death.

**WARNING!** This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm.

# Safety Instructions

1. Installation of this product should only be performed by a person who has knowledge and experience with electric power.
2. Make sure the line cord is disconnected from power before physically mounting or moving the location of this product.
3. This product is designed to be used within an electronic equipment rack. The metal case of this product is electrically bonded to the line cord ground wire. A threaded grounding point on the case may be used as an additional means of protectively grounding this product and the rack.
4. Examine the branch circuit receptacle that will supply electric power to this product. Make sure the receptacle’s power lines, neutral and protective earth ground pins are wired correctly and are the correct voltage and phase. Make sure the branch circuit receptacle is protected by a suitably rated fuse or circuit breaker.
5. If the product is a model that contains receptacles that can be switched on/off, electric power may still be present at a receptacle even when it is switched off.

FCC Information

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 in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential environment may cause harmful interference.

VCCI Information (Japan)

この装置は, クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI－A

Raritan is not responsible for damage to this product resulting from accident, disaster, misuse, abuse, non-Raritan modification of the product, or other events outside of Raritan's reasonable control or not arising under normal operating conditions.

If a power cable is included with this product, it must be used exclusively for this product.

CE c UL us LISTED 1F61 I.T.E.

**Warning**

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

**CAUTION:**

To reduce the risk of shock – Use indoors only in a dry location. No user serviceable parts inside. Refer servicing to qualified personnel. For use with IT equipment only.Disconnect power before servicing.

SecureLock™

# Contents

# Chapter 1 Introduction

Raritan provides a USB-cascading solution, which enables multiple Raritan devices to share the network connectivity after cascading them through the USB interface.

The first device in the USB-cascading configuration is the master device and the other are slave devices.

Each individual device in the USB-cascading configuration can be accessed and administered over the Internet from anywhere. Therefore, you can access any device in the chain via the Web, SNMP, SSH, Telnet or Modbus interface. Besides, each cascaded device can be upgraded respectively.

### In This Chapter



## Hardware Requirements

**Raritan products supporting the USB-cascading feature:**

- PX2 series power distribution units (PDUs)
- PX3 series PDUs
- EMX asset management devices
- Branch Circuit Monitor (BCM)
- PX3TS transfer switch

The USB-cascading configuration comprises either identical or diverse Raritan products. For example, you can cascade PX2 PDUs only, or you can cascade PX2, PX3, EMX, PX3TS and BCM devices in the USB-cascading configuration.

**If wireless networking is intended:**

A Raritan product with two USB-A ports must be the master device, such as PX3 or PX3TS. Slave devices can be any Raritan products shown in the above list. See ***Cascading Raritan Devices*** (on page 8) for information on master and slave devices.

## Software Requirements

A Raritan device must run an appropriate firmware to support the USB-cascading feature.

Depending on the firmware version implemented, the maximum number of cascaded devices that are supported in a USB-cascading configuration differs.

### Firmware versions supporting a maximum of four Raritan devices:

- PX2 series: 2.3.1 or later
- PX3 series: 2.5.10 or later
- EMX series: 2.1.0 or later
- BCM series: 2.3.1 or later

*The firmware versions supporting four devices support the network "Bridging" mode only.*

### Firmware versions supporting a maximum of eight Raritan devices:

- PX2 series: 2.5.20 or later
- PX3 series: 2.5.20 or later
- EMX series: 2.5.0 or later
- BCM series: 2.5.20 or later
- PX3TS series: 2.6.0 or later

*The firmware versions supporting eight devices support both "Bridging" and "Port Forwarding" modes. See Setting the Cascading Mode (on page 10).*

If the "Port Forwarding" mode is intended, you must upgrade all devices in the chain to support two cascading modes.

### Firmware versions supporting different networking modes:

- Prior to release 3.1.0, the USB-cascading configuration only supports connection to the wired LAN.
- As of release 3.1.0, the Port Forwarding mode supports connection to either wired or "wireless" LAN. The "Bridging" mode still supports connection to the wired LAN only.

  Upgrade all devices in the chain to version 3.1.0 or later when wireless networking is intended.

*Note: A Raritan product with two USB-A ports must be the master device, such as PX3 or PX3TS.*

Check firmware versions before cascading Raritan devices and upgrade any device as needed. See ***Updating the Raritan device Firmware*** (on page 42).

## Plug and Play

The USB-cascading solution is a plug-and-play function. You can add or remove a Raritan device from the USB-cascading configuration at any time, and the shared network connectivity is immediately in effect or lost based on the USB connection status.

# Chapter 2 USB-Cascading Applications

This chapter illustrates several USB-cascading scenarios using PDUs, and points out best practices and the condition the USB-cascading solution should be avoided.

### In This Chapter



## Appropriate Applications

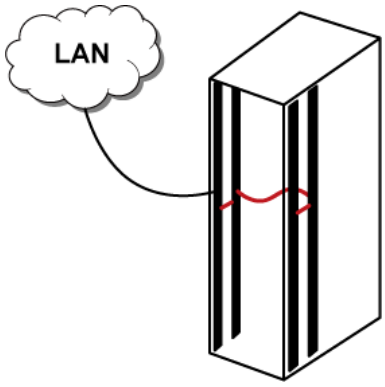
When intending to reduce the number of Ethernet connections or save networking costs, apply the USB-cascading solution.

In the USB-cascading configuration, all Raritan devices are cascaded using USB cables and only the first Raritan device in the chain is connected to the LAN.

The following illustrate a few USB-cascading scenarios using Zero U PDUs. Red lines in the diagrams represent USB connections.

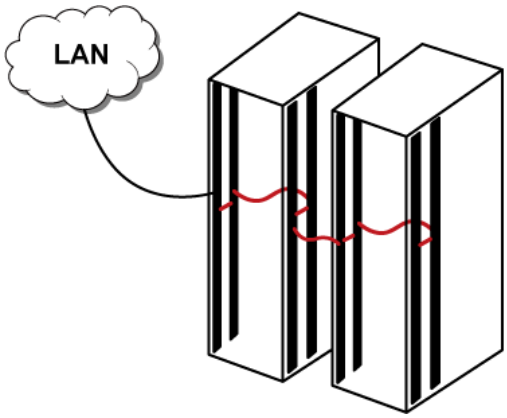
**When your firmware supports up to four cascaded devices:**

- Scenario 1: Cabinet 1 has four PDUs cascaded, all of which share one Ethernet connection.

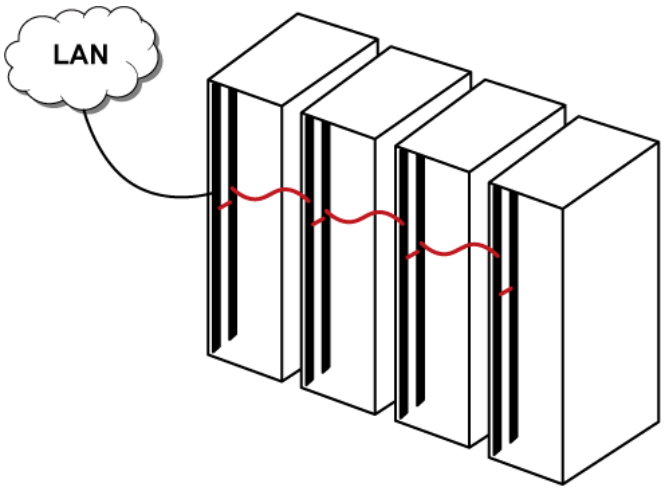


### When your firmware supports up to eight cascaded devices:

- Scenario 2: Cabinet 1 and Cabinet 2 have four PDUs respectively. The eight PDUs are cascaded, sharing one Ethernet connection.




- Scenario 3: Cabinet 1 through Cabinet 4 have two PDUs respectively. The eight PDUs are cascaded, sharing one Ethernet connection.



## Best Practices

One Ethernet connection per cabinet is better than one Ethernet connection across cabinets because of the following advantages:

- Easier to manage or maintain one cabinet when all of the cabling and connections are located in the same cabinet.
- Reduces the cross-cabinet cabling.

An eight-device cascaded configuration saves the most Ethernet connections and costs, and it is recommended when:

- Ethernet ports are expensive or limited.
- Available IPv4 addresses are limited.

## Inappropriate Applications

Though the USB-cascading solution helps decrease the Ethernet connections and costs, there are two scenarios where this solution is NOT recommended:

### High network reliability is required:

The USB-cascading solution increases the number of network bridging points for cascaded devices, which may result in network unreliability. Therefore, when high network reliability is required, establish a separate Ethernet connection for each Raritan device to minimize the number of potential network failure points.

### High bandwidth is required:

The USB bandwidth between the master and the first slave device is 12Mbit/s. Due to this bandwidth limitation, the actual data transfer rate for all slave devices ranges between 8Mbit/s and 10Mbit/s. If high bandwidth is required, such as transmission of webcam videos, directly connect that Raritan device to the network to optimize the data transfer rate.

# Chapter 3 USB-Cascading Instructions

This chapter describes the USB-cascading limitations, instructions and various methods to identify a cascaded Raritan device.

The USB-cascading configuration can operate in either cascading mode -- bridging or port forwarding, as long as it is running appropriate firmware. See ***Software Requirements*** (on page 2).

The first device in the USB-cascading configuration is the master device and the other are slave devices.

### In This Chapter



## USB-Cascading Restrictions

Some restrictions apply regardless of the networking method used with the USB-cascading configuration, but some restrictions apply only when connecting to the wireless LAN.

**Common restrictions:**

- All devices in the USB-cascading configuration must be running appropriate firmware. See ***Software Requirements*** (on page 2).
- Depending on the firmware version, up to four or eight Raritan devices can be connected.
- Only the master device must be connected to the LAN. Do NOT connect slave devices to the LAN via a standard network patch cable or a USB wireless LAN adapter.

  *Note: The Ethernet interface on slave devices is disabled automatically. See* **Ethernet Disabled Scenarios on Slave Devices** *(on page 55).*

- Appropriate networking methods vary based on the cascading mode. See ***Setting the Cascading Mode*** (on page 10).
  - The bridging mode supports only the *wired* networking.
  - The port forwarding mode supports both the *wired* and *wireless* networking.

- Your network switch's port security settings must support the USB-cascading solution. Make sure that packets forwarding is enabled for the Ethernet port where the master device is connected.

**Restrictions only for the port forwarding mode over "wireless" LAN:**

- Port forwarding mode over wireless LAN is supported as of release 3.1.0. You must upgrade all devices in the chain to version 3.1.0 or later if wireless networking is preferred.
- You must use the Raritan USB WIFI wireless LAN adapter instead of other adapters for network connection.
- A Raritan product with two USB-A ports must be the master device, such as PX3 or PX3TS. This is because one USB-A port is used to connect the USB wireless LAN adapter and the other is to connect a slave device.
- No external USB hub is used with the master device.

## Cascading Raritan Devices

Only specific types of Raritan products support the USB-cascading function. See ***Hardware Requirements*** (on page 1).

**To cascade Raritan devices:**

1. Verify that the Raritan devices to be cascaded are running appropriate firmware versions by choosing Maintenance > Device Information in the web interface.

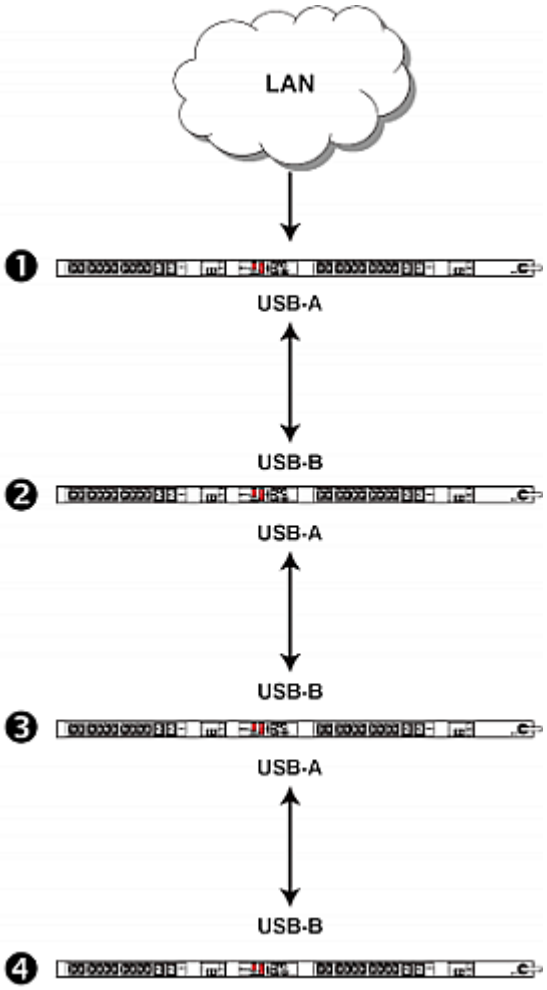
   If any device is running an inappropriate firmware, upgrade it. See ***Updating the Raritan device Firmware*** (on page 42).

2. Select one of the devices as the master device.
   - When the port forwarding mode over wireless LAN is intended, a Raritan product with two USB-A ports must be the master device, such as PX3.
3. Connect the master device to the LAN via:
   - A standard network patch cable (CAT5e or higher) if the bridging mode is intended.
   - A standard network patch cable or a Raritan USB WIFI wireless LAN adapter if the port forwarding mode is intended. For information on the Raritan USB WIFI adapter, see ***USB Wireless LAN Adapters*** (on page 57).

   For information on cascading modes, see ***Setting the Cascading Mode*** (on page 10).

4. Connect the USB-A port of the master device to the USB-B port of an additional Raritan device via a USB cable. This additional device is Slave 1.
5. Connect Slave 1's USB-A port to the USB-B port of an additional Raritan device via a USB cable. The second additional device is Slave 2.
6. Repeat the above step to connect more slave devices.

   If your firmware supports eight cascaded devices, you may cascade up to 7 slave devices. See ***Software Requirements*** (on page 2).




| Number | Device role |
|---|---|
| 1 | Master device |
| 2 | Slave 1 |
| 3 | Slave 2 |

| Number | Device role |
|---|---|
| ❹ | Slave 3 |

## Setting the Cascading Mode

This section only applies to the firmware versions that support two cascading modes. See ***Software Requirements*** (on page 2).

The Ethernet sharing mode applied to the USB-cascading configuration is either network bridging or port forwarding. This mode is determined by the master device.

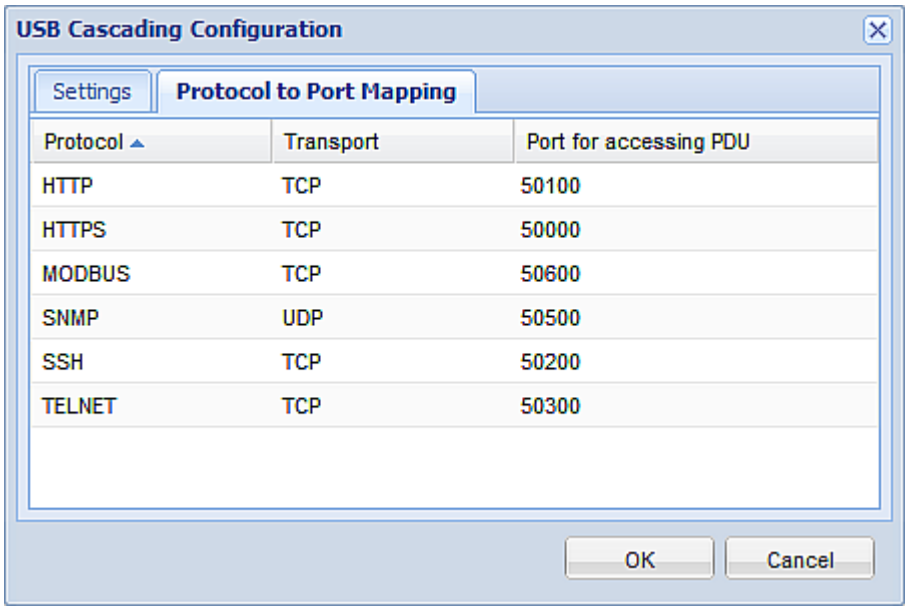
Only the Admin user or a user who has the Administrator Privileges permission can configure the cascading mode.

### To configure the cascading mode via the web interface:

1. Log in to the master device's web interface.
2. Choose Device Settings > USB Cascading. The USB Cascading Configuration dialog appears.
3. Verify that the "Position in cascaded chain" field shows 0 (Master), indicating that this Raritan device is the master device.
4. Select the preferred cascading mode in the "Cascading mode" field.
   - Bridging: Each device in the USB-cascading configuration is accessed with a different IP address. This is the default.
   - Port Forwarding: Each device in the USB-cascading configuration is accessed with the same IP address with a different port number assigned. The port numbers vary based on the networking protocol and device position in the chain. See ***Port Number Syntax*** (on page 12).

   *Note: If reversing or disconnecting the USB cable from a slave device, causing the slave device to become a master or standalone device, you must plug an Ethernet cable to it to update its USB-cascading status.*
5. Click OK.
6. If selecting Port Forwarding, a list of port numbers for diverse networking protocols will be available on the "Protocol to Port Mapping" tab of each cascaded device.

Return to the same dialog and click the "Protocol to Port Mapping" tab to view the master device's port numbers.




For information on accessing each cascaded device in the Port Forwarding mode, see ***Port Forwarding Examples*** (on page 13).

### To configure the cascading mode via the command line interface (CLI):

1. Log in to the CLI of the master device. To use the SSH or Telnet service, see ***SSH/Telnet Access*** (on page 24).
2. Type `config` and press Enter to enter the configuration mode.
3. Type the following command to set the cascading mode.

```
config:#   cascading mode <mode>
```

*Variables:*

- <mode> is one of the following cascading modes:

| Mode | Description |
|---|---|
| bridging | The network bridging mode, where each cascaded device is assigned a unique IP address. |
| portForwarding | The port forwarding mode, where every cascaded device in the chain shares the same IP address, with diverse port numbers assigned. |

### Port Number Syntax

In the Port Forwarding mode, all devices in the USB-cascading configuration share the same IP address. To access any cascaded device, you must assign an appropriate port number to it.

- Master device: The port number is either *5NNXX* or the standard TCP/UDP port.
- Slave device: The port number is *5NNXX*.

#### 5NNXX port number syntax:

- NN is a two-digit number representing the network protocol as shown below:

| Protocols | NN |
|---|---|
| HTTPS | 00 |
| HTTP | 01 |
| SSH | 02 |
| TELNET | 03 |
| SNMP | 05 |
| MODBUS | 06 |

- XX is a two-digit number representing the device position as shown below:

| Position | XX |
|---|---|
| Master device | 00 |
| Slave 1 | 01 |
| Slave 2 | 02 |
| Slave 3 | 03 |
| Slave 4 | 04 |
| Slave 5 | 05 |
| Slave 6 | 06 |
| Slave 7 | 07 |

For example, to access the Slave 4 device via Modbus/TCP, the port number is 50604. See ***Port Forwarding Examples*** (on page 13) for further illustrations.

*Tip: The full list of each cascaded device's port numbers can be retrieved from the web interface. See* **Setting the Cascading Mode** *(on page 10).*

### Standard TCP/UDP ports:

The master device can be also accessed through standard TCP/UDP ports as listed in the following table.

| Protocols | Port Numbers |
|---|---|
| HTTPS | 443 |
| HTTP | 80 |
| SSH | 22 |
| TELNET | 23 |
| SNMP | 161 |
| MODBUS | 502 |

In the Port Forwarding mode, the Raritan device does NOT allow you to modify the standard TCP/UDP port configuration, including HTTP, HTTPS, SSH, Telnet, SNMP and Modbus/TCP.

## Port Forwarding Examples

To access a cascaded device in the Port Forwarding mode, assign a port number to the IP address.

- Master device: Assign proper 5NNXX port numbers or standard TCP/UDP ports. See ***Port Number Syntax*** (on page 12) for details.
- Slave device: Assign proper 5NNXX port numbers.

**Assumption:** *The Port Forwarding mode is applied to a USB-cascading configuration comprising three Raritan products. The IP address is 192.168.84.77.*

### Master device:

Position code for the master device is 00 so each port number is 5NN00 as shown below.

| Protocols | Port numbers |
|---|---|
| HTTPS | 50000 |
| HTTP | 50100 |
| SSH | 50200 |

| Protocols | Port numbers |
|---|---|
| TELNET | 50300 |
| SNMP | 50500 |
| MODBUS | 50600 |

**Examples using "5NN00" ports:**

- To access the master device via HTTPS, the IP address is:
  *https://192.168.84.77:50000/*
- To access the master device via HTTP, the IP address is:
  *http://192.168.84.77:50100/*
- To access the master device via SSH, the command is:
  *ssh -p 50200 192.168.84.77*

**Examples using standard TCP/UDP ports:**

- To access the master device via HTTPS, the IP address is:
  *https://192.168.84.77:443/*
- To access the master device via HTTP, the IP address is:
  *http://192.168.84.77:80/*
- To access the master device via SSH, the command is:
  *ssh -p 22 192.168.84.77*

### Slave 1 device:

Position code for Slave 1 is 01 so each port number is 5NN01 as shown below.

| Protocols | Port numbers |
|---|---|
| HTTPS | 50001 |
| HTTP | 50101 |
| SSH | 50201 |
| TELNET | 50301 |
| SNMP | 50501 |
| MODBUS | 50601 |

**Examples:**

- To access Slave 1 via HTTPS, the IP address is:
  *https://192.168.84.77:50001/*

- To access Slave 1 via HTTP, the IP address is:
  *http://192.168.84.77:50101/*
- To access Slave 1 via SSH, the command is:
  *ssh -p 50201 192.168.84.77*

### Slave 2 device:

Position code for Slave 2 is 02 so each port number is 5NN02 as shown below.

| Protocols | Port numbers |
|---|---|
| HTTPS | 50002 |
| HTTP | 50102 |
| SSH | 50202 |
| TELNET | 50302 |
| SNMP | 50502 |
| MODBUS | 50602 |

**Examples:**

- To access Slave 2 via HTTPS, the IP address is:
  *https://192.168.84.77:50002/*
- To access Slave 2 via HTTP, the IP address is:
  *http://192.168.84.77:50102/*
- To access Slave 2 via SSH, the command is:
  *ssh -p 50202 192.168.84.77*

# Chapter 4 Network Access

The master device functions as the network bridge and can transmit IP packets between the LAN and all slave devices connected to it. Therefore, you can remotely access the master and every slave device via the Web, SNMP, SSH, or Telnet interface, or manage them via Raritan's Power IQ or dcTrack™.

### In This Chapter



## Finding the IP Address

There are various ways to retrieve the IP address of a Raritan device.

- Access the local console.
- Use the device's MAC address and common networking tools.
- Operate the front panel LCD display if the Raritan device is a PX3, PX3TS, BCM or EMX device.

### Local Console

The IP address of the master or slave device is available in each device's local console, which uses the command line interface.

To access the local console, first connect the desired Raritan device to the computer using a serial RS-232 cable, and then use a terminal emulation program on the computer to access it.

You can also access a master device's local console via a USB connection. For details, see the Quick Setup Guide, Online Help or User Guide, which can be downloaded from Raritan website's ***Support page*** (***http://www.raritan.com/support/***).

You can use any terminal emulation programs for local access to the command line interface.

This section illustrates HyperTerminal, which is part of Windows operating systems prior to Windows Vista.

#### ▶ To get the IP address using HyperTerminal:

1. Connect your computer to the Raritan device via a local connection.

2. Launch HyperTerminal on your computer and open a console window. When the window first opens, it is blank.

   Make sure the COM port settings use this configuration:

   - Bits per second = 115200 (115.2Kbps)
   - Data bits = 8
   - Stop bits = 1
   - Parity = None
   - Flow control = None

3. In the communications program, press Enter to send a carriage return to the Raritan device. Now you should see the Raritan device's IP address displayed in the terminal.

### MAC Address

A label is affixed to the Raritan device, showing both the serial number and MAC address.


If necessary, you can find its IP address through the MAC address by using commonly-used network tools. Contact your LAN administrator for assistance.

### LCD Display

Some Raritan products have a front panel LCD display which can show the Raritan device's networking information.

Depending on the Raritan product you purchased, the LCD display type varies.

- PX3 phase II models use a dot-matrix LCD display.
- PX3 phase I models, EMX and BCM use a character LCD display.

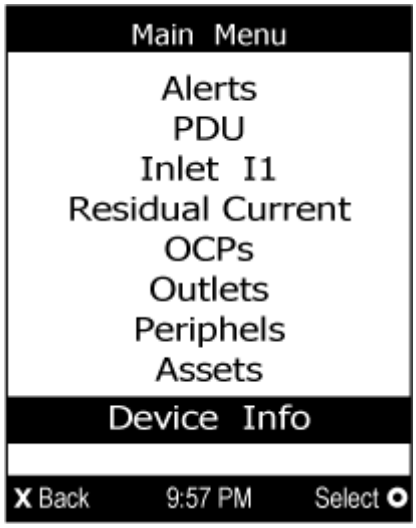
**Dot-Matrix LCD Display**

The dot-matrix LCD display can show both IPv4 and IPv6 networking information.

Note that the diagrams illustrated in this section are for Zero U models, and your dot-matrix LCD display may look slightly different if it is on a 1U or 2U model.

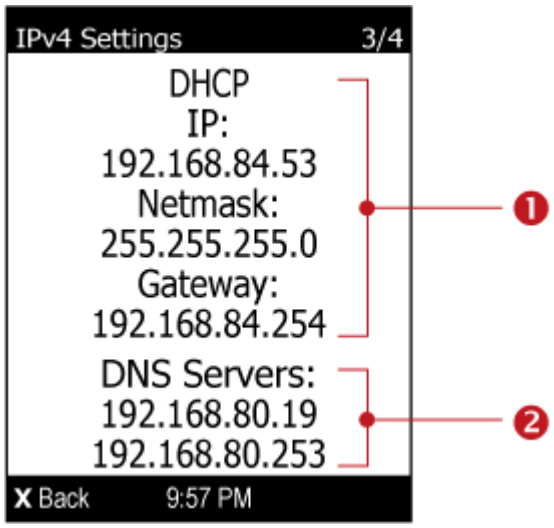
### To retrieve the IPv4 and/or IPv6 addresses:

1. If the LCD display is in the Automatic mode, exit it by pressing ⦿ or ⊗. The Main Menu similar to the following is displayed.




2. Press ▲ or ▼ to select "Device Info" in the Main Menu, and press ⦿.

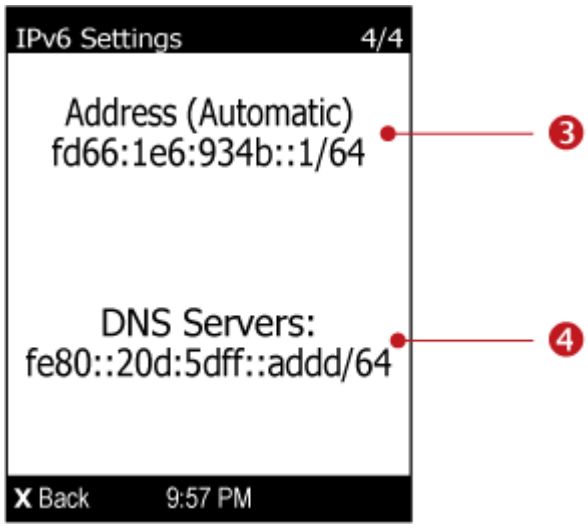
3. Press ⊙ until IPv4 settings are displayed.




| Number | Description |
|---|---|
| ❶ | IPv4 network information, including:<br>▪ Network configuration: DHCP or Static. Static represents Static IP.<br>▪ IP address.<br>▪ Netmask.<br>▪ Gateway. |
| ❷ | DNS server addresses, including the primary and secondary ones. |

If you do not enable IPv4 settings, a message is displayed to indicate IPv4 is disabled.

4. Press ▼ again to display IPv6 settings.




| Number | Description |
|---|---|
| ❸ | IPv6 network information, including:<br>▪ Network configuration: Automatic or Static.<br>▪ IP address(es). |
| ❹ | DNS server address(es). |

If you do not enable IPv6 settings, a message is displayed to indicate IPv6 is disabled.

**Character LCD Display**

The IP address is available in the Device mode, which is indicated by the alphabet 'd' shown at the top of the LCD display. Note that the LCD display only shows the IPv4 address (if available).

Below illustrates the IP address information shown on the LCD display.

| Section | Example information |
|---|---|
| ❶ | "d" means the LCD display has entered the Device mode. |
| ❷ | The LCD display is showing 192, which is one of the IP address octets. It will cycle through four octets of the IP address. |
| ❸ | "i4" indicates that the IP address shown on the LCD display is an IPv4 address. |
| ❹ | The word "MASTER" indicates the Raritan device is the master device in a USB-cascading configuration. See ***Cascading the Raritan device via USB*** (see "***Cascading Raritan Devices***" on page 8).<br>For a standalone Raritan device, this word is NOT displayed. |

If you connect your Raritan device to the wireless network, a Wi-Fi icon is displayed at the bottom-right corner.


### To retrieve the IP address:

1. Press the MODE button until device settings are displayed, indicated by a 'd' in at the top left of the display.
2. The LCD display cycles between the four octets of the IPv4 address, indicated by "i4" at the upper right corner of the display.

   For example, if the IPv4 address is 192.168.84.4, the LCD display cycles through it as shown below:

   192 --> 168 --> 84 --> 4

## HTTP/HTTPS Access

You can remotely access the web interface of any Raritan device in a USB-cascaded configuration by using a web browser. See ***Supported Web Browsers*** (on page 22) for a list of supported web browsers.

### Supported Web Browsers

The following web browsers can be used to access a Raritan device's web interface. For details, see the online help or User Guide for your Raritan device.

- Internet Explorer®
- Firefox®
- Safari®
- Google® Chrome®
- IOS

### Using the Web Browser

The web interface allows a maximum of 16 users to log in simultaneously.

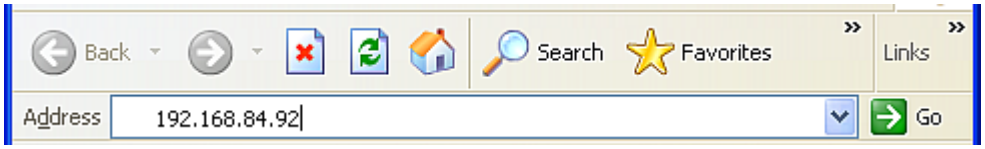
You must enable JavaScript in the web browser for proper operation.

#### To log in to the web interface:

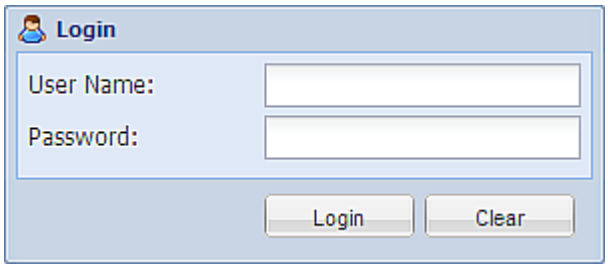
1. Open a browser, such as Microsoft Internet Explorer or Mozilla Firefox, and type this URL:

   *http(s)://<ip address>*

   where *<ip address>* is the IP address of the Raritan device.




2. If a security alert message appears, click OK or Yes to accept. The Login page then opens.
3. Type your user name in the User Name field, and password in the Password field.



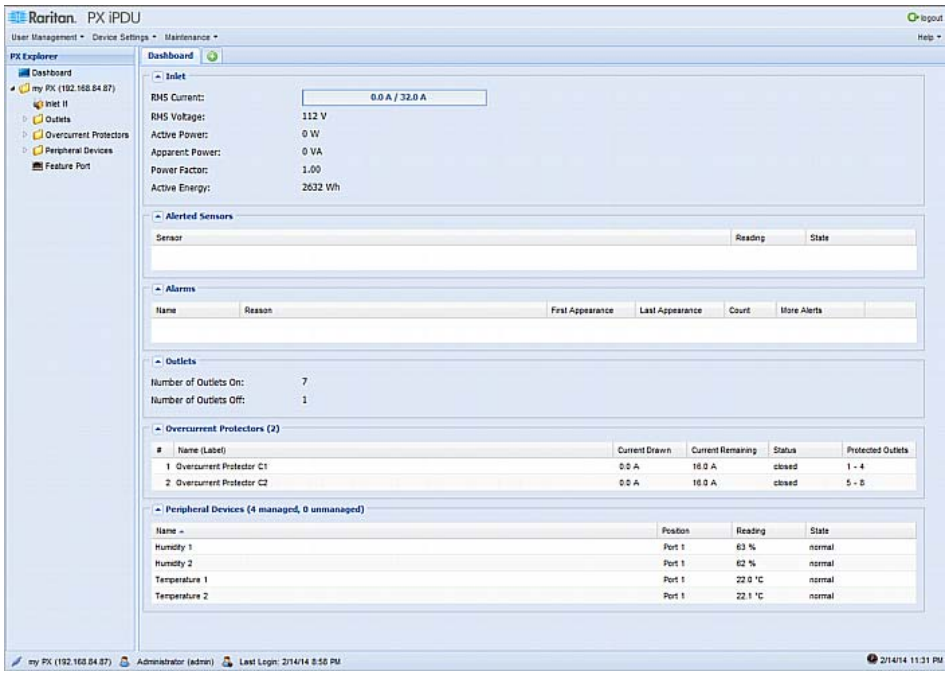

*Note: Both the user name and password are case sensitive. If needed, click Clear to clear either the inputs or any error message that appears.*

4. If a security agreement is displayed on the Login page, accept it. To select the agreement checkbox using the keyboard, press the Space bar.

*Note: If you do not accept the security agreement, you cannot log in successfully.*

5. Click Login or press Enter. The Raritan device page opens.

*Note: Depending on your hardware configuration, elements shown on the web interface may appear slightly different from this image.*




*Note: The IP address to access a slave device in the port forwarding mode is a combination of the IP address and the port number. See* **Port Forwarding Examples** *(on page 13).*

## SSH/Telnet Access

All devices in the USB-cascading configuration support the SSH or Telnet service.

You can remotely log in to the command line interface (CLI) using an SSH or Telnet client, such as PuTTY.

*Note: PuTTY is a free program you can download from the Internet. See PuTTY's documentation for details on configuration.*

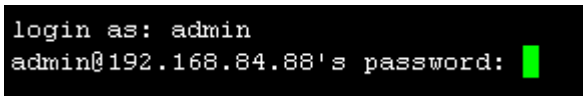
### To log in using SSH or Telnet:

1. Ensure SSH or Telnet has been enabled. See Modifying Network Service Settings in the online help.
2. Launch an SSH or Telnet client and open a console window. A login prompt appears.


3. Type a name and press Enter. The name is case sensitive.

   *Note: If using the SSH client, the name must NOT exceed 25 characters. Otherwise, the login fails.*

   Then you are prompted to enter a password.




4. Type a password and press Enter. The password is case sensitive.
5. After properly entering the password, the # or > system prompt appears. See Different CLI Modes and Prompts in the online help for more information.

   *Tip: The "Last Login" information, including the date and time, is also displayed if the same user profile was used to log in to this product's web interface or CLI.*

You are now logged in to the command line interface and can begin administering the Raritan device.

## SNMP Management

In the USB-cascading configuration, the SNMP capability of each Raritan device remains unchanged. A cascaded device is able to send SNMP notifications and communicate with an SNMP manager.

### SNMP Notifications

A Raritan device in the USB-cascading configuration can send out SNMP traps or informs to an SNMP destination like a standalone Raritan device. All you have to do is to configure the SNMP notification setting on that device. For details, see Configuring SNMP Notifications in the online help, which is accessible from the application or on the Raritan website's ***Support page*** (***http://www.raritan.com/support/***).

### Third-Party SNMP Managers

A third-party SNMP manager can communicate with any Raritan device in the USB-cascading configuration. There are no differences made to the SNMP accessibility no matter the device is a master or slave device.

To allow a Raritan device to communicate with an SNMP manager, you must enable the SNMP agent implemented on that device and download the latest SNMP MIB for your SNMP manager. For details, see Enabling SNMP in the online help, which is accessible from the application or on the Raritan website's ***Support page*** (***http://www.raritan.com/support/***).

## Power IQ and dcTrack Management

Depending on the cascading mode applied, support for the USB-cascading configuration by Raritan's Power IQ and dcTrack™ applications slightly differs. See ***Setting the Cascading Mode*** (on page 10) for information on cascading modes.

#### Bridging mode:

The way to manage a cascaded Raritan device in the bridging mode with Raritan's Power IQ or dcTrack™ is the same as managing a standalone device since each cascaded device has a unique IP address.

#### Port forwarding mode:

- Power IQ supports the port forwarding mode comprising 2 PDUs as of release 4.3.0.
- dcTrack™ manages a cascaded Raritan device in the port forwarding mode in the same way as managing a standalone device and can communicate with them via SNMP.

### Power IQ

Raritan's Power IQ is a software application that collects and manages the data from different PDUs installed in your server room or data center. With this software, you can:

- Do bulk configuration for multiple PDUs
- Name outlets on different PDUs
- Switch on/off outlets on outlet-switching capable PDUs

For more information on Power IQ, see either of the following available on Raritan's website:

- Power IQ User Guide: Available on the ***Support page*** (***http://www.raritan.com/support/***).
- Power IQ Online Help: Available on the ***Product Online Help page*** (***http://www.raritan.com/support/online-help/***).

### dcTrack

Raritan's dcTrack™ is a software application that collects the data of all components implemented in the data center, including power and non-power items, and then administers and maintains the data center efficiently after the data center building is completed in dcTrack.

Each Raritan device in the USB-cascading configuration can be added to dcTrack, and communicate with dcTrack via SNMP respectively.

For more information on dcTrack, see the online help accessible from the dcTrack application.

# Chapter 5 Identifying Cascaded Devices

You can retrieve a device's USB-cascading status from one of these interfaces:

- Web interface: Accessible via HTTP or HTTPS.
- Command line interface (CLI): Accessible via SSH, Telnet or the serial interface.
- SNMP: An SNMP manager is required.
- LCD display: Use the front panel LCD display if your Raritan device has it.

Before remotely accessing a Raritan device, you need to get its IP address. See ***Finding the IP Address*** (on page 16).

### In This Chapter



## Using the Web Interface

This section explains how to identify a cascaded device through the web interface.

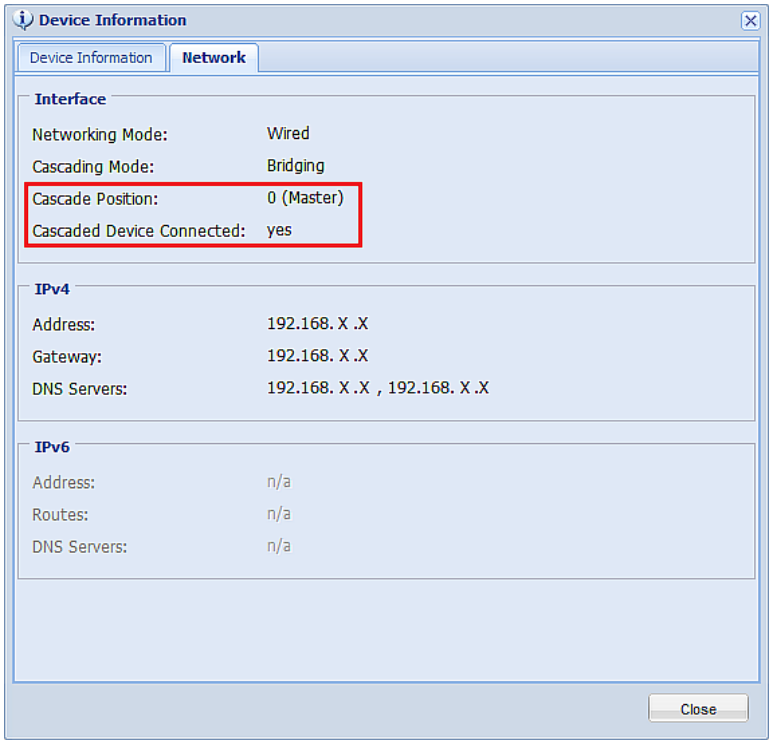
The web interface differs depending on your firmware versions. See ***Software Requirements*** (on page 2) for information on different firmware versions.

**When your firmware supports two cascading modes:**

1. Log in to the desired Raritan device using a supported web browser. See ***HTTP/HTTPS Access*** (on page 21).
2. Choose Maintenance > Device Information. The Device Information dialog appears.
3. Select the Network tab and locate the Interface section. The Interface section contains four read-only fields as listed below.

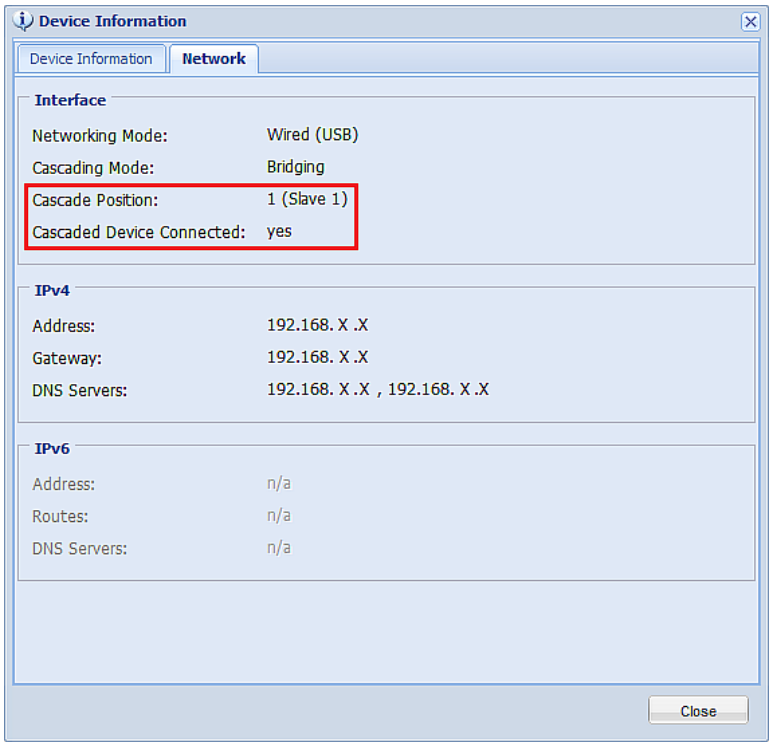
| Fields | Description |
|---|---|
| Networking Mode | Indicates how the Raritan device is connected to the LAN.<br>▪ Wired: The device is connected to the LAN through a standard network cable.<br>▪ Wireless: The device is connected to the LAN through a supported USB wireless LAN adapter. See ***USB Wireless LAN Adapters*** (on page 57).<br>▪ XXX (USB): XXX represents Wired or Wireless. The device is connected to the LAN through a USB-cascading configuration. That is, it is a slave device. |
| Cascading Mode | Shows the cascading mode applied. See ***Setting the Cascading Mode*** (on page 10). |
| Cascade Position | Indicates the position of the Raritan device in the USB-cascading configuration.<br>▪ 0 (zero) represents the master device.<br>▪ A non-zero number represents a slave device. 1 is Slave 1, 2 is Slave 2, 3 is Slave 3 and so on.<br>This field is NOT available on a standalone Raritan device. |
| Cascaded Device Connected | Indicates whether the presence of a slave device is detected on the USB-A port.<br>▪ yes: Connection to a slave device is detected.<br>▪ no: NO connection to a slave device is detected. |

- A master device shows *0* (zero) in the Cascade Position field and *yes* in the Cascaded Device Connected field.



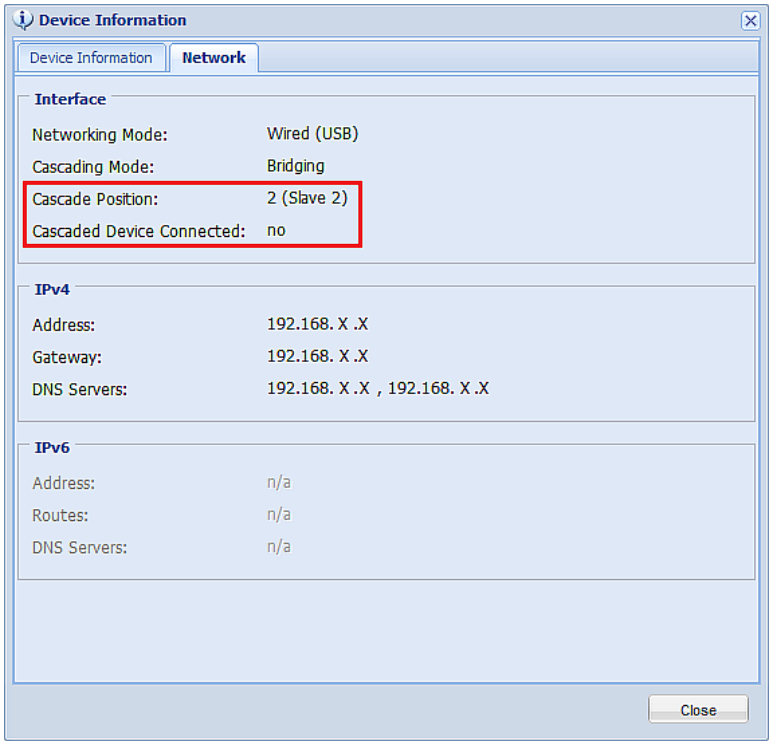

- A slave device in the middle position shows a non-zero number which indicates its exact position in the Cascade Position field and *yes* in the Cascaded Device Connected field.

The following diagram shows 1, indicating it is the first slave - Slave 1.




- The final slave device shows a non-zero number which indicates its position in the Cascade Position field and *no* in the Cascaded Device Connected field.

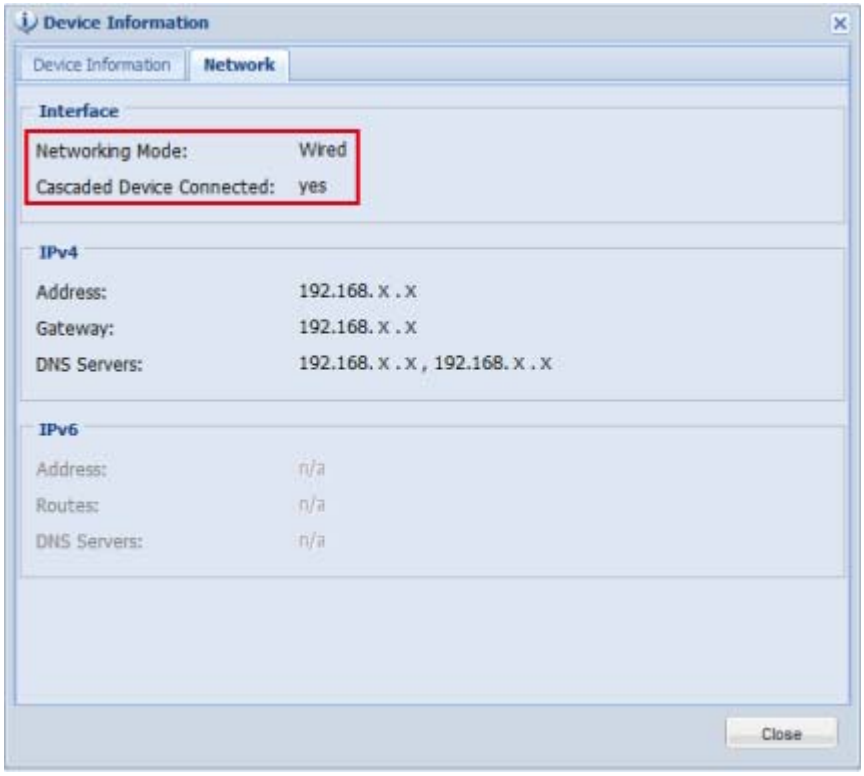
The following diagram shows 2, indicating it is the second slave - Slave 2. The Cascaded Device Connected field shows *no*, indicating that it is the final one in the chain.



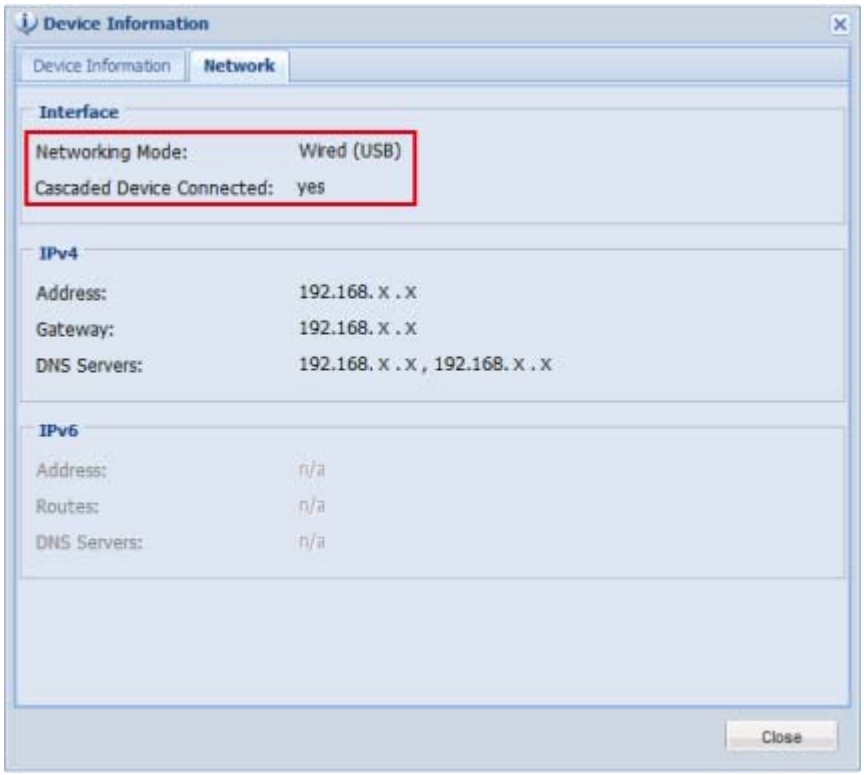

### When your firmware supports the "Bridging" mode only:

1. Choose Maintenance > Device Information. The Device Information dialog appears.
2. Select the Network tab and locate the Interface section. The Interface section contains two read-only fields: Networking Mode and Cascaded Device Connected.

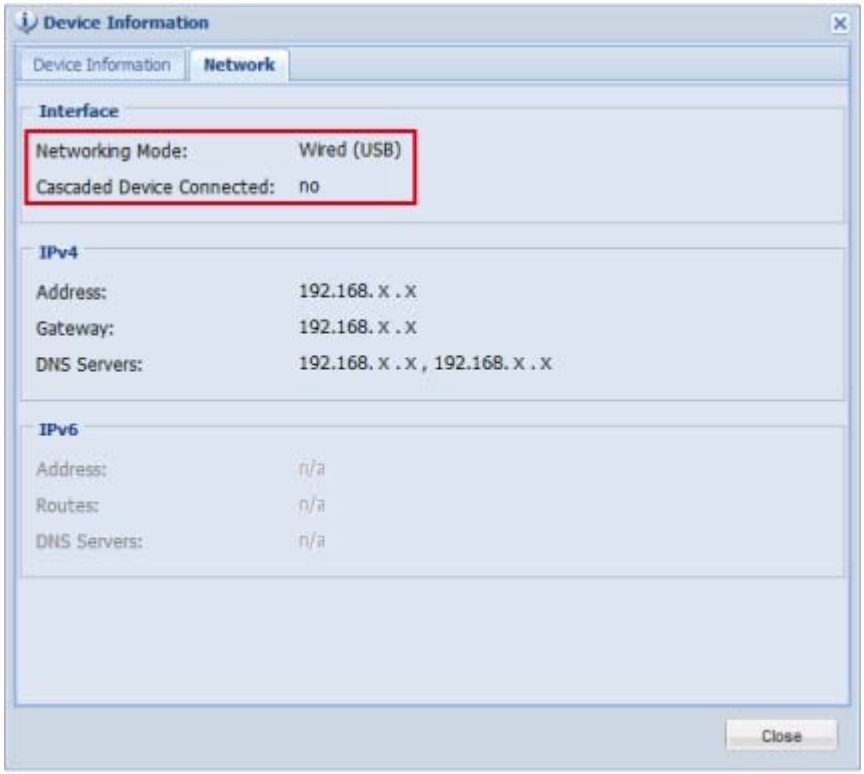
- A master device shows *Wired* in the Networking Mode field and *yes* in the Cascaded Device Connected field.



- A slave device in the middle position shows *Wired (USB)* in the Networking Mode field and *yes* in the Cascaded Device Connected field.



- The final slave device shows *Wired (USB)* in the Networking Mode field and *no* in the Cascaded Device Connection field.




## Using the CLI

This section explains how to identify a cascaded Raritan device through the CLI.

The ways to identify a cascaded device vary according to your firmware version. See ***Software Requirements*** (on page 2) for information on different firmware versions.

### When your firmware supports two cascading modes:

1. Log in to the CLI of the desired Raritan device. To use the SSH or Telnet service, see ***SSH/Telnet Access*** (on page 24).
2. Type either of the following CLI commands and press Enter.

```
#       show cascading

#       show cascading details
```

3. The "Mode" field shows the cascading mode being applied: Bridging or Port Forwarding.

4. The'"Position" field indicates the device's position.
   - A master device shows *0 (Master)*.

     If a master device has NO slave devices connected to it, it is a standalone device. See step 6 for how to determine the presence of a connected slave device.

     ```
     Position: 0 (Master)
     ```

   - A slave device shows a non-zero number which indicates its position. For example:

     *1 (Slave 1)* is the first slave device.

     ```
     Position: 1 (Slave 1)
     ```

     *2 (Slave 2)* is the second slave device.

     ```
     Position: 2 (Slave 2)
     ```

5. In the Port Forwarding mode, a port mapping list similar to the following diagram is displayed.

   ```
     HTTPS: 50000 (TCP)
      HTTP: 50100 (TCP)
       SSH: 50200 (TCP)
    TELNET: 50300 (TCP)
      SNMP: 50500 (UDP)
   MODBUS: 50600 (TCP)
   ```

6. To check whether a slave device is connected to this device's USB-A port, type either of the following CLI commands.

   ```
   #        show network
   ```

   A final slave device or a standalone device shows *no* in the "Cascaded device connected" field, indicating that there is no slave device connected to its USB-A port. Otherwise, it shows *yes*.

   ```
   Cascaded device connected: no
   ```

### When your firmware supports the "bridging" mode only:

1. Log in to the CLI of the desired Raritan device.
2. Type either of the following CLI commands.

   ```
   #        show network
   ```

3. Locate the "Networking mode" and "Cascaded device connected" fields displayed onscreen.
   - A master device shows *Wired* in the "Networking mode" field and *yes* in the "Cascaded device connected" field.

```
Networking mode:           Wired
Cascaded device connected: yes
```

- A slave device in the middle position shows *Wired (USB)* in the "Networking mode" field and *yes* in the "Cascaded device connected" field.

```
Networking mode:           Wired (USB)
Cascaded device connected: yes
```

- A final slave device shows *Wired (USB)* in the "Networking mode" field and *no* in the "Cascaded device connected" field.

```
Networking mode:           Wired (USB)
Cascaded device connected: no
```

## Using the SNMP

Later firmware versions retrieve more USB-cascading information via SNMP than earlier ones. See ***Software Requirements*** (on page 2) for information on different firmware versions.

The *unitConfigurationTable* in MIB contains entries for USB-cascading information. One SNMP MIB manager, such as a MIB browser, is required for the following operation.

### When your firmware supports two cascading modes:

1. Launch your SNMP MIB manager and connect to the desired Raritan device.
2. To find whether the Raritan device is in a USB-cascading configuration, retrieve the value of either one below:
   - SNMP name - **pduDaisychainMemberType**
   - SNMP object identifier (OID) - **1.3.6.1.4.1.13742.6.3.2.2.1.41**

   One of the values in the following table is returned.

| SNMP value | Description |
|---|---|
| standalone (0) | The Raritan device is not in the USB-cascading configuration. It is a standalone device. |
| master (1) | The Raritan device is the master device. |
| slave (2) | The Raritan device is a slave device. |

3. To check the cascading mode applied, retrieve the value of either one below:
   - SNMP name - **deviceCascadeType**
   - SNMP OID - **1.3.6.1.4.1.13742.6.3.2.2.1.70**

One of the values in the following table is returned.

| SNMP value | Cascading mode |
|---|---|
| 0 | Bridging mode |
| 1 | Port forwarding mode |

4. To identify the device's position in the USB-cascading configuration, retrieve the value of either one below:
   - SNMP name - **deviceCascadePosition**
   - SNMP OID - **1.3.6.1.4.1.13742.6.3.2.2.1.71**

   One of the values in the following table is returned.

| SNMP value | Device position |
|---|---|
| 0 | Master device |
| 1 | Slave 1 |
| 2 | Slave 2 |
| 3 | Slave 3 |
| 4 | Slave 4 |
| 5 | Slave 5 |
| 6 | Slave 6 |
| 7 | Slave 7 |

5. To find whether the Raritan device is the final slave device, retrieve the value of either one below:
   - SNMP name - **cascadedDeviceConnected**
   - SNMP OID - **1.3.6.1.4.1.13742.6.3.2.2.1.58**

   Check which value is returned. A final slave device has NO slave device connected to its USB-A port.

| SNMP value | Description |
|---|---|
| true (1) | A slave device has been connected to this Raritan device's USB-A port. |
| false (2) | No slave device is connected to this Raritan device's USB-A port. |

**When your firmware supports the "Bridging" mode only:**

Use the *cascadedDeviceConnected* object to determine whether your Raritan device is a USB-cascaded device. See the final step in the above procedure for details.

## Using the LCD Display

Some Raritan products have a front panel LCD display which can show USB-cascading information, such as the device position.

Depending on the Raritan product you purchased, the LCD display type varies.

- PX3 phase II models use a dot-matrix LCD display.
- PX3 phase I models, EMX and BCM use a character LCD display.

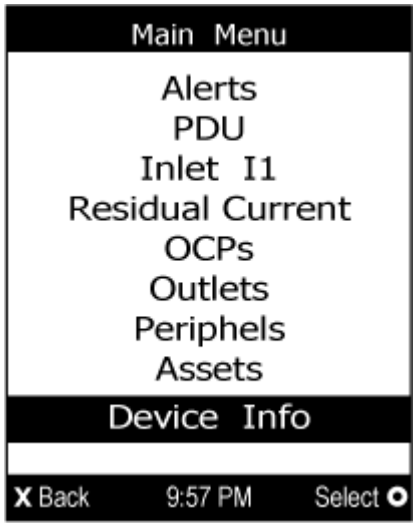
### Dot-Matrix LCD Display

On the dot-matrix LCD display, the USB-cascading information indicates the cascading mode, position and the presence of a connected slave device.

Note that the diagrams illustrated in this section are for Zero U models, and your dot-matrix LCD display may look slightly different if it is on a 1U or 2U model.

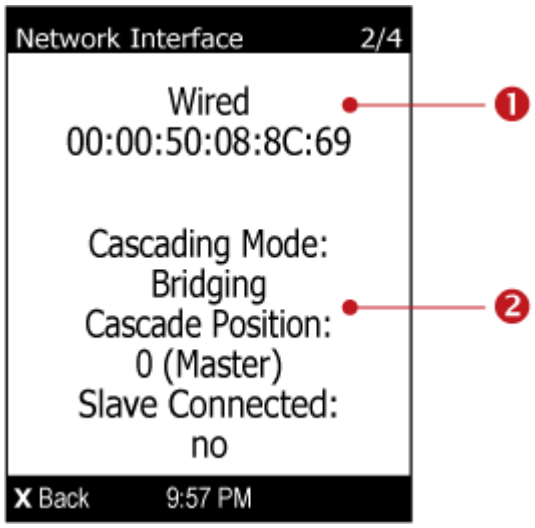
**To view the USB-cascading information:**

1. If the LCD display is in the Automatic mode, exit it by pressing ● or ⊗. The Main Menu similar to the following is displayed.




2. Press ▲ or ▼ to select "Device Info" in the Main Menu, and press ●.
3. To go to the next page which shows the networking mode and USB-cascading status, press ▼.

Below illustrates the USB-cascading information displayed on the dot-matrix LCD display.



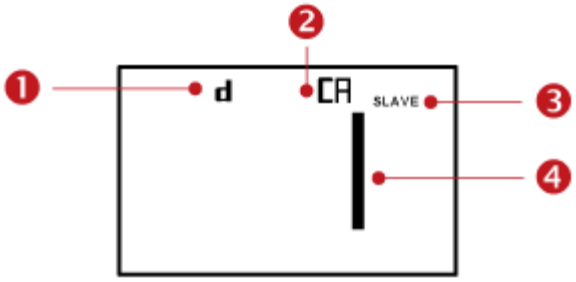

| Number | Description |
|---|---|
| ❶ | Networking information, including the network mode and MAC address. |
| ❷ | USB-cascading information, including:<br>▪ Cascading mode: Bridging or Port Forwarding. See ***Setting the Cascading Mode*** (on page 10).<br>▪ Cascade position: The position information is available only when the Raritan device is in a USB-cascading configuration. The information comprises a number and a noun enclosed in parentheses:<br>- The number represents the device's position. For example, 0 represents the master device, 1 represents Slave 1, 2 represents Slave 2, and so on.<br>- The noun in parentheses indicates whether it is a master or slave device.<br>▪ Slave connected: Indicates whether the presence of a slave device is detected on the USB-A port - *yes* or *no*. |

### Character LCD Display

A cascaded device's position is available on the character LCD display. Use the MODE button to switch between different modes. When in device mode, a small "d" is displayed in the upper left corner.

For more information on the USB-cascading configuration, see ***Cascading the Raritan device via USB*** (see "***Cascading Raritan Devices***" on page 8).

Below illustrates a slave device's position shown on the LCD display.




| Section | Example information |
|---|---|
| ❶ | "d" means the LCD display has entered the Device mode. |
| ❷ | "CA" indicates that the USB-cascading information is being displayed. |
| ❸ | "SLAVE" indicates that this Raritan device is a slave device. |
| ❹ | The number 1 means the device position is Slave 1. |

For a master device, a word "MASTER" is displayed on the LCD display instead of the word "SLAVE."

#### ▶ To retrieve the device's USB-cascading position information:

1. Press the MODE button until device settings are displayed, indicated by a 'd' in at the top left of the display.
2. Press the FUNC button until "CA" is displayed at the top right of the display.
3. The device's position is represented by any number defined below:

| Number | Device position |
|---|---|
| 0 | Master device |
| 1 | Slave 1 |

| Number | Device position |
|---|---|
| 2 | Slave 2 |
| 3 | Slave 3 |
| 4 | Slave 4 |
| 5 | Slave 5 |
| 6 | Slave 6 |
| 7 | Slave 7 |

*Note 1: For a standalone Raritan device, its position is the number 0, but the word "MASTER" is NOT shown on the LCD display.*

*Note 2: If reversing or disconnecting the USB cable from a slave device, causing the slave device to become a master or standalone device, you must plug an Ethernet cable to it to update its USB-cascading status.*

# Chapter 6 Updating the Raritan device Firmware

You can upgrade each individual Raritan device in the USB-cascading configuration through the web interface. The upgrade procedure is completely identical to the procedure for a standalone Raritan device.

Firmware files are available on Raritan website's ***Support page*** (***http://www.raritan.com/support/***).

### To update the firmware:

1. Choose Maintenance > Update Firmware. The Update Firmware dialog appears.
2. In the Firmware File field, click Browse to select an appropriate firmware file.
3. Click Upload. A progress bar appears to indicate the upload status.
4. When the upload is complete, version information of both the existing firmware and uploaded firmware is shown, providing you a last chance to terminate the update.
5. To view the certificate of the uploaded firmware, click View Certificate. **Optional.**
6. To proceed with the update, click Update Firmware. The update may take several minutes.

   *Warning: Do NOT power off the Raritan device during the update.*

   During the firmware update:

   - A progress bar appears in the web interface, indicating the update status.
   - The front panel display on the Raritan device shows three digits: 'FuP' or 'FUP.'

   *Exception: A PX3 Phase II model shows the upgrade progress in percent instead of FUP on its LCD display.*

   - No users can successfully log in to the Raritan device.
   - The user management operation, if any, is forced to suspend.
7. When the update is complete, a message appears, indicating the update is successful.
8. The Raritan device resets, and the Login page re-appears. You can now log in and resume your operation.

*Note 1: The other logged-in users are also logged out when the firmware update is complete.*

*Note 2: If you are using the Raritan device with an SNMP manager, download its MIB again after the firmware update to ensure your SNMP manager has the correct MIB for the latest release you are using. See Using SNMP in the online help.*

# Appendix A Configuring Network Settings

Network settings can be configured through either the web interface or command line interface (CLI). This appendix only shows basic operation. For details, see the online help or User Guide for your Raritan device.

If the bridging mode is intended, you must configure the network settings of each cascaded device respectively.

If the port forwarding mode is intended, you only need to configure the master device's network settings.

### In This Chapter

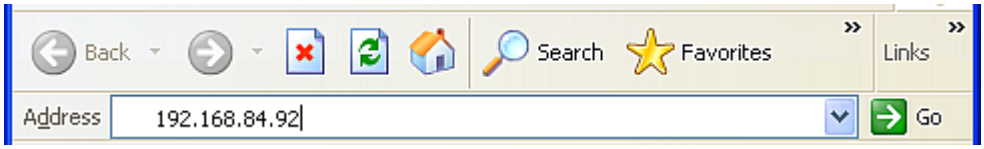


## Configuration via Web Interface

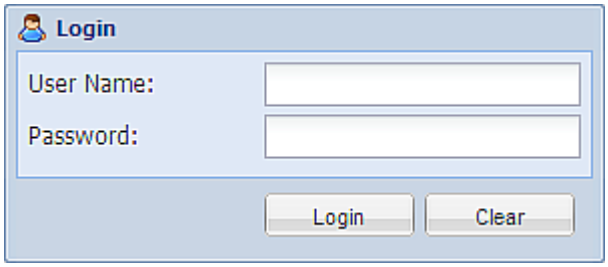
When you are able to connect to the master or slave device over Internet, you can access its web interface to change the network settings.

**To change initial network settings:**

1. Launch a web browser and type the IP address of the Raritan device in the address bar.




2. Accept any warnings that may appear and log in to that Raritan device using the administrator account.
   - User name: *admin*
   - Password: *raritan* (or a new password if you have changed the password)




3. If this is the first time to log in to the Raritan device, you are prompted to change the password. Then type the new password.

4. Choose Device Settings > Network. The Network Configuration dialog appears.
5. Click the IP Protocol tab to enable IPv4, IPv6 or both.
6. Depending on which IP protocol has been enabled in the above step, click the corresponding tab to change the IP address settings.
   - If IPv4 is enabled, click the IPv4 Settings tab.
   - If IPv6 is enabled, click the IPv6 Settings tab.
   - If both are enabled, click both tabs to configure IP addresses respectively.

## Configuration via CLI

If you want to configure a master or slave device's network settings via CLI, you must connect that device to a computer via a serial RS-232 connection.

You can also access the master device's CLI through a USB connection. For details, see the Quick Setup Guide, Online Help or User Guide, which can be downloaded from Raritan website's ***Support page*** (***http://www.raritan.com/support/***).

### To configure network settings via CLI:

1. On the computer connected to the Raritan device, open a communications program such as HyperTerminal or PuTTY.
2. Select the appropriate COM port, and set the following port settings:
   - Bits per second = 115200 (115.2Kbps)
   - Data bits = 8
   - Stop bits = 1
   - Parity = None
   - Flow control = None

   *Tip: For a USB connection, you can determine the COM port by choosing Control Panel > System > Hardware > Device Manager, and locating the "Dominion PX2 Serial Console" under the Ports group.*
3. In the communications program, press Enter to send a carriage return to the Raritan device.
4. The Raritan device prompts you to log in. Both user name and password are case sensitive.
   a. Username: `admin`
   b. Password: `raritan` (or a new password if you have changed it).

5. If prompted to change the default password, follow onscreen instructions to type your new password.
6. The # prompt appears.
7. Type `config` and press Enter.
8. To configure network settings, type appropriate commands and press Enter. All commands are case sensitive.
   a. To set the networking mode, type this command:

      `network mode <mode>`

      where <mode> is *wired* (default) or *wireless*.

   b. For the wired network mode, you may configure the LAN interface settings. In most scenarios, the default setting (auto) works well and should not be changed unless required.

| To set | Use this command |
|---|---|
| LAN interface speed | `network interface LANInterfaceSpeed <option>`<br><br><option> = *auto*, *10Mbps*, or *100Mbps*. |
| LAN interface duplex mode | `network interface LANInterfaceDuplexMode <mode>`<br><br><mode> = *half*, *full* or *auto*. |

*Tip: You can combine multiple commands to configure multiple parameters at a time. For example,*
*`network interface LANInterfaceSpeed <option> LANInterfaceDuplexMode <mode>`*

   c. For the wireless network mode, you must configure the Service Set Identifier (SSID) parameter.

| To set | Use this command |
|---|---|
| SSID | `network wireless SSID <ssid>`<br><br><ssid> = SSID string |

      If necessary, configure more wireless parameters shown in the following table.

| To set | Use this command |
|---|---|
| BSSID | `network wireless BSSID <bssid>`<br><br><bssid> = AP MAC address or *none* |
| Authentication method | `network wireless authMethod <method>`<br><br><method> = *psk* or *eap* |
| PSK | `network wireless PSK <psk>`<br><br><psk> = PSK string |
| EAP outer authentication | `network wireless eapOuterAuthentication <outer_auth>`<br><br><outer_auth> = *PEAP* |
| EAP inner authentication | `network wireless eapInnerAuthentication <inner_auth>`<br><br><inner_auth> = *MSCHAPv2* |
| EAP identity | `network wireless eapIdentity <identity>`<br><br><identity> = your user name for EAP authentication |
| EAP passord | `network wireless eapPassword`<br><br>When prompted to enter the password for EAP authentication, type the password. |
| EAP CA certificate | `network wireless eapCACertificate`<br><br>When prompted to enter the CA certificate, open the certificate with a text editor, copy and paste the content into the communications program. |

The content to be copied from the CA certificate does NOT include the first line containing "BEGIN CERTIFICATE" and the final line containing "END CERTIFICATE." If a certificate is installed, configure the following:

| Whether to | Use this command |
|---|---|
| Verify the certificate | `network wireless enableCertVerification <option1>`<br><br><option1> = *true* or *false* |
| Accept an expired or not valid certificate | `network wireless allowOffTimeRangeCerts <option2>`<br><br><option2> = *true* or *false* |
| Make the connection successful by ignoring the "incorrect" system time | `network wireless allowConnectionWithIncorrectClock <option3>`<br><br><option3> = *true* or *false* |

d. To determine which IP protocol (IPv4 or IPv6) is enabled and which IP address (IPv4 or IPv6) returned by the DNS server is used, configure the following parameters.

| To set | Use this command |
|---|---|
| IP protocol | `network ip proto <protocol>`<br><br><protocol> = *v4Only*, *v6Only* or *both* |
| IP address returned by the DNS server | `network ip dnsResolverPreference <resolver>`<br><br><resolver> = *preferV4* or *preferV6* |

e. After enabling the IPv4 or IPv6 protocol in the earlier step, configure the IPv4 or IPv6 network parameters.

| To set | Use this command |
|---|---|
| IPv4 configuration method | `network ipv4 ipConfigurationMode <mode>`<br><br><mode> = *dhcp* (default) or *static* |

| To set | Use this command |
|---|---|
| IPv6 configuration method | `network ipv6 ipConfigurationMode <mode>`<br><br><mode> = *automatic* (default) or *static* |

- Configure the preferred host name for the IPv4 DHCP or IPv6 automatic configuration.

*Note: The <version> variable in all of the following commands is either* ipv4 *or* ipv6*, depending on the type of the IP protocol you have enabled.*

| To set | Use this command |
|---|---|
| Preferred host name (optional) | `network <version> preferredHostName <name>`<br><br><name> = preferred host name |

*Tip: To override the DHCP-assigned DNS servers with those you specify manually, type this command:*

*`network <version> overrideDNS <option>`*

*where <option> is `enable` or `disable`. See the table below for the commands for manually specifying DNS servers.*

- For static IP configuration, configure these parameters.

| To set | Use this command |
|---|---|
| Static IPv4 or IPv6 address | `network <version> ipAddress <ip address>`<br><br><ip address> = static IP address |
| IPv4 subnet mask | `network ipv4 subnetMask <netmask>`<br><br><netmask> = subnet mask |
| IPv4 or IPv6 gateway | `network <version> gateway <ip address>`<br><br><ip address> = gateway's IP address |

| To set | Use this command |
|---|---|
| IPv4 or IPv6 primary DNS server | `network <version> primaryDNSServer <ip address>`<br><br><ip address> = IP address of the primary DNS server |
| IPv4 or IPv6 secondary DNS server (optional) | `network <version> secondaryDNSServer <ip address>`<br><br><ip address> = IP address of the secondary DNS server |

9. To quit the configuration mode, type either of the following commands, and press Enter.

| Command | Description |
|---|---|
| `apply` | Save all configuration changes and exit. |
| `cancel` | Abort all configuration changes and exit. |

The # prompt appears, indicating that you have quit the configuration mode.

10. To verify whether all settings are correct, type the following commands one by one.

| Command | Description |
|---|---|
| `show network` | Show network parameters. |
| `show network ip` all | Show all IP configuration parameters. |
| `show network wireless details` | Show all wireless parameters. |

*Tip: You can type "`show network wireless`" to display a shortened version of wireless settings.*

If all are correct, type `exit` to log out of the Raritan device. If any are incorrect, repeat Steps 7 to 10 to change network settings.

# Appendix B Accessibility Troubleshooting

Any accessibility problem occurred on one of the devices in the USB-cascading configuration may result in failure to access all subsequent slave devices that are connected to it.

### In This Chapter



## Possible Root Causes

The following lists the network accessibility issues and possible root causes.

| Symptom | Probable cause |
|---|---|
| Failure to access the master device | • Network connection to the master device is lost.<br>• No power is supplied to the master device.<br>• For the wireless networking, one of the following may lead to the accessibility failure:<br>▪ The USB wireless LAN adapter attached to the master device is not the Raritan USB WIFI LAN adapter. See ***USB Wireless LAN Adapters*** (on page 57).<br>▪ The wireless LAN configuration is not supported. See ***Supported Wireless LAN Configuration*** (on page 57).<br>▪ The installed CA certificate chain contains any certificate that has expired or is not valid yet. |
| Failure to access a slave device | • Network connection to the master device is lost.<br>• USB connection to the slave device in question or any prior slave device (if available) is lost.<br>• No power is supplied to the slave device in question or any prior cascaded devices.<br>• Inappropriate firmware version is loaded to the slave device in question or any prior cascaded devices. See ***Software Requirements*** (on page 2).<br>• In the port forwarding mode, the port number assigned to the IP address is incorrect. See ***Port Number Syntax*** (on page 12). |

*Tip: To determine which Raritan device may be the failure point of network, you may ping each Raritan device in the USB-cascading configuration, or look for the slave-related events in each Raritan device's event log. See* **Slave Connection and Disconnection Events** *(on page 52) and* **The Ping Tool** *(on page 52).*

## Slave Connection and Disconnection Events

Whenever the connection or disconnection of a subsequent slave device is detected, the Raritan device at the USB-A end of the USB cable logs it in the internal log. Note that the Raritan device at the USB-B end of the cable does NOT log these events.

There are two slave-related events:

| Event | Description |
|---|---|
| USB slave connected | This log entry is generated when a Raritan device detects the presence of a slave device on its USB-A port. |
| USB slave disconnected | This log entry is generated when it detects the disconnection of a slave device from its USB-A port. |

## The Ping Tool

The Raritan device provides a ping tool in the web interface and CLI so you can ping any host or Raritan device in your data center.

### Using the Web Interface

To log in to the web interface, see ***HTTP/HTTPS Access*** (on page 21).

The Ping tool is useful for checking whether a host is accessible through the network or Internet.

**To ping a host:**

1. Choose Maintenance > Network Diagnostics > Ping. The Ping Network Host dialog appears.
2. In the Host Name field, type the name or IP address of the host that you want to check.
3. In the Number of Requests field, type a number up to 20 or adjust the value by clicking either arrow. This number determines how many packets are sent for pinging the host.
4. Click Run Ping to start pinging the host. A dialog appears, displaying the Ping results.

5. Click Close to quit the dialog.

### Using the CLI

You can access the CLI interface by connecting a computer to the Raritan device or using SSH/Telnet. See ***SSH/Telnet Access*** (on page 24) for details.

You must perform the ping command in the diagnostic mode. To enter the diagnostic mode, type the following command and press Ener.

```
#        diag
```

After the diag> or diag# prompt appears, you can perform the ping command.

This ping command sends the ICMP ECHO_REQUEST message to a network host for checking its network connectivity. If the output shows the host is responding properly, the network connectivity is good. If not, either the host is shut down or it is not being properly connected to the network.

```
diag>       ping <host>
```

*Variables:*

- <host> is the host name or IP address whose networking connectivity you want to check.

*Options:*

- You can include any or all of additional options listed below in the ping command.

| Options | Description |
|---|---|
| count <number1> | Determines the number of messages to be sent. <number1> is an integer number between 1 and 100. |
| size <number2> | Determines the packet size. <number2> is an integer number in bytes between 1 and 65468. |
| timeout <number3> | Determines the waiting period before timeout. <number3> is an integer number in seconds ranging from 1 to 600. |

The command looks like the following when it includes all options:

```
diag>       ping <host> count <number1> size <number2> timeout <number3>
```

# Appendix C Ethernet Disabled Scenarios on Slave Devices

The Ethernet interface is automatically disabled on slave devices. This appendix illustrates this limitation by showing two scenarios.

## In This Chapter



## Example 1

Raritan device-1 has been directly connected to the LAN. Its Ethernet interface is enabled and networking mode shows *Wired*.

Raritan device-2 has been directly connected to the LAN. Its Ethernet interface is enabled and networking mode shows *Wired*.

If now you connect Raritan device-1 to the USB-B port of Raritan device-2 using a USB cable, the following changes occur:

- Raritan device-1 becomes the master device.
- Raritan device-2 becomes a slave device.
- The Ethernet interface on Raritan device-2 is automatically disabled. All of its IP packets are transmitted through Raritan device-1.
- The networking mode of Raritan device-2 changes to *Wired (USB)*, indicating that it is connected to the network through the master device.

## Example 2

Raritan device-1 is a master device, which has Raritan device-2 connected to its USB-A port. On Raritan device-1, the Ethernet interface is enabled, and the networking mode shows *Wired*.

Raritan device-2 is a slave device, whose Ethernet interface has been disabled, networking mode shows *Wired (USB)*, and IP packets are transmitted through the master device.

If you directly connect Raritan device-2 to the LAN now, NO changes occur.

- Raritan device-2 continues to operate as a slave device.
- The networking mode of Raritan device-2 still shows *Wired (USB).*
- The Ethernet interface on Raritan device-2 remains disabled. All of its IP packets are still transmitted through the master device.

# Appendix D Wireless LAN Information

The USB-cascading configuration supports either a wired or wireless LAN when in the port forwarding mode. See ***Setting the Cascading Mode*** (on page 10).

This appendix provides information regarding wireless LAN configuration and LAN adapters.

### In This Chapter



## Supported Wireless LAN Configuration

If wireless networking is preferred, ensure that the wireless LAN configuration of your Raritan device matches the access point. The following is the wireless LAN configuration that the Raritan device supports.

- Network type: 802.11 A/B/G/N
- Protocol: WPA2 (RSN)
- Key management: WPA-PSK, or WPA-EAP with PEAP and MSCHAPv2 authentication
- Encryption: CCMP (AES)

**Important: Raritan only supports specific wireless LAN adapters. Supported 802.11 network protocols vary according to the wireless LAN adapter being used with the Raritan device. See *USB Wireless LAN Adapters* (on page 57).**

## USB Wireless LAN Adapters

A standalone Raritan device supports the use of all of the following USB wireless LAN adapters. However, the port forwarding mode only supports the use of the Raritan USB WIFI LAN adapter.

| Wi-Fi LAN adapter | Supported 802.11 protocols |
|---|---|
| Proxim Orinoco 8494 | A/B/G |
| Zyxel NWD271N | B/G |
| Edimax EW-7722UnD | A/B/G/N |
| TP-Link TL-WDN3200 v1 | A/B/G/N |

| Wi-Fi LAN adapter | Supported 802.11 protocols |
|---|---|
| Raritan USB WIFI | A/B/G/N |

*Note: To use the Edimax EW-7722UnD or Raritan USB WIFI wireless LAN adapter to connect to an* 802.11n *wireless network, the handshake timeout setting must be changed to 500 or greater, or the wireless connection will fail.*

# Index

## W

## U.S./Canada/Latin America

Monday - Friday
8 a.m. - 6 p.m. ET
Phone: 800-724-8090 or 732-764-8886
For CommandCenter NOC: Press 6, then Press 1
For CommandCenter Secure Gateway: Press 6, then Press 2
Fax: 732-764-8887
Email for CommandCenter NOC: tech-ccnoc@raritan.com
Email for all other products: tech@raritan.com

## China

### Beijing
Monday - Friday
9 a.m. - 6 p.m. local time
Phone: +86-10-88091890

### Shanghai
Monday - Friday
9 a.m. - 6 p.m. local time
Phone: +86-21-5425-2499

### GuangZhou
Monday - Friday
9 a.m. - 6 p.m. local time
Phone: +86-20-8755-5561

## India

Monday - Friday
9 a.m. - 6 p.m. local time
Phone: +91-124-410-7881

## Japan

Monday - Friday
9:30 a.m. - 5:30 p.m. local time
Phone: +81-3-5795-3170
Email: support.japan@raritan.com

## Europe

### Europe
Monday - Friday
8:30 a.m. - 5 p.m. GMT+1 CET
Phone: +31-10-2844040
Email: tech.europe@raritan.com

### United Kingdom
Monday - Friday
8:30 a.m. to 5 p.m. GMT
Phone +44(0)20-7090-1390

### France
Monday - Friday
8:30 a.m. - 5 p.m. GMT+1 CET
Phone: +33-1-47-56-20-39

### Germany
Monday - Friday
8:30 a.m. - 5:30 p.m. GMT+1 CET
Phone: +49-20-17-47-98-0
Email: rg-support@raritan.com

## Melbourne, Australia

Monday - Friday
9:00 a.m. - 6 p.m. local time
Phone: +61-3-9866-6887

## Taiwan

Monday - Friday
9 a.m. - 6 p.m. GMT -5 Standard -4 Daylight
Phone: +886-2-8919-1333
Email: support.apac@raritan.com