



Raritan PXE

User Guide
Release 3.0

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PXE-0D-v3.0-E

March 2015

255-80-0008-00

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.

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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.



Contents

Safety Guidelines	ii
<hr/>	
Safety Instructions	iii
<hr/>	
What's New in the PXE User Guide	xiii
<hr/>	
Chapter 1 Introduction	1
<hr/>	
Product Models	1
Package Contents.....	1
Zero U Products.....	1
1U Products	1
<hr/>	
Chapter 2 Rack-Mounting the PDU	2
<hr/>	
Rackmount Safety Guidelines	2
Circuit Breaker Orientation Limitation	2
Mounting 1U Models Using L-Brackets and Buttons	3
Mounting Zero U Models Using Two Rear Buttons	4
Mounting Zero U Models Using L-Brackets and Buttons.....	6
<hr/>	
Chapter 3 Installation and Configuration	8
<hr/>	
Before You Begin.....	8
Unpacking the Product and Components.....	8
Preparing the Installation Site.....	8
Filling Out the Equipment Setup Worksheet	9
Checking the Branch Circuit Rating.....	9
Connecting the PDU to a Power Source	9
Configuring the PXE	9
Installing the USB-to-Serial Driver (Optional)	10
Connecting the PXE to a Computer	11
Connecting the PXE to Your Network	12
Initial Network Configuration via CLI	12

Installing Cable Retention Clips on Outlets (Optional)	16
Chapter 4 Connecting Environmental Sensor Packages (Optional)	18
DPX Sensor Packages	18
Using an Optional Sensor Hub	19
Using a Raritan Y cable	21
Supported Maximum DPX Sensor Distances	22
DPX2 Sensor Packages	23
DX Sensor Packages	25
Chapter 5 Using the PDU	27
Panel Components	27
Power Cord	27
Outlets	27
Connection Ports	28
LED Display	29
Reset Button	32
Circuit Breakers	32
Resetting the Button-Type Circuit Breaker	32
Resetting the Handle-Type Circuit Breaker	33
Chapter 6 Using the Web Interface	35
Supported Web Browsers	35
Logging in to the Web Interface	36
Login	36
Changing Your Password	38
Remembering User Names and Passwords	38
Logout	39
Introduction to the Web Interface	40
Menus	41
PX Explorer Pane	41
Setup Button	43
Status Bar	43
Add Page Icon	45
Logout Button	45
Data Pane	45
More Information	46
Viewing the Dashboard	51
Alerted Sensors	51
Alarms List	52
Device Management	53
Displaying PDU Information	54
Naming the PDU	55
Modifying the Network Configuration	55
Modifying Network Service Settings	63

Setting the Date and Time	69
Setting Default Measurement Units	73
Specifying the Device Altitude	73
Setting Data Logging	74
Configuring SMTP Settings	75
Setting the EnergyWise Configuration	76
Rebooting the PXE Device	77
Resetting All Active Energy Readings	77
Internal Beeper State	78
User Management	78
Creating a User Profile	78
Modifying a User Profile	81
Deleting a User Profile	82
Changing the User List View	82
Setting Up Your Preferred Measurement Units	83
Setting Up Roles	83
Creating a Role	84
Modifying a Role	84
Deleting a Role	86
Changing the Role List View	86
Forcing HTTPS Encryption	86
Access Security Control	86
Configuring the Firewall	87
Setting Up User Login Controls	93
Setting Up Role-Based Access Control Rules	97
Setting Up an SSL Certificate	101
Certificate Signing Request	102
Creating a Self-Signed Certificate	104
Installing Existing Key and Certificate Files	105
Downloading Key and Certificate Files	106
Setting Up External Authentication	106
Gathering the External Authentication Information	107
Adding Authentication Servers	108
Sorting the Access Order	112
Testing the Server Connection	112
Editing Authentication Server Settings	112
Deleting Authentication Server Settings	113
Disabling External Authentication	113
Enabling External and Local Authentication Services	114
Outlet Management	114
Naming Outlets	114
Checking Outlet-Specific Data	115
Inlet and Overcurrent Protector Management	115
Naming the Inlet	116
Monitoring the Inlet	116
Naming Overcurrent Protectors	117
Resetting Inlet Active Energy Readings	117
Disabling an Inlet (for Multi-Inlet PDUs)	118
Setting Power Thresholds	119
Setting Inlet Thresholds	119
Event Rules and Actions	121
Components of an Event Rule	121

Creating an Event Rule	122
Sample Event Rules	147
A Note about Infinite Loop	148
Modifying an Event Rule.....	149
Modifying an Action	150
Deleting an Event Rule or Action.....	150
A Note about Untriggered Rules.....	151
Managing Event Logging	151
Viewing the Local Event Log	151
Clearing Event Entries	152
Viewing Connected Users	152
Monitoring Server Accessibility	153
Adding IT Devices for Ping Monitoring	154
Editing Ping Monitoring Settings.....	155
Deleting Ping Monitoring Settings	155
Checking Server Monitoring States	156
Environmental Sensors and Actuators	156
Identifying Environmental Sensors and Actuators.....	157
Managing Environmental Sensors or Actuators	160
Configuring Environmental Sensors or Actuators	162
Viewing Sensor or Actuator Data	167
Unmanaging Environmental Sensors or Actuators	171
Disabling the Automatic Management Function.....	172
Controlling Actuators	172
Bulk Configuration.....	173
Saving the PXE Configuration.....	174
Copying the PXE Configuration.....	175
Backup and Restore of PXE Device Settings.....	176
Network Diagnostics	177
Pinging a Host	177
Tracing the Network Route.....	177
Listing TCP Connections	178
Downloading Diagnostic Information	178
Firmware Upgrade	178
Updating the PXE Firmware	179
Viewing Firmware Update History	181
Full Disaster Recovery	182
Accessing the Help	182
Retrieving Software Packages Information	182
Browsing through the Online Help.....	183

Chapter 7 Using SNMP 185

Enabling SNMP.....	185
Configuring Users for Encrypted SNMP v3	186
Configuring SNMP Notifications	187
SNMP Gets and Sets.....	188
The PXE MIB.....	188
A Note about Enabling Thresholds.....	190

Chapter 8 Using the Command Line Interface 191

About the Interface.....	191
Logging in to CLI.....	192
With HyperTerminal.....	192
With SSH or Telnet.....	193
Different CLI Modes and Prompts	194
Closing a Local Connection.....	194
Logging out of CLI.....	194
Help Command	195
Querying Available Parameters for a Command	196
Showing Information	196
Network Configuration	197
PDU Configuration.....	199
Outlet Information	199
Inlet Information	200
Overcurrent Protector Information	201
Date and Time Settings	202
Default Measurement Units	202
Environmental Sensor Information	203
Actuator Information	204
Environmental Sensor Package Information	205
Inlet Sensor Threshold Information	206
Inlet Pole Sensor Threshold Information	207
Environmental Sensor Threshold Information	209
Environmental Sensor Default Thresholds.....	210
Security Settings.....	211
Existing User Profiles	212
Existing Roles	213
EnergyWise Settings	213
Event Log.....	214
Reliability Data.....	215
Reliability Error Log	215
Command History	216
History Buffer Length	216
Examples	216
Clearing Information.....	218
Clearing Event Log	218
Configuring the PXE Device and Network.....	219
Entering Configuration Mode.....	219
Quitting Configuration Mode.....	219
PDU Configuration Commands	220
Network Configuration Commands.....	223
Time Configuration Commands.....	241
Security Configuration Commands.....	244
Outlet Configuration Commands	264
Inlet Configuration Commands	265
Overcurrent Protector Configuration Commands	266
User Configuration Commands	266

Role Configuration Commands	279
Environmental Sensor Configuration Commands	284
Sensor Threshold Configuration Commands	288
Actuator Configuration Commands	306
EnergyWise Configuration Commands	309
Setting the History Buffer Length.....	311
Multi-Command Syntax	311
Actuator Control Operations	312
Switching On the Actuator(s).....	313
Switching Off the Actuator(s).....	314
Example - Turning On a Specific Actuator	314
Unlocking a User.....	315
Resetting the PXE.....	315
Restarting the PDU.....	315
Resetting Active Energy Readings	316
Resetting to Factory Defaults	316
Network Troubleshooting.....	317
Entering Diagnostic Mode	317
Quitting Diagnostic Mode	317
Diagnostic Commands	317

Retrieving Previous Commands	320
Automatically Completing a Command.....	320

Appendix A Specifications 322

Maximum Ambient Operating Temperature	322
Sensor RJ-12 Port Pinouts	322
RS-485 Port Pinouts	322

Appendix B Equipment Setup Worksheet 324

Appendix C Resetting to Factory Defaults 328

Using the CLI Command	328
-----------------------------	-----

Appendix D LDAP Configuration Illustration 330

Step A. Determine User Accounts and Groups	330
Step B. Configure User Groups on the AD Server	331
Step C. Configure LDAP Authentication on the PXE Device	332
Step D. Configure User Groups on the PXE Device	334

Appendix E Integration 338

Power IQ Configuration	338
Adding PDUs to Power IQ Management.....	338
dcTrack	340
dcTrack Overview	341
Adding the PX to dcTrack Management.....	341

Appendix F Additional PXE Information 343

MAC Address.....	343
Locking Outlets and Cords	343
SecureLock™ Outlets and Cords.....	344
Button-Type Locking Outlets	345
Unbalanced Current Calculation.....	346
Altitude Correction Factors	347
Raritan Training Website	348
Truncated Data in the Web Interface.....	348
Reserving IP Addresses in Windows DHCP Servers	349
Sensor Threshold Settings	349
Thresholds and Sensor States	350

[Contents](#)

"To Assert" and Assertion Timeout.....	352
"To De-assert" and Deassertion Hysteresis	354

Index	357
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What's New in the PXE User Guide

The following sections have changed or information has been added to the PXE Online Help based on enhancements and changes to the equipment and/or user documentation.

Checking the Branch Circuit Rating (on page 9)

Configuring the PXE (on page 9)

Connecting Environmental Sensor Packages (Optional) (on page 18)

DPX Sensor Packages (on page 18)

DPX2 Sensor Packages (on page 23)

DX Sensor Packages (on page 25)

Using the PDU (on page 27)

Circuit Breakers (on page 32)

Supported Web Browsers (on page 35)

Login (on page 36)

Remembering User Names and Passwords (on page 38)

Status Bar (on page 43)

Alerted Sensors (on page 51)

Alarms List (on page 52)

Modifying IPv4 Settings (on page 57)

Modifying IPv6 Settings (on page 59)

Static Route Examples (on page 61)

Changing HTTP(S) Settings (on page 64)

Changing Modbus/TCP Settings (on page 67)

Enabling Service Advertisement (on page 68)

Windows NTP Server Synchronization Solution (on page 72)

Setting Default Measurement Units (on page 73)

Resetting All Active Energy Readings (on page 77)

Internal Beeper State (on page 78)

Setting Up Your Preferred Measurement Units (on page 83)

Configuring the Firewall (on page 87)

Changing the Default Policy (on page 88)

Creating Firewall Rules (on page 89)

Enabling and Editing the Security Banner (on page 96)

Enabling the Feature (on page 97)

Changing the Default Policy (on page 98)

Creating Role-Based Access Control Rules (on page 98)

Setting Up External Authentication (on page 106)

Gathering the RADIUS Information (on page 108)

Adding RADIUS Server Settings (on page 111)

Checking Outlet-Specific Data (on page 115)

Resetting Inlet Active Energy Readings (on page 117)

Disabling an Inlet (for Multi-Inlet PDUs) (on page 118)

Event Rules and Actions (on page 121)

Creating Actions (on page 122)

Creating Rules (on page 133)

Scheduling an Action (on page 137)

Default Log Messages (on page 139)

Email and SMS Message Placeholders (on page 144)

A Note about Infinite Loop (on page 148)

Adding IT Devices for Ping Monitoring (on page 154)

Environmental Sensors and Actuators (on page 156)

Identifying Environmental Sensors and Actuators (on page 157)

Matching the Serial Number (on page 158)

Matching the Position (on page 159)

Managing Environmental Sensors or Actuators (on page 160)

Identifying Sensor or Actuator Channels (on page 161)

Configuring Environmental Sensors or Actuators (on page 162)

Changing Default Thresholds (on page 165)

Setting Thresholds for Multiple Sensors (on page 166)

States of Managed Actuators (on page 171)

Unmanaging Environmental Sensors or Actuators (on page 171)

Disabling the Automatic Management Function (on page 172)

Controlling Actuators (on page 172)

Copying the PXE Configuration (on page 175)

Backup and Restore of PXE Device Settings (on page 176)

Updating the PXE Firmware (on page 179)

Firmware Update via SCP (on page 180)

Using the Command Line Interface (on page 191)

Using the CLI Command (on page 328)

dcTrack (on page 340)

Locking Outlets and Cords (on page 343)

Unbalanced Current Calculation (on page 346)

Raritan Training Website (on page 348)

Truncated Data in the Web Interface (on page 348)

Reserving IP Addresses in Windows DHCP Servers (on page 349)

Sensor Threshold Settings (on page 349)

Please see the Release Notes for a more detailed explanation of the changes applied to this version of PXE.

Chapter 1 Introduction

Raritan PXE is an intelligent power distribution unit (PDU) that allows you to remotely monitor power consumed by IT equipment in the server room or data center.

The intended use of the PXE is distribution of power to information technology equipment such as computers and communication equipment where such equipment is typically mounted in an equipment rack located in an information technology equipment room.

In This Chapter

Product Models.....	1
Package Contents	1

Product Models

The PXE comes in several models that are built to stock and can be obtained almost immediately. Raritan also offers custom models that are built to order and can only be obtained on request.

Visit the **Product Selector page** (<http://www.findmypdu.com/>) on the Raritan website or contact your local reseller for a list of available models.

Package Contents

The following sub-topics describe the equipment and other material included in the product package.

Zero U Products

- The PXE device
- Mounting screws, brackets and/or buttons
- Cable retention clips for outlets (optional)

1U Products

- The PXE device
- Mounting screws, brackets and/or buttons

Chapter 2 Rack-Mounting the PDU

This chapter describes how to rack mount a PXE device.

In This Chapter

Rackmount Safety Guidelines	2
Circuit Breaker Orientation Limitation.....	2
Mounting 1U Models Using L-Brackets and Buttons.....	3
Mounting Zero U Models Using Two Rear Buttons	4
Mounting Zero U Models Using L-Brackets and Buttons	6

Rackmount Safety Guidelines

In Raritan products which require rack mounting, follow these precautions:

- Operation temperature in a closed rack environment may be greater than room temperature. Do not exceed the rated maximum ambient temperature of the Power Distribution Units. See **Specifications** (on page 322) in the Online Help.
- Ensure sufficient airflow through the rack environment.
- Mount equipment in the rack carefully to avoid uneven mechanical loading.
- Connect equipment to the supply circuit carefully to avoid overloading circuits.
- Ground all equipment properly, especially supply connections, to the branch circuit.

Circuit Breaker Orientation Limitation

Usually a PDU can be mounted in any orientation. However, when mounting a PDU with circuit breakers, you must obey these rules:

- Circuit breakers CANNOT face down. For example, do not horizontally mount a Zero U PDU with circuit breakers on the ceiling.
- If a rack is subject to shock in environments such as boats or airplanes, the PDU CANNOT be mounted upside down. If installed upside down, shock stress reduces the trip point by 10%.

Note: If normally the line cord is down, upside down means the line cord is up.

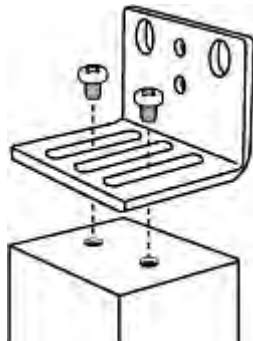
Mounting 1U Models Using L-Brackets and Buttons

This section describes how to mount a 1U PXE device using L-brackets and two buttons.



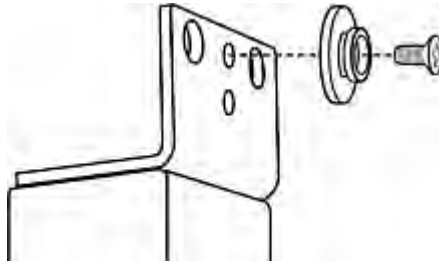
► **To mount 1U models using L-brackets and two buttons:**

1. Align the two edge slots of the L-bracket with the two screw holes on the top of the PXE device.
2. Screw the L-bracket to the device and ensure the bracket is fastened securely.



3. Repeat Steps 1 to 2 to screw another L-bracket to the bottom of the device.
4. After both L-brackets are installed on the device, you can choose either of the following ways to mount the device in the rack.
 - Using rack screws, fasten the device to the rack through two identical holes near the edge of each L-bracket.

- Mount the device by screwing a mounting button in the back center of each L-bracket and then having both buttons engage the mounting holes in the rack. The recommended torque for the button is 1.96 N·m (20 kgf·cm).



Mounting Zero U Models Using Two Rear Buttons

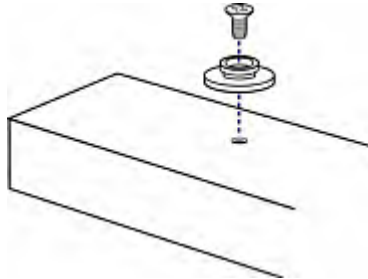
The following describes how to mount a PDU using two buttons only. If your PDU has circuit breakers implemented, read **Circuit Breaker Orientation Limitation** (on page 2) before mounting it.



► **To mount Zero U models using two buttons:**

1. Turn to the rear of the PDU.

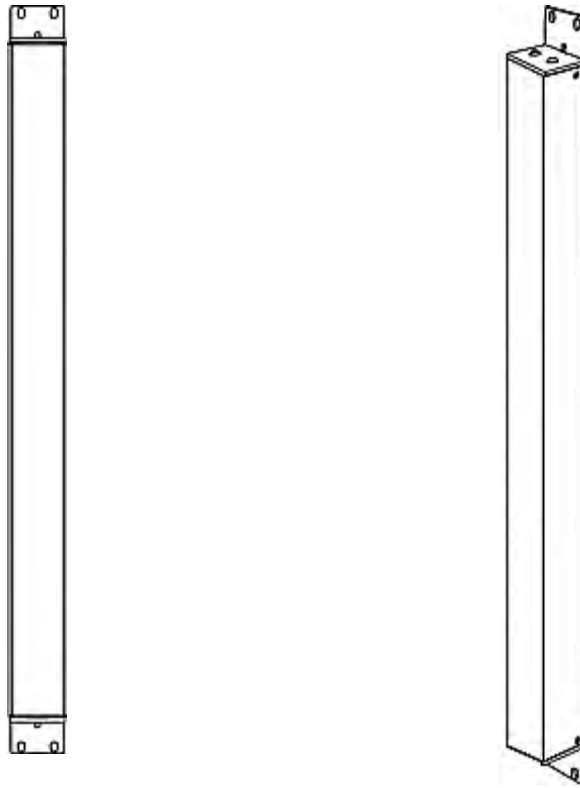
2. Locate two screw holes on the rear panel: one near the bottom and the other near the top (the side of cable gland).
3. Screw a button in the screw hole near the bottom. The recommended torque for the button is 1.96 N·m (20 kgf·cm).



4. Screw a button in the screw hole near the top. The recommended torque for the button is 1.96 N·m (20 kgf·cm).
5. Ensure that the two buttons can engage their mounting holes in the rack or cabinet simultaneously.
6. Press the PXE device forward, pushing the mounting buttons through the mounting holes, then letting the device drop slightly. This secures the PXE device in place and completes the installation.

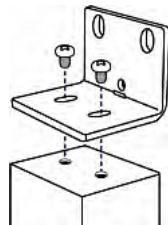
Mounting Zero U Models Using L-Brackets and Buttons

This section describes how to mount a PDU using L-brackets and two buttons. If your PDU has circuit breakers implemented, read ***Circuit Breaker Orientation Limitation*** (on page 2) before mounting it.



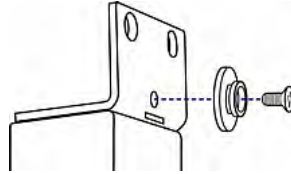
► **To mount Zero U models using L-brackets and two buttons:**

1. Align the two central holes of the L-bracket with the two screw holes on the top of the PXE device.
2. Screw the L-bracket to the device and ensure the bracket is fastened securely.



3. Repeat Steps 1 to 2 to screw another L-bracket to the bottom of the device.

4. After both L-brackets are installed on the device, you can choose either of the following ways to mount the device in the rack.
 - Using rack screws, fasten the device to the rack through two identical holes near the edge of each L-bracket.
 - Mount the device by screwing a mounting button in the back center of each L-bracket and then having both buttons engage the mounting holes in the rack. The recommended torque for the button is 1.96 N·m (20 kgf·cm).



Chapter 3 Installation and Configuration

This chapter explains how to install a PXE device and configure it for network connectivity.

In This Chapter

Before You Begin	8
Connecting the PDU to a Power Source	9
Configuring the PXE	9
Installing Cable Retention Clips on Outlets (Optional)	16

Before You Begin

Before beginning the installation, perform the following activities:

- Unpack the product and components
- Prepare the installation site
- Fill out the equipment setup worksheet
- Check the branch circuit rating

Unpacking the Product and Components

1. Remove the PXE device and other equipment from the box in which they were shipped. See **Package Contents** (on page 1) for a complete list of the contents of the box.
2. Compare the serial number of the equipment with the number on the packing slip located on the outside of the box and make sure they match.
3. Inspect the equipment carefully. If any of the equipment is damaged or missing, contact Raritan's Technical Support Department for assistance.
4. Verify that all circuit breakers on the PXE device are set to ON. If not, turn them ON.

Or make sure that all fuses are inserted and seated properly. If there are any fuse covers, ensure that they are closed.

Note: Not all PXE devices have overcurrent protection mechanisms.

Preparing the Installation Site

1. Make sure the installation area is clean and free of extreme temperatures and humidity.

*Note: If necessary, contact Raritan Technical Support for the maximum operating temperature for your model. See **Maximum Ambient Operating Temperature** (on page 322).*

2. Allow sufficient space around the PXE device for cabling and outlet connections.
3. Review **Safety Instructions** (on page iii) listed in this online help.

Filling Out the Equipment Setup Worksheet

An Equipment Setup Worksheet is provided in this online help. See **Equipment Setup Worksheet** (on page 324). Use this worksheet to record the model, serial number, and use of each IT device connected to the PDU.

As you add and remove devices, keep the worksheet up-to-date.

Checking the Branch Circuit Rating

The rating of the branch circuit supplying power to the PDU shall be in accordance with national and local electrical codes.

Connecting the PDU to a Power Source

1. Verify that all circuit breakers on the PXE device are set to ON. If not, turn them ON.

Or make sure that all fuses are inserted and seated properly. If there are any fuse covers, ensure that they are closed.

Note: Not all PXE devices have overcurrent protection mechanisms.

2. Connect each PXE to an appropriately rated branch circuit. See the label or nameplate affixed to your PXE for appropriate input ratings or range of ratings.
3. When a PXE device powers up, it proceeds with the power-on self test and software loading for a few moments.
4. When the software has completed loading, the LED display illuminates and shows numeric digits.

Configuring the PXE

There are two alternatives to initially configure a PXE device:

- Connect the PXE device to a computer via a USB cable to configure it.

The computer must have a communications program such as HyperTerminal or PuTTY.

If your computer is using the Windows(r) operating system, a USB-to-serial driver must be installed.

- Connect the PXE device to a TCP/IP network that supports DHCP, and use the IPv4 address and web browser to configure the PXE.

The DHCP-assigned IP address can be retrieved through the PXE device's MAC address. You can contact your LAN administrator for assistance. See **MAC Address** (on page 343).

A Category 5e/6 UTP cable is required for a network connection.

Installing the USB-to-Serial Driver (Optional)

The PXE can emulate a USB-to-serial converter over a USB connection. A USB-to-serial driver named "Dominion PX2 Serial Console" is required for Microsoft® Windows® operating systems. Download the *USB Driver* file, which contains *dominion-serial.inf*, *dominion-serial.cat* and *dominion-serial-setup-<n>.exe* files, from Raritan website's **PX2 Support Files page**

(<https://www.raritan.com/support/product/px2/px2-support-files>).

Note: <n> in the filename of "dominion-serial-setup-<n>.exe" represents the file's version number.

There are two ways to install this driver: automatic and manual installation. Automatic driver installation is highly recommended.

► Automatic driver installation in Windows®:

1. Make sure the PXE is NOT connected to the computer via a USB cable.
2. Run *dominion-serial-setup-<n>.exe* on the computer and follow online instructions to install the driver.

Note: If any Windows security warning appears, accept it to continue the installation.

3. Connect the PXE to the computer via a USB cable. The driver is automatically installed.

► Manual driver installation in Windows®:

1. Make sure the PXE has been connected to the computer via a USB cable.
2. The computer detects the new device and the "Found New Hardware Wizard" dialog appears. If this dialog does not appear, choose Control Panel > System > Hardware > Device Manager, right-click the *Dominion PX2 Serial Console*, and choose Update Driver.
3. Select the option of driver installation from a specific location, and then specify the location where both *dominion-serial.inf* and *dominion-serial.cat* are stored.

Note: If any Windows security warning appears, accept it to continue the installation.

4. Wait until the installation is complete.

Note: If the PXE enters the disaster recovery mode when the USB serial driver is not installed yet, it may be shown as a 'GPS camera' in the Device Manager on the computer connected to it.

► In Linux:

No additional drivers are required, but you must provide the name of the tty device, which can be found in the output of the "dmesg" after connecting the PXE to the computer. Usually the tty device is "/dev/ttyACM#" or "/dev/ttyUSB#", where # is an integer number.

For example, if you are using the kermit terminal program, and the tty device is "/dev/ttyACM0," perform the following commands:

```
> set line /dev/ttyACM0
```

```
> connect
```

Connecting the PXE to a Computer

To configure the PXE using a computer, it must be connected to the computer via the USB port.



The PXE device can emulate a USB-to-serial converter after the USB-to-serial driver is properly installed in the Windows® operating system.

Now establish a USB connection between the PXE and a computer for initial configuration.

► To make a USB connection:

1. A USB-to-serial driver is required in Windows®. Install this driver before connecting the USB cable. See **Installing the USB-to-Serial Driver (Optional)** (on page 10).
2. Connect a USB cable between the PXE device's USB-B port and your computer's USB-A port.

Note: If you plan to use this USB connection to log in to the command line interface, leave the cable connected after the configuration is complete.

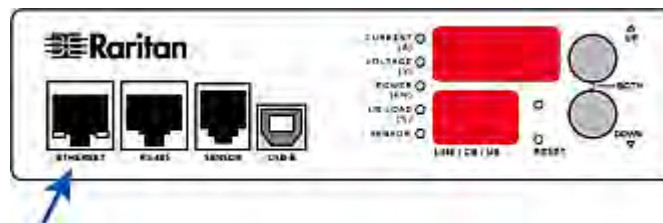
Connecting the PXE to Your Network

To use the web interface to administer the PXE, you must connect the PXE to your local area network (LAN). The PXE device does not support the wireless networking so you must establish a wired connection.

► To make a wired connection:

1. Connect a standard network cable to the ETHERNET port on the PXE.
2. Connect the other end of the cable to your LAN.

See this diagram for the ETHERNET port location.



Initial Network Configuration via CLI

After the PXE is connected to your network, you must provide it with an IP address and some additional networking information.

This section describes the initial configuration via the USB connection.

*Note: To configure the PXE via the LAN, see **Using the Web Interface** (on page 35).*

► To configure the PXE device:

1. On the computer connected to the PXE, 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 PXE.
4. The PXE prompts you to log in. Both user name and password are case sensitive.
 - a. At the Username prompt, type `admin` and press Enter.
 - b. At the Password prompt, type `raritan` and press Enter.
5. When 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. The default networking mode is the "wired" mode. Do not change this mode.
 - b. 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	<pre>network interface LANInterfaceSpeed <option></pre> <p><i><option> = auto, 10Mbps, or 100Mbps.</i></p>
LAN interface duplex mode	<pre>network interface LANInterfaceDuplexMode <mode></pre> <p><i><mode> = half, full or auto.</i></p>

Tip: You can combine multiple commands to configure multiple parameters at a time. For example,

```
network interface LANInterfaceSpeed <option>
LANInterfaceDuplexMode <mode>
```

- c. 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> <protocol> = <i>v4Only</i> , <i>v6Only</i> or <i>both</i>
IP address returned by the DNS server	network ip dnsResolverPreference <resolver> <resolver> = <i>preferV4</i> or <i>preferV6</i>

- d. 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> <mode> = <i>dhcp</i> (default) or <i>static</i>
IPv6 configuration method	network ipv6 ipConfigurationMode <mode> <mode> = <i>automatic</i> (default) or <i>static</i>

- 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> <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 the static IP configuration, configure these parameters.

To set	Use this command
Static IPv4 or IPv6 address	network <version> ipAddress <ip address> <ip address> = static IP address
IPv4 subnet mask	network ipv4 subnetMask <netmask> <netmask> = subnet mask
IPv4 or IPv6 gateway	network <version> gateway <ip address> <ip address> = gateway's IP address
IPv4 or IPv6 primary DNS server	network <version> primaryDNSServer <ip address> <ip address> = IP address of the primary DNS server
IPv4 or IPv6 secondary DNS server (optional)	network <version> secondaryDNSServer <ip address> <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.

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

The IP address configured may take seconds to take effect.

Installing Cable Retention Clips on Outlets (Optional)

If your PXE device is designed to use a cable retention clip, install the clip before connecting a power cord. A cable retention clip prevents the connected power cord from coming loose or falling off.

The use of cable retention clips is highly recommended for regions with high seismic activities, and environments where shocks and vibrations are expected.

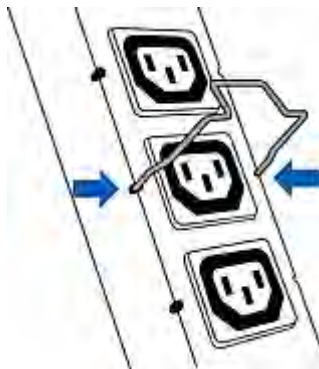
These optional clips come in various sizes to accommodate diverse power cords used on IT equipment, which are connected to C13 or C19 outlets. You can request a cable retention kit containing different sizes of clips from your reseller. Make sure you use a clip that fits the power cord snugly to facilitate the installation or removal operation (for servicing).



*Note: Some NEMA sockets on PSE-certified PDUs for Japan have integral locking capability and do not need cable retention clips. See **Locking Outlets and Cords** (on page 343).*

► To install and use a cable retention clip on the outlet:

1. Locate two tiny holes at two sides of an outlet.
2. Install the cable retention clip by inserting two ends of the clip into the tiny holes.



3. Plug the power cord into the outlet, and press the clip toward the power cord until it holds the cord firmly. The clip's central part holding the plug should face downwards toward the ground, like an inverted "U". This allows gravity to keep the clip in place.



4. Repeat the same steps to install clips and power cords on the other outlets.

Chapter 4 Connecting Environmental Sensor Packages (Optional)

The PXE supports all types of Raritan environmental sensor packages, including DPX, DPX2 and DX series. For detailed information on each sensor package, download the Environmental Sensors Guide from Raritan website's **PX2 Support Files page** (<https://www.raritan.com/support/product/px2/px2-support-files>).

The PXE supports a maximum of 32 sensors or actuators.

For information on connecting DPX packages, see **DPX Sensor Packages** (on page 18).

For information on connecting DPX2 packages, see **DPX2 Sensor Packages** (on page 23).

For information on connecting DX packages, see **DX Sensor Packages** (on page 25).

In This Chapter

DPX Sensor Packages	18
DPX2 Sensor Packages	23
DX Sensor Packages	25

DPX Sensor Packages

Most DPX sensor packages come with a factory-installed sensor cable, whose sensor connector is RJ-12.

The supported maximum distance is 98 feet (30 m). See **Supported Maximum DPX Sensor Distances** (on page 22) for further illustrations.

► **To connect a DPX sensor package with a factory-installed sensor cable:**

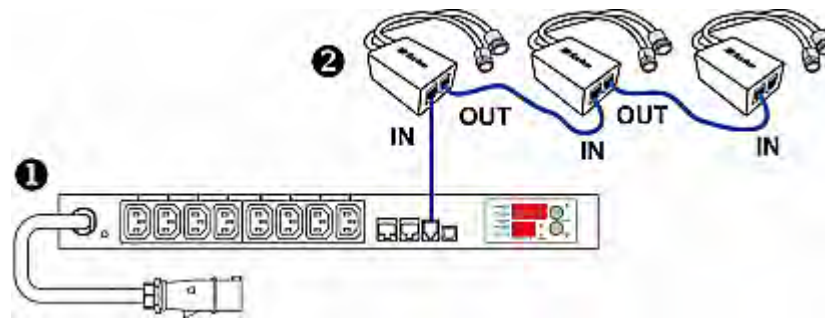
Plug the RJ-12 connector of the DPX sensor cable into the RJ-12 SENSOR port on the PXE.

► **To connect a DPX differential air pressure sensor:**

1. Plug one end of a Raritan-provided phone cable into the IN port of a differential air pressure sensor.
2. Plug the other end of this phone cable into the RJ-12 SENSOR port on the PXE.

*Note: You can cascade multiple differential air pressure sensors using Raritan-provided phone cables. For details, see the Environmental Sensors Guide, which is available from Raritan website's **PX2 Support Files** page*

(<https://www.raritan.com/support/product/px2/px2-support-files>). When cascading air pressure sensors, remember that a SENSOR port supports a maximum of 32 sensors.



1	The PXE device
2	Raritan differential air pressure sensor

Using an Optional Sensor Hub

A Raritan sensor hub increases the number of connected DPX environmental sensors per SENSOR port. Make sure the total number of sensors connected to a SENSOR port does not exceed 32.

This hub supports DPX sensor packages only. Do NOT connect DPX2 or DX to the hub.

► To connect DPX sensor packages via an optional sensor hub:

1. Connect a Raritan sensor hub to the PXE device.
 - a. Plug one end of the Raritan-provided phone cable (4-wire, 6-pin, RJ-12) into the IN port (Port 1) of the hub.
 - b. Plug the other end of the phone cable into the PDU's RJ-12 SENSOR port.
2. Connect DPX sensor packages to any of the four OUT ports on the hub.

Raritan sensor hubs CANNOT be cascaded so at most a sensor hub can be connected to each SENSOR port on the PXE device. This diagram illustrates a configuration with a sensor hub connected.



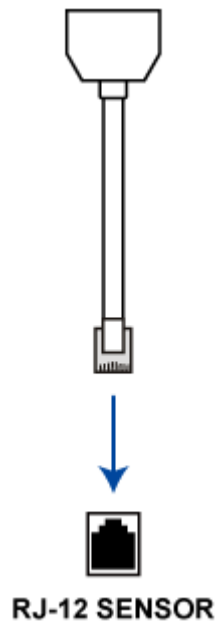
1	The PXE device
2	Raritan-provided phone cable
3	Raritan sensor hub
4	DPX sensor packages

Using a Raritan Y cable

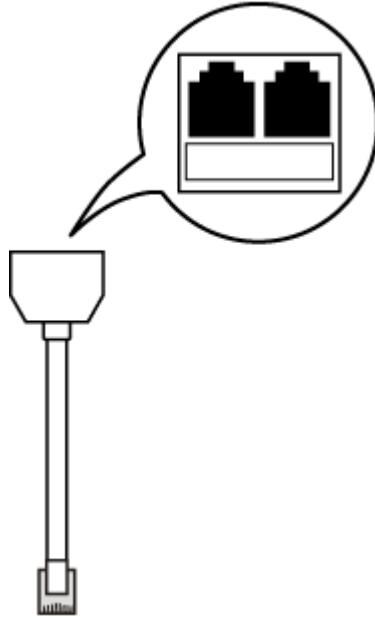
A Raritan Y cable doubles the number of connected environmental sensors per SENSOR port. It supports DPX sensor packages only. Do NOT connect DPX2 or DX.

► **To connect DPX sensor packages via a Raritan Y cable:**

1. Plug the connector of the Y cable directly into the PDU's RJ-12 SENSOR port.



2. A Y cable has two RJ-12 sensor ports. Connect DPX sensor packages to the Y cable's sensor ports.



3. Repeat the above steps if there are additional SENSOR ports on your PXE.

Supported Maximum DPX Sensor Distances

A maximum connection distance of 98' (30 m) is supported when connecting the following DPX packages to the PXE. This maximum includes the 16' (5 m) sensor cable length:

- DPX-CC2-TR
- DPX-T1
- DPX-T3H1
- DPX-AF1
- DPX-T1DP1

The following configurations were tested when connecting DPX sensor packages to a PXE via a sensor hub:

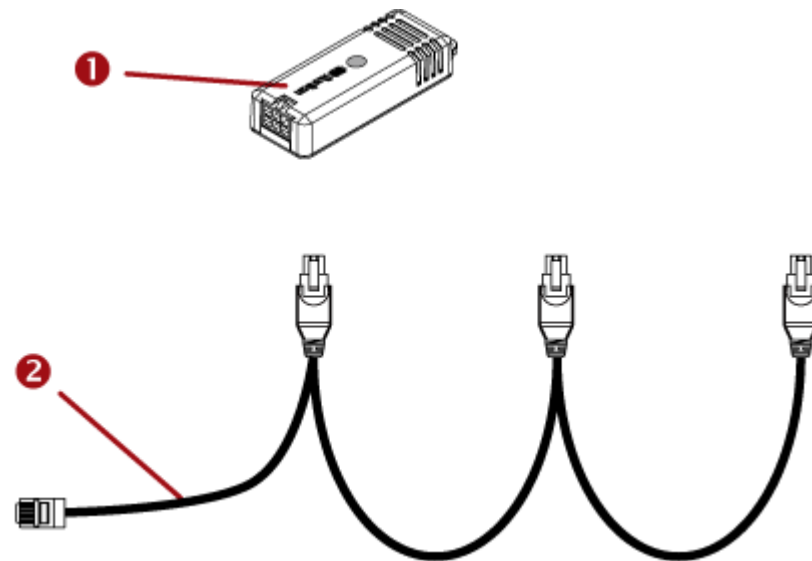
PXE → 16' (5 m) cable → 1 sensor hub → 16' (5 m) cable → Up to 4 DPX-T3H1 sensors

PXE	→	50' (15 m) cable	→	1 sensor hub	→	16' (5 m) cable	→	Up to 4 DPX-T3H1 sensors
PXE	→	82' (25 m) cable	→	1 sensor hub	→	16' (5 m) cable	→	Up to 4 DPX-T3H1 sensors

DPX2 Sensor Packages

A DPX2 sensor cable is shipped with a DPX2 sensor package. This cable has one RJ-12 connector and several (one to three) head connectors. You need to manually connect DPX2 sensors to the sensor cable.

For more information on DPX2, download the Environmental Sensors Guide from Raritan website's **PX2 Support Files page** (<https://www.raritan.com/support/product/px2/px2-support-files>).



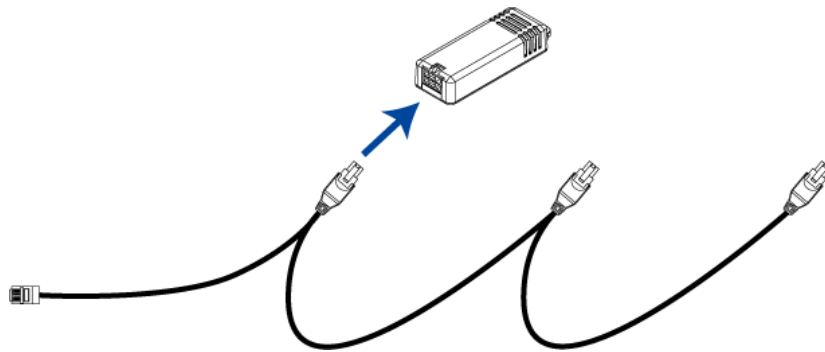
Number	Item
1	DPX2 sensor
2	DPX2 sensor cable with one RJ-45 connector and three head connectors

The following procedure illustrates a DPX2 sensor cable with three head connectors. Your sensor cable may have less head connectors.

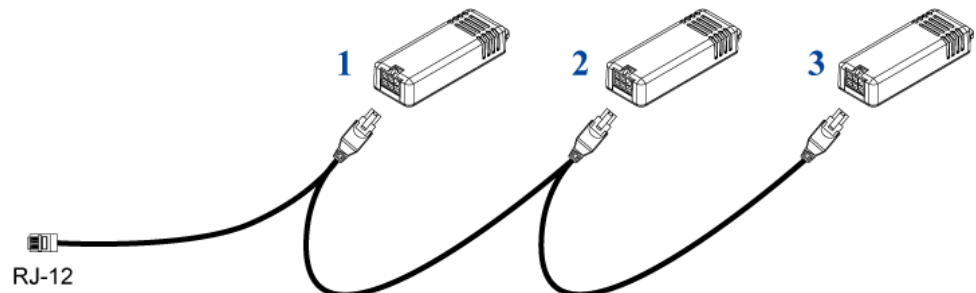
Warning: If there are free head connectors available between a DPX2 sensor cable's RJ-12 connector and the final DPX2 sensor attached, some or all sensors connected to the same cable do NOT work properly. Therefore, always occupy all head connectors prior to the final sensor with a DPX2 sensor.

► **To connect a DPX2 sensor package to the PXE:**

1. Connect a DPX2 sensor to the first head connector of the DPX2 sensor cable.



2. Connect remaining DPX2 sensors to the second head connector, and then to the third head connector.



Tip: If the number of sensors you are connecting is less than the number of head connectors on your sensor cable, connect them to the first one or first two head connectors to ensure that there are NO free head connectors available prior to the final DPX2 sensor attached.

3. Plug the RJ-12 connector of the DPX2 sensor cable into the RJ-12 SENSOR port on the PXE.

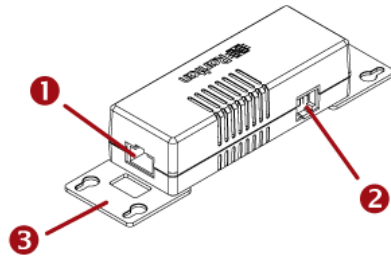
DX Sensor Packages

Most DX sensor packages contain terminals for connecting detectors or actuators. For information on connecting actuators or detectors to DX terminals, download the Environmental Sensors Guide from Raritan website's **PX2 Support Files page** (<https://www.raritan.com/support/product/px2/px2-support-files>).

You can cascade up to 12 DX sensor packages.

When cascading DX, remember that the PXE only supports a maximum of 32 sensors or actuators. If there are more than 32 sensors and/or actuators connected, the PXE ignores those sensors and/or actuators following the 32nd one. For example, if you cascade 12 DX packages, and each package contains 3 functions (a function is a sensor or actuator), because the total 36 ($12 \times 3 = 36$) exceeds 32 by 4, the PXE ignores the last 4 functions.

*Tip: To manage the last 4 functions, you can release 4 sensors or actuators that have been under management, and then manually bring the last 4 functions into management. See **Unmanaging Environmental Sensors or Actuators** (on page 171) and **Managing Environmental Sensors or Actuators** (on page 160).*



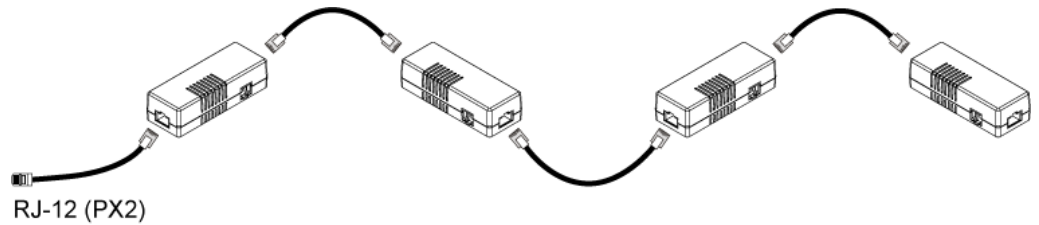
Numbers	Components
①	RJ-45 ports, each of which is located on either end of a DX sensor package.
②	RJ-12 port, which is reserved for future use.
③	Removable rackmount brackets.

► Connect DX to the PXE:

1. Connect an RJ-12 to RJ-45 adapter cable to a DX sensor package.
 - Connect the adapter's RJ-45 connector to either RJ-45 port of the DX sensor package.
2. If you want to cascade DX packages, get another standard network cable and then:

- a. Plug one end of the cable into the remaining RJ-45 port on the prior DX package.
- b. Plug the other end into either RJ-45 port on an additional DX package.

Repeat the same steps to cascade more DX packages.



3. Connect the first DX sensor package to the PXE.
 - Plug the adapter cable's RJ-12 connector into the RJ-12 SENSOR port of the PDU.

Chapter 5 Using the PDU

This chapter explains how to use the PXE device, including:

- Description of the LEDs and ports on the PDU
- How to use the front panel display
- How the overcurrent protector (a circuit breaker) works

In This Chapter

Panel Components	27
Circuit Breakers.....	32

Panel Components

The PXE comes in Zero U, 1U, and 2U sizes. All types of models come with the following components on the outer panels.

- Power cord
- Outlets
- Connection ports
- LED display
- Reset button

Power Cord

Most of Raritan PDUs come with an installed power cord, which is ready to be plugged into an appropriate receptacle for receiving electricity. Such devices cannot be rewired by the user.

Connect each PXE to an appropriately rated branch circuit. See the label or nameplate affixed to your PXE for appropriate input ratings or range of ratings.

There is no power switch on the PXE device. To power cycle the PDU, unplug it from the branch circuit, wait 10 seconds and then plug it back in.

Outlets

The total number of outlets varies from model to model.

These PDUs are NOT outlet-switching capable models so all outlets are always in the ON state.

Outlet LEDs are not available.

Connection Ports

There are 4 ports located on the front panel of the PDU as shown below.



The table below explains the function of each port.

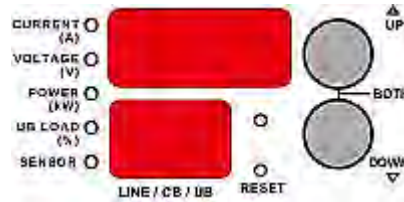
Port	Used for...
USB-B	Establishing a USB connection between a computer and the PXE device. This port can be used for disaster recovery of the PXE device. Contact Raritan Technical Support for instructions.
RS-485	Reserved for a future release.
*SENSOR	Connection to Raritan's environmental sensors. A sensor hub is required if you want to connect more than one DPX sensor package.
ETHERNET	Connecting the PXE device to your company's network: Connect a standard Cat5e/6 UTP cable to this port and connect the other end to your network. This connection is necessary to administer or access the PXE device remotely using the web interface. There are two small LEDs adjacent to the port: <ul style="list-style-type: none"> Green indicates a physical link and activity. Yellow indicates communications at 10/100 BaseT speeds.

* The SENSOR port on a PXE PDU is RJ-12.

LED Display

The LED display is located on the side where outlets are available.

These diagrams show the LED display on different types of PDUs. Note that the LED display might slightly vary according to the PDU you purchased.



The LED display consists of:

- A row displaying three digits
- A row displaying two digits
- Up and Down buttons
- Five LEDs for measurement units

Note: When a PXE device powers up, it proceeds with the power-on self test and software loading for a few moments. When the software has completed loading, the LED display illuminates.

Three-Digit Row

The three-digit row shows the readings for the selected component. Values that may appear include:

- Active power or unbalanced load of the inlet
- Current, voltage, or active power of the selected line

Note: L1 voltage refers to the L1-L2 or L1-N voltage, L2 voltage refers to the L2-L3 or L2-N voltage, and L3 voltage refers to the L3-L1 or L3-N voltage.

- The text “FuP,” which indicates that the **F**irmware **uP**grade is being performed

LEDs for Measurement Units

Five small LED indicators are on the LED display: four measurement units LEDs and one Sensor LED.

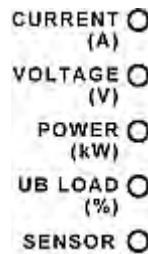
The measurement units vary according to the readings that appear in the three-digit row. They are:

- Amp (A) for current
- Volt (V) for voltage
- Kilowatt (kW) for active power
- Percentage (%) of the unbalanced load

One of the measurement unit LEDs will be lit to indicate the unit for the value currently shown in the three-digit row.

The Sensor LED is lit only when PXE detects the physical connection of any environmental sensor.

The five LEDs look similar to this diagram but may slightly vary according to the model you purchased.



Two-Digit Row

The two-digit row shows the number of the currently selected line or inlet. Values that may appear include:

- L_x: This indicates the selected line, where _x is the line number. For example, L₂ represents Line 2.

Note: For a single-phase model, L1 current represents the Unit Current.

- AP: This indicates the selected inlet's active power.

Automatic Mode

When left alone, the LED display cycles through the line readings at intervals of 10 seconds, as available for your PXE. This is the Automatic Mode.

Manual Mode

You can press the Up or Down button to enter the Manual Mode so that a particular line or the inlet's active power is selected to show specific readings.

► To operate the LED display:

1. Press the Up or Down button until the desired line's number is selected in the two-digit row. Or you can press either button to select the inlet's active power, which is shown as *AP*.
 - Pressing the Δ (UP) button moves up one selection.
 - Pressing the ∇ (DOWN) button moves down one selection.
2. When selecting a line, you can press the Up and Down buttons simultaneously to switch between voltage, active power and current readings.
 - Current of the selected component is shown in the three-digit row. Simultaneously the CURRENT(A) LED is lit. See **LEDs for Measurement Units** (on page 30).
 - When the voltage is displayed, the VOLTAGE(V) LED is lit. It is displayed for about five seconds, after which the current reading re-appears.
 - When the active power is displayed, the POWER(kW) LED is lit. It is displayed for about five seconds, after which the current reading re-appears.
3. When selecting the inlet (AP), it displays the active power reading.
 - When the active power is displayed, the POWER(kW) LED is lit.

Note: The LED display returns to the Automatic Mode after 20 seconds elapse since the last time any button was pressed.

Reset Button

The reset button is located inside the small hole near the display panel on the PDU.

Pressing this reset button restarts the PXE device's software without any loss of power to outlets. This operation also power cycles the LED display, causing the LED display to go blank and then return to normal.

The following image indicates the locations of the reset button on the PXE device.



Circuit Breakers

PXE models rated over 20A (North American) or 16A (international) contain overcurrent protectors, which are usually branch circuit breakers. These circuit breakers automatically trip (disconnect power) when the current flowing through the circuit breaker exceeds its rating.

When a circuit breaker trips, power flow ceases to all outlets connected to it. You must manually reset the circuit breaker so that affected outlets can resume normal operation.

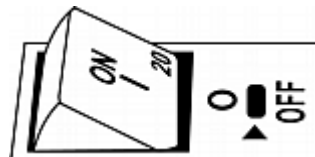
Depending on the model you purchased, the circuit breaker may use a button- or handle-reset mechanism.

Resetting the Button-Type Circuit Breaker

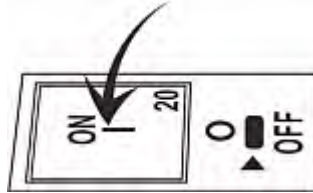
Your button-type circuit breakers may look slightly different from the images shown in this section, but the reset procedure remains the same.

► **To reset the button-type breakers:**

1. Locate the breaker whose ON button is up, indicating that the breaker has tripped.



2. Examine your PXE device and the connected equipment to remove or resolve the cause that results in the overload or short circuit. **This step is required, or you cannot proceed with the next step.**
3. Press the ON button until it is completely down.

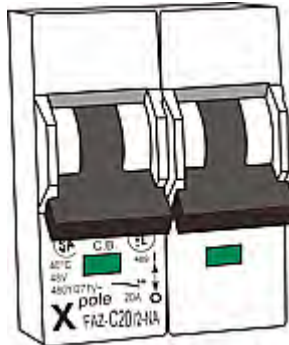


Resetting the Handle-Type Circuit Breaker

Your handle-type circuit breakers may look slightly different from the images shown in this section, but the reset procedure remains the same.

► **To reset the handle-type breakers:**

1. Lift the hinged cover over the breaker.
2. Check if the colorful rectangle or triangle below the operating handle is GREEN, indicating that the breaker has tripped.



3. Examine your PXE device and the connected equipment to remove or resolve the cause that results in the overload or short circuit. **This step is required, or you cannot proceed with the next step.**

4. Pull up the operating handle until the colorful rectangle or triangle turns RED.



Chapter 6 Using the Web Interface

This chapter explains how to use the web interface to administer a PXE.

In This Chapter

Supported Web Browsers.....	35
Logging in to the Web Interface	36
Logout.....	39
Introduction to the Web Interface	40
Viewing the Dashboard	51
Device Management.....	53
User Management	78
Setting Up Roles.....	83
Forcing HTTPS Encryption.....	86
Access Security Control	86
Setting Up an SSL Certificate.....	101
Setting Up External Authentication.....	106
Outlet Management	114
Inlet and Overcurrent Protector Management	115
Setting Power Thresholds	119
Event Rules and Actions	121
Managing Event Logging.....	151
Viewing Connected Users	152
Monitoring Server Accessibility.....	153
Environmental Sensors and Actuators	156
Bulk Configuration	173
Backup and Restore of PXE Device Settings.....	176
Network Diagnostics.....	177
Downloading Diagnostic Information.....	178
Firmware Upgrade.....	178
Accessing the Help.....	182

Supported Web Browsers

The following web browsers can be used to access the PXE web interface:

- Internet Explorer® 8, 9, 10 and 11
- Firefox® 25 and later
- Safari® 5.x (MacOS Lion)
- Google® Chrome® 32 and later
- Android 4.2 and later
- IOS 7.0

Logging in to the Web Interface

To log in to the web interface, you must enter a user name and password. The first time you log in to the PXE, use the default user name (admin) and password (raritan). You are then prompted to change the password for security purposes.

Exception: If you already changed the password for the admin account, use the new password instead for login, and the PXE will NOT prompt you to change the password.

After successfully logging in, you can create user profiles for your other users. These profiles define their login names and passwords. See **Creating a User Profile** (on page 78).

Login

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 PXE.



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.

A screenshot of a web browser window displaying a "Login" page. The page has a light blue background. At the top left is a small icon of a person and the word "Login". Below this are two text input fields: "User Name:" and "Password:". At the bottom of the form are two buttons: "Login" and "Clear".

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.

- 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.

- Click Login or press Enter. The PXE page opens.

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

The screenshot displays the Raritan iPX IPDU web interface. The top navigation bar includes links for User Management, Device Settings, and Maintenance. The left sidebar shows a tree view with options like Dashboard, my PX (192.168.04.47), my IPDU II, Outlets, Overcurrent Protection, and Peripheral Devices. The main content area is titled 'Dashboard' and contains several sections:

- Select:** A dropdown menu currently showing '0.0 A / 24.0 A'.
- Power Metrics:**
 - RMS Current: 0.0 A / 24.0 A
 - RMS Voltage: 111 V
 - Active Power: 2 W
 - Apparent Power: 4 VA
 - Power Factor: 1.00
 - Active Energy: 11870 Wh
- Alerted Sensors:** A table with columns for Sensor, Reading, and State. It shows 'Tamper Detector 1' with a reading of 'alarmed'.
- Alarms:** A table with columns for Name, Reason, First Appearance, Last Appearance, Count, and More Alerts. It is currently empty.
- Peripheral Devices (7 managed, 0 unmanaged):** A table with columns for Name, Position, Reading, and State.

Name	Position	Reading	State
Humidity 1	Port 1	73 %	normal
Humidity 2	Port 1	74 %	normal
DewPt 1	Port 1, Chain Po		normal
Presence Detector 1	Port 1, Chain Po		normal
Tamper Detector 1	Port 1, Chain Po		normal
Temperature 1	Port 1	25.2 °C	normal
Temperature 2	Port 1	24.6 °C	normal

The bottom status bar shows the user 'my PX (192.168.04.47)' as 'Administrator (admin)' and the time '01/04/10 24 PM'.

Changing Your Password

Normal users can change their own passwords if they have the Change Own Password permission. See **Setting Up Roles** (on page 83).

If you are the administrator (admin), the PXE web interface automatically prompts you to change the password if this is your first time to log in to the PXE. If you have the Administrator Privileges, you can change other users' passwords, as well. See **Modifying a User Profile** (on page 81).

► **To change your password:**

1. Choose User Management > Change Password. The Change User Password dialog appears.

A screenshot of a web-based dialog box titled "Change User 'admin' Password". The dialog has a light blue border and a close button (X) in the top right corner. It contains three text input fields: "Old Password:" with an empty field, "Password:" with the placeholder text "Enter new password", and "Confirm Password:" with the placeholder text "Repeat new password". At the bottom right of the dialog are two buttons: "OK" and "Cancel".

2. Type the current password in the Old Password field.
3. Type your new password in the Password and Confirm Password fields. The password can be 4 to 64 characters long. It is case sensitive.
4. Click OK.

*Tip: If you have the Administrator Privileges, you can change other users' passwords. See **Modifying a User Profile** (on page 81).*

Remembering User Names and Passwords

As of release 3.0.0, the PXE supports the password manager of Microsoft Internet Explorer® and Mozilla Firefox®.

You can choose to save the user name and password used to log in to the PXE when these two browsers ask whether you want to remember them. If yes, next time your user name and password can be automatically completed at login.



For information on how to activate a browser's password manager, see the user documentation accompanying Internet Explorer or Firefox.

The PXE does NOT support other browser password managers.

Logout

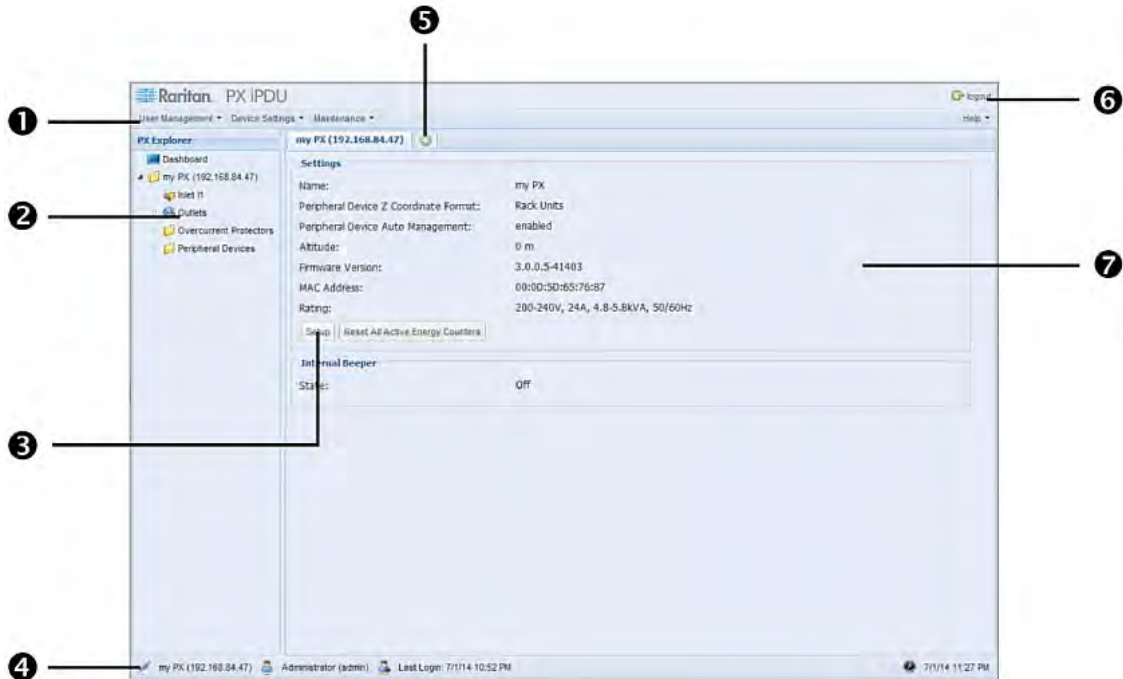
After finishing your tasks with the PXE, you should log out to prevent others from accessing the web interface.

► **To log out of the web interface:**

1. Do one of these:
 - Click "logout" on the top-right corner of the web interface.
The image shows a green circular icon with a white 'G' inside, followed by the word 'logout' in a sans-serif font.
 - Close the web browser by clicking the Close button () on the top-right corner of the browser.
 - Close the web browser by choosing File > Close, or File > Exit. The command varies according to the version of the browser you use.
 - Choose the Refresh command or click the Refresh button on the web browser.
2. Either the login page opens or the browser is closed, depending on your choice in the previous step.

Introduction to the Web Interface

The web interface provides two panes, a menu bar, a status bar, an Add Page icon, and a logout button throughout every page.



Number	Web interface element
1	Menus
2	PX Explorer pane
3	Setup button*
4	Status bar
5	Add Page icon
6	Logout button
7	Data pane

* The Setup button is not available on some pages, such as the *Dashboard* page.

For detailed information about these web interface elements, see the sections that follow.

Menus

There is a menu bar across the top of the page. You can click any menu to select the desired menu item from the drop-down list.

Four menus are available for managing different tasks or showing information.

- **User Management** contains menu items for managing user profiles, permissions (roles), and password.
- **Device Settings** deals with device-related settings, such as the device name, network settings, security settings, and system time.
- **Maintenance** provides tools that are helpful for maintaining the PXE, such as the event log, hardware information, firmware upgrade and so on.
- **Help** displays information regarding the firmware and all open source packages embedded on the PXE. In addition, you can access the online help from this menu.

PX Explorer Pane

The hierarchical tree to the left displays the PXE device you are accessing as well as all physical components embedded on or connected to this product, such as inlets, outlets, and environmental sensors. In addition, an icon named Dashboard is available for displaying the PDU summary information.

The tree structure comprises three hierarchical levels.

First level	Second level	Third level
Dashboard	None	None
PDU folder*	Inlet I1	None
	Outlets folder	1 to n**
	Overcurrent Protectors folder	C1 to Cn**
	Peripheral Devices folder	A list of connected environmental sensors

* The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).

** n represents the final number of that component.

► To navigate through the tree:

1. To expand any folders, see **Expanding the Tree** (on page 42).

2. To show any tree item's data, click on that item. See **Add Page Icon** (on page 45).

Expanding the Tree

The icons representing all components implemented on or connected to the PXE device are expanded by default. If they are hidden, you may expand the tree manually to show all component icons.

► To expand the tree:

1. By default, the PDU folder has been expanded.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

If it is not expanded, click the white arrow ► prior to the folder icon, or double-click the folder. The arrow then turns into a black, gradient arrow ▲, and icons of components or component groups appear below the PDU folder.

2. To expand any component group at the second level, click the white arrow ► prior to the folder icon, or double-click the folder.

The arrow then turns into a black, gradient arrow ▲, and icons representing individual components appear below the group folder.

Repeat Step 2 for other component groups you want to expand. The expanded tree looks similar to this image.



Collapsing the Tree

You can collapse the whole tree structure or a specific component group to hide all or partial tree items.

► To collapse the whole tree:

- Click the black, gradient arrow ▲ prior to the PDU folder icon, or double-click the folder.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

The arrow then turns into a white arrow ▾, and all items below the PDU folder disappear.

► To hide some tree items:

- Click the black, gradient arrow ▲ prior to the component group folder that you want to collapse, or double-click the folder.

The arrow then turns into a white arrow ▾, and all items below the folder disappear.

- Repeat Step 1 for other component groups you want to collapse.

Adjusting the Pane

You can change the width of the pane to make the area larger or smaller.

► To adjust the pane's width:

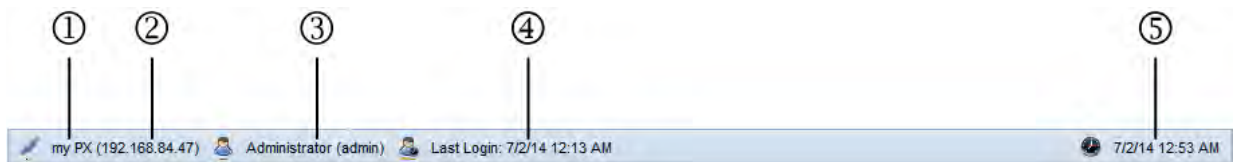
- Move the mouse pointer to the right border of the PX Explorer pane.
- When the mouse pointer turns into a two-way arrow, drag the border horizontally to widen or shrink the pane.

Setup Button

The Setup button is available for most tree items. It triggers a setup dialog where you can change settings for the selected tree item.

Status Bar

The status bar shows five pieces of information.




- Device name:

This is the name assigned to the PXE device. The default is "my PX." See **Naming the PDU** (on page 55).

2. *IP address:*

The numbers enclosed in parentheses is the IP address assigned to the PXE device. See **Initial Network Configuration via CLI** (on page 12) or **Modifying Network Settings** (on page 56).

Tip: The presence of the device name and IP address in the status bar indicates the connection to the PXE device. If the connection is lost, it shows "  disconnected " instead.

3. *Login name:*

This is the user name you used to log in to the web interface.

4. *Last login time:*

This shows the date and time this login name was used to log in to this PXE device last time.

When the mouse pointer hovers over the last login time, detailed information about the last login is displayed, including the access client and IP address.

For the login via a local connection (serial RS-232 or USB), <local> is displayed instead of an IP address.

There are different types of access clients:

- Web GUI: Refers to the PXE web interface.
- CLI: Refers to the command line interface (CLI).


The information in parentheses following "CLI" indicates how this user is connected to the CLI.

- *Serial*: Represents the local connection (serial RS-232 or USB).
- *SSH*: Represents the SSH connection.
- *Telnet*: Represents the Telnet connection.


5. *System date and time:*

Current date, year, and time are displayed to the right of the bar. If positioning the mouse pointer over the system date and time, the time zone information is also displayed.

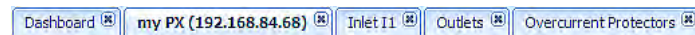
Add Page Icon

The Add Page icon , located on the top of the data pane, lets you open data pages of multiple tree items without overriding any opened page.

► To open new data pages:



1. Click the Add Page icon . A new tab along with a blank data page appears.
2. Click a tree item whose data page you want to open. The data of the selected tree item is then displayed on the blank page.
3. To open more data pages, repeat the above steps. All tabs representing opened pages are shown across the top of the page.


The following diagram shows a multi-tab example.



4. With multiple pages opened, you can take these actions:

- To switch to one of the opened data pages, click the corresponding tab.

If there are too many tabs to be all shown, two arrows ( and ) appear at the left and right borders of the pane. Click either arrow to navigate through all tabs.

- To close any data page, click the Close button () on the corresponding tab.

Logout Button

Click the logout button when you want to log out of the web interface.



Data Pane

The right pane shows the data page of the selected tree item. The data page includes the item's current status, settings and a Setup button (if available).

All tabs above the pane represent the opened data pages. The highlighted tab indicates the current selection.

You can change the width of the pane to make the area larger or smaller.

► To adjust the pane's width:

1. Move the mouse pointer to the left border of the right pane.

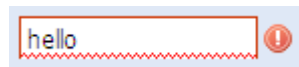
2. When the mouse pointer turns into a two-way arrow, drag the border horizontally to widen or shrink the pane.

More Information

This section explains additional web interface elements or operations that are useful.

Warning Icon

If the value you entered in a specific field is invalid, a red warning icon appears to the right and the field in question is surrounded by a red frame as shown in this illustration.



When this occurs, position your mouse pointer over the warning icon to view the reason and modify the entered value accordingly.

The Yellow- or Red-Highlighted Sensors

When a numeric sensor's reading crosses any upper or lower threshold, the background color of the whole row turns to yellow or red for alerting users.

For a discrete (on/off) sensor, the row changes the background color when the sensor enters the abnormal state.

See the table for the meaning of each color:

Color	State
White	<p>The background is white in one of the following scenarios:</p> <ul style="list-style-type: none"> For a numeric sensor, no thresholds have been enabled. If any thresholds have been enabled for a numeric sensor, the sensor reading falls between the lower and upper warning thresholds. For a discrete (on/off) sensor, the sensor state is normal. The sensor is unavailable.
Yellow	<p>The reading drops below the lower warning threshold or rises above the upper warning threshold.</p>

Color	State
Red	<p>The meaning of the red color varies depending on the sensor type:</p> <ul style="list-style-type: none"> For a numeric sensor, this color indicates the reading drops below the lower critical threshold or rises above the upper critical threshold. For a discrete (on/off) sensor, this color indicates the sensor is in the "alarmed" state.

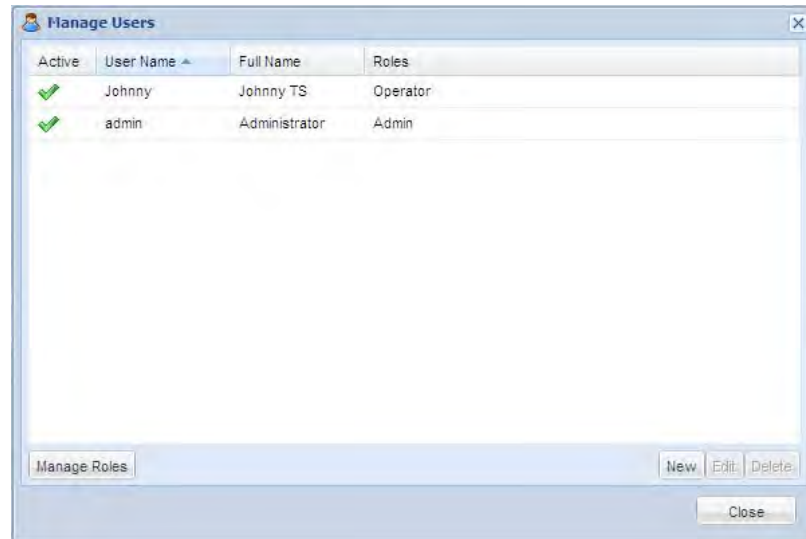
To find the exact meaning of the alert, read the information shown in the State (or Status) column:

- below lower critical: The numeric sensor's reading drops below the lower critical threshold.
- below lower warning: The numeric sensor's reading drops below the lower warning threshold.
- above upper critical: The numeric sensor's reading reaches or exceeds the upper critical threshold.
- above upper warning: The numeric sensor's reading reaches or exceeds the upper warning threshold.
- alarmed: The discrete sensor is NOT in the normal state.

For information on the thresholds, see **Setting Power Thresholds** (on page 119) and **Configuring Environmental Sensors or Actuators** (on page 162).

Changing the View of a List

Some dialogs and data pages contain a list or table, such as the Manage Users dialog shown below. You may change the number of displayed columns or re-sort the list for better viewing the data. Note the column or sorting changes are not saved when quitting the dialog or data page. Next time when the dialog or page re-opens, the list returns to the default view.




Note: Not all dialogs support the sorting or column change functions.

Changing the Column

You can hide some columns of a list or table, or adjust a specific column's width.

► To change displayed columns:

1. Hover your mouse pointer over any column header. A black triangle  appears to the far right of this column header.
2. Click the black triangle, and a drop-down menu appears.
3. Point to Columns. A submenu showing all columns appears.
4. Click any column you want to deselect or select.
 - To hide a column, have its checkbox deselected.
 - To show a column, have its checkbox selected.

► To change the column width:

1. Hover the mouse pointer to the right border of the desired column.

2. When the mouse pointer turns to a two-way arrow, drag the border horizontally to widen or shrink the column.

Changing the Sorting

By default, a list or table is sorted against the first column in the ascending order. You can re-sort the list in a reverse order or against a different column.

► **To re-sort the list by doing either of the following:**

- Click the column header against which you want to sort the list.
 - a. The first click sorts the list in the ascending order, indicated by a blue upward-pointing triangle ▲.
 - b. The second click reverses the sorting to the descending order, indicated by a blue downward-pointing triangle ▼.
- Select a sorting command from the column menu.
 - a. Hover your mouse pointer over the column header against which you want to sort the list. A black triangle ▼ appears to the far right of this column header.
 - b. Click the black triangle, and a drop-down menu appears.
 - c. Select Sort Ascending or Sort Descending.

The newly selected column header is marked with the upward- or downward-pointing triangle.

Resizing a Dialog

Most dialogs cannot be resized except for a few ones (such as the Event Log dialog), which can be resized to display more information at a time.

► **To resize a dialog:**

1. Hover your mouse pointer over any border of the dialog.
2. When the mouse pointer turns to a double-headed arrow, drag the border vertically or horizontally to make the dialog bigger or smaller.

Browser-Defined Shortcut Menu

A shortcut menu, which is built in the web browser, may appear when right-clicking anywhere in the PXE web interface.

The shortcut menu functions are defined by the browser. For example, the Back command on the Internet Explorer® (IE) shortcut menu works the same as the Back button in the IE browser. Both of these functions take you to the previous page.

For information on each shortcut menu command or item, see the online help or documentation accompanying your web browser.

Below is the illustration of the IE browser's shortcut menu. Available menu commands or items may slightly differ based on your web browser version.



Viewing the Dashboard

When you log in to the web interface, the Dashboard page is displayed by default. This page provides an overview of the PXE device's status.


The page is divided into various sections according to the component type, such as inlet and peripheral devices.

*Note: If a sensor row is colored, it means the sensor reading already crosses one of the thresholds or the sensor enters the alarmed state. See **The Yellow- or Red-Highlighted Sensors** (on page 46).*


After clicking any other icon in the hierarchical tree, the Dashboard page is overridden. To return to the Dashboard page, click the Dashboard icon.

When the Dashboard page is opened, you can do the following to uncover or hide specific data.

► To collapse any section:

1. Locate the section you want to collapse.
2. Click the upward arrow  prior to the section title. The data specific to the section is hidden.

► To expand a collapsed section:

1. Locate the section you want to expand.
2. Click the downward arrow  prior to the section title. The data specific to the section appears.

Alerted Sensors

One of the sections on the Dashboard page only displays critical or warning conditions detected by internal or external sensors so that you are alerted to take actions. This section is labeled Alerted Sensors.

The Alerted Sensors section lists any or all of the following:

- Any sensor that enters the warning or critical range if the thresholds have been enabled
- Discrete (on/off) sensors that enter the alarmed state

Alerted Sensors		
Sensor	Reading	State
Inlet I1 L1-L2 RMS Voltage	427 V	above upper warning
Temperature 1	20.7 °C	below lower warning
Temperature 2	20.2 °C	below lower warning
On/Off 1		alarmed

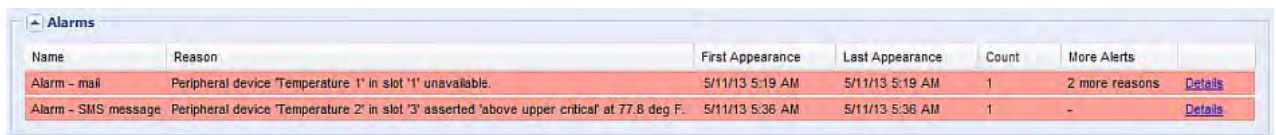
For the background color meanings in this section, see **The Yellow- or Red-Highlighted Sensors** (on page 46).

Alarms List

You can create event rules that request users to acknowledge certain alerts, and resend alert notifications if the acknowledgment action is not taken yet. See **Creating Actions** (on page 122).

If any of these alerts has not been acknowledged since its occurrence, the Alarms section on the dashboard shows this alert until it is acknowledged. All alerts on the Alarms section are highlighted in red.

Below is the illustration of the alarms list.



Name	Reason	First Appearance	Last Appearance	Count	More Alerts	
Alarm - mail	Peripheral device 'Temperature 1' in slot '1' unavailable.	5/11/13 5:19 AM	5/11/13 5:19 AM	1	2 more reasons	Details
Alarm - SMS message	Peripheral device 'Temperature 2' in slot '3' asserted 'above upper critical' at 77.8 deg F.	5/11/13 5:36 AM	5/11/13 5:36 AM	1	-	Details

The following table explains each column of the alarms list.

Column	Description
Name	The customized name of the Alarm action.
Reason	The first event that triggers the alert.
First Appearance	The date and time when the event indicated in the Reason column occurred for the first time.
Last Appearance	The date and time when the event indicated in the Reason column occurred for the last time.
Count	The number of times the event indicated in the Reason column has occurred.
More Alerts	<ul style="list-style-type: none"> A dash is displayed when there is only one event triggering this alert. If there are other types of events triggering the same alert, the total number of these additional reasons is displayed. You can double click that alarm to view a list of all events that have occurred.
Details	Click "Details" to trigger a dialog showing both the alarm details and the acknowledgment button.

Any alarm displayed in the Alarms section can be manually acknowledged.

► **To acknowledge an alarm:**

1. Double click the alarm that you want to acknowledge, or click Details in the final column. A dialog appears.
2. Click Acknowledge Alarm to acknowledge it. That alarm then disappears from the Alarms section.

*Tip: When browsing through all events, you can sort the list of all events shown in the dialog by clicking the header row. See **Changing the View of a List** (on page 48).*

Device Management

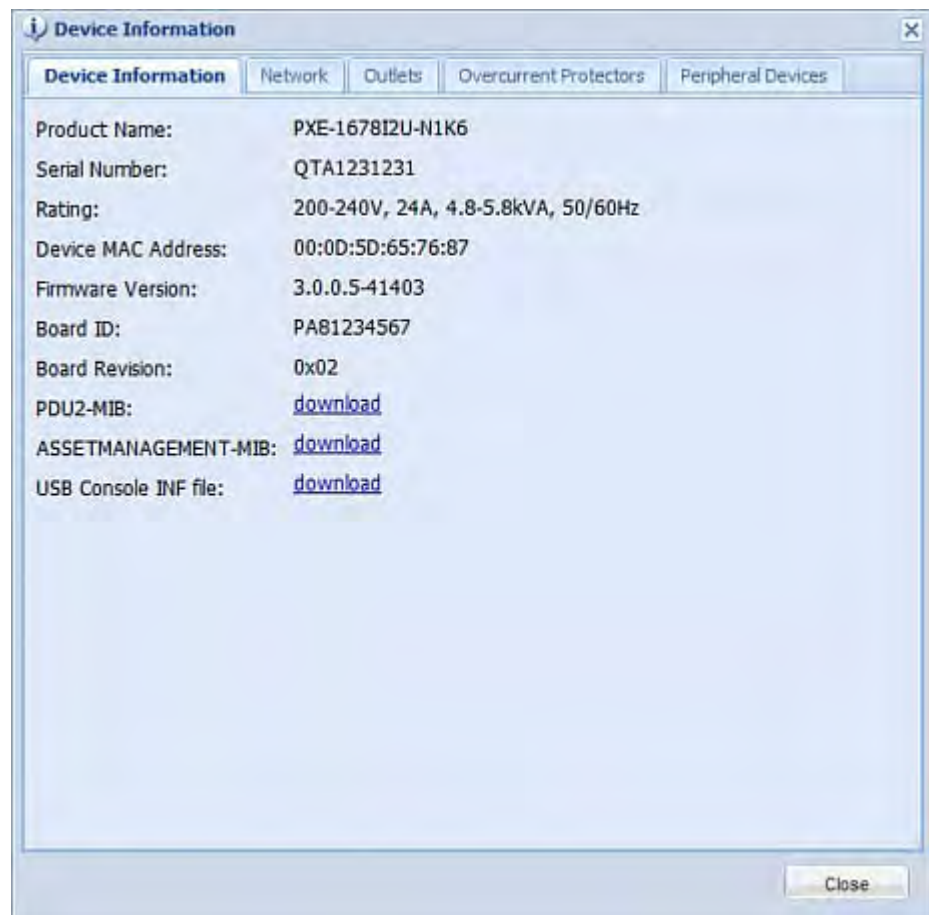
Using the web interface, you can retrieve basic hardware and software information, give the PXE a new device name, set the system date and time, and modify network settings that were entered during the initial configuration process.

Displaying PDU Information

To display information specific to the PXE device that you are using, such as inlet or outlet types, trigger the Device Information dialog.

► **To display the PDU-specific information:**

1. Choose Maintenance > Device Information. The Device Information dialog appears.



2. Click a tab to view type-specific information. The number of available tabs varies according to the model you purchased.

Tab	Data
Device Information	General PDU information, such as model name, serial number, firmware version, hardware revision, and so on.
Network	The PDU specific network information, such as the current networking mode, IPv4 and/or

Tab	Data
	IPv6 addresses and so on.
Outlets	Each outlet's receptacle type, operating voltage and rated current.
Controllers	Each outlet controller's serial number, board ID, firmware version and hardware version.
Inlets	Each inlet's plug type, rated voltage and current.
Overcurrent Protectors	Each overcurrent protector's type, rated current and the outlets that it protects.
Peripheral Devices	Serial numbers, model names and firmware-related information of connected external devices, such as environmental sensors.

3. Enlarge the dialog if necessary.
4. You can re-sort the list or change the columns displayed.
5. Click Close to quit the dialog.

Tip: The firmware version is also available by clicking the PDU folder in the PX Explorer pane.

Naming the PDU

The default name for PXE is *my PX*. You may give it a unique device name.

► To change the device name:

1. Click the PDU folder in the PX Explorer pane to open the PDU page.
2. Click Setup in the Settings section. The Pdu Setup dialog appears.
3. Type a new name in the Device Name field.
4. Click OK.

Modifying the Network Configuration

The network settings you can change via the web interface include wired, wireless, IPv4 and/or IPv6 settings.

Modifying the Network Interface Settings

The PXE device only supports the wired networking mode. The wireless networking mode is NOT supported.

The LAN interface speed and duplex mode were set during the initial configuration process.

By default, the LAN speed and duplex mode are set to "Auto" (automatic), which works in nearly all scenarios. You can change them if there are special local requirements.

► To modify the network interface settings:

1. Choose Device Settings > Network. The Network Configuration dialog appears.
2. The Interface Settings tab should have been selected. If not, click the Interface Settings tab.
3. In the Network Interface field, click the drop-down arrow, and select Wired from the list.
4. To change the LAN speed, click the drop-down arrow in the Speed field and select an option from the list.
 - Auto: System determines the optimum LAN speed through auto-negotiation.
 - 10 Mbit/s: The LAN speed is always 10 Mbps.
 - 100 Mbit/s: The LAN speed is always 100 Mbps.
5. To change the duplex mode, click the drop-down arrow in the Duplex field and select an option from the list.
 - Auto: The PXE selects the optimum transmission mode through auto-negotiation.
 - Full: Data is transmitted in both directions simultaneously.
 - Half: Data is transmitted in one direction (to or from the PXE device) at a time.
6. Click OK.

Tip: You can check the LAN status in the Current State field, including the speed and duplex mode.

Modifying Network Settings

The PXE was configured for network connectivity during the installation and configuration process. See **Configuring the PXE** (on page 9). If necessary, you can modify any network settings using the web interface.

Selecting the Internet Protocol

The PXE device supports two types of Internet protocols -- IPv4 and IPv6. You can enable either or both protocols. After enabling the desired Internet protocol(s), all but not limited to the following protocols will be compliant with the enabled Internet protocol(s):

- LDAP
- NTP
- SMTP
- SSH
- Telnet
- FTP
- SSL
- SNMP
- SysLog

► **To select the appropriate Internet Protocol:**

1. Choose Device Settings > Network. The Network Configuration dialog appears.
2. Click the IP Protocol tab.
3. Select one checkbox according to the Internet protocol(s) you want to enable:
 - IPv4 only: Enables IPv4 only on all interfaces. This is the default.
 - IPv6 only: Enables IPv6 only on all interfaces.
 - IPv4 and IPv6: Enables both IPv4 and IPv6 on all interfaces.
4. If you selected the "IPv4 and IPv6" checkbox in the previous step, you must determine which IP address is used when the DNS resolver returns both IPv4 and IPv6 addresses.
 - IPv4 Address: Use the IPv4 addresses returned by the DNS server.
 - IPv6 Address: Use the IPv6 addresses returned by the DNS server.
5. Click OK.

Modifying IPv4 Settings

You must enable the IPv4 protocol before you can modify the IPv4 network settings. See **Selecting the Internet Protocol** (on page 57).

► **To modify IPv4 settings:**

1. Choose Device Settings > Network. The Network Configuration dialog appears.

2. Click the IPv4 Settings tab.
3. In the IP Auto Configuration field, click the drop-down arrow, and select the desired option from the list.

Option	Description
DHCP	<p>To auto-configure the PXE, select DHCP.</p> <p>With DHCP selected, you can enter a preferred DHCP host name, which is optional. Type the host name in the Preferred Hostname field.</p> <p>The host name:</p> <ul style="list-style-type: none"> ▪ Consists of alphanumeric characters and/or hyphens ▪ Cannot begin or end with a hyphen ▪ Cannot contain more than 63 characters ▪ Cannot contain punctuation marks, spaces, and other symbols <p>Select the "Specify DNS server manually" checkbox if necessary. Then type the address of the primary DNS server in the Primary DNS Server field. The secondary DNS server and DNS suffix are optional.</p>
Static	<p>To manually assign an IP address, select Static, and enter the following information in the corresponding fields:</p> <ul style="list-style-type: none"> ▪ IP address ▪ Netmask ▪ Default gateway ▪ Primary DNS server ▪ Secondary DNS server (optional) ▪ DNS Suffix (optional) <p>If your local network contains two subnets and IP forwarding has been enabled, you can click Append to add static routes so that your PXE can communicate with the other subnet. Each static route requires:</p> <ul style="list-style-type: none"> ▪ Destination: IP address of the other subnet and subnet mask using the format "IP address/subnet mask." ▪ Next Hop: IP address of the next hop router. <p>See Static Route Examples (on page 61) for illustrations.</p>

4. Click OK.

Note: The PXE supports a maximum of 3 DNS servers. If two IPv4 DNS servers and two IPv6 DNS servers are available, the PXE only uses the primary IPv4 and IPv6 DNS servers.

Modifying IPv6 Settings

You must enable the IPv6 protocol before you can modify the IPv6 network settings. See **Selecting the Internet Protocol** (on page 57).

► **To modify IPv6 settings:**

1. Choose Device Settings > Network. The Network Configuration dialog appears.
2. Click the IPv6 Settings tab.
3. In the IP Auto Configuration field, click the drop-down arrow, and select the desired option from the list.

Option	Description
Automatic	<p>To auto-configure the PXE, select Automatic.</p> <p>With this option selected, you can enter a preferred host name, which is optional. Type the host name in the Preferred Hostname field.</p> <p>The host name:</p> <ul style="list-style-type: none"> ▪ Consists of alphanumeric characters and/or hyphens ▪ Cannot begin or end with a hyphen ▪ Cannot contain more than 63 characters ▪ Cannot contain punctuation marks, spaces, and other symbols <p>Select the "Specify DNS server manually" checkbox if necessary. Then type the address of the primary DNS server in the Primary DNS Server field. The secondary DNS server and DNS suffix are optional.</p>
Static	<p>To manually assign an IP address, select Static, and enter the following information in the corresponding fields:</p> <ul style="list-style-type: none"> ▪ IP address ▪ Default gateway ▪ Primary DNS server ▪ Secondary DNS server (optional) ▪ DNS Suffix (optional) <p>If your local network contains two subnets and IP forwarding has been enabled, you can click Append to</p>

Option	Description
	<p>add static routes so that your PXE can communicate with the other subnet. Each static route requires:</p> <ul style="list-style-type: none">▪ Destination: IP address of the current subnet and prefix length using the format "IP address/prefix."▪ Next Hop: IP address of the next hop router. <p>See Static Route Examples (on page 61) for illustrations.</p>

4. Click OK.

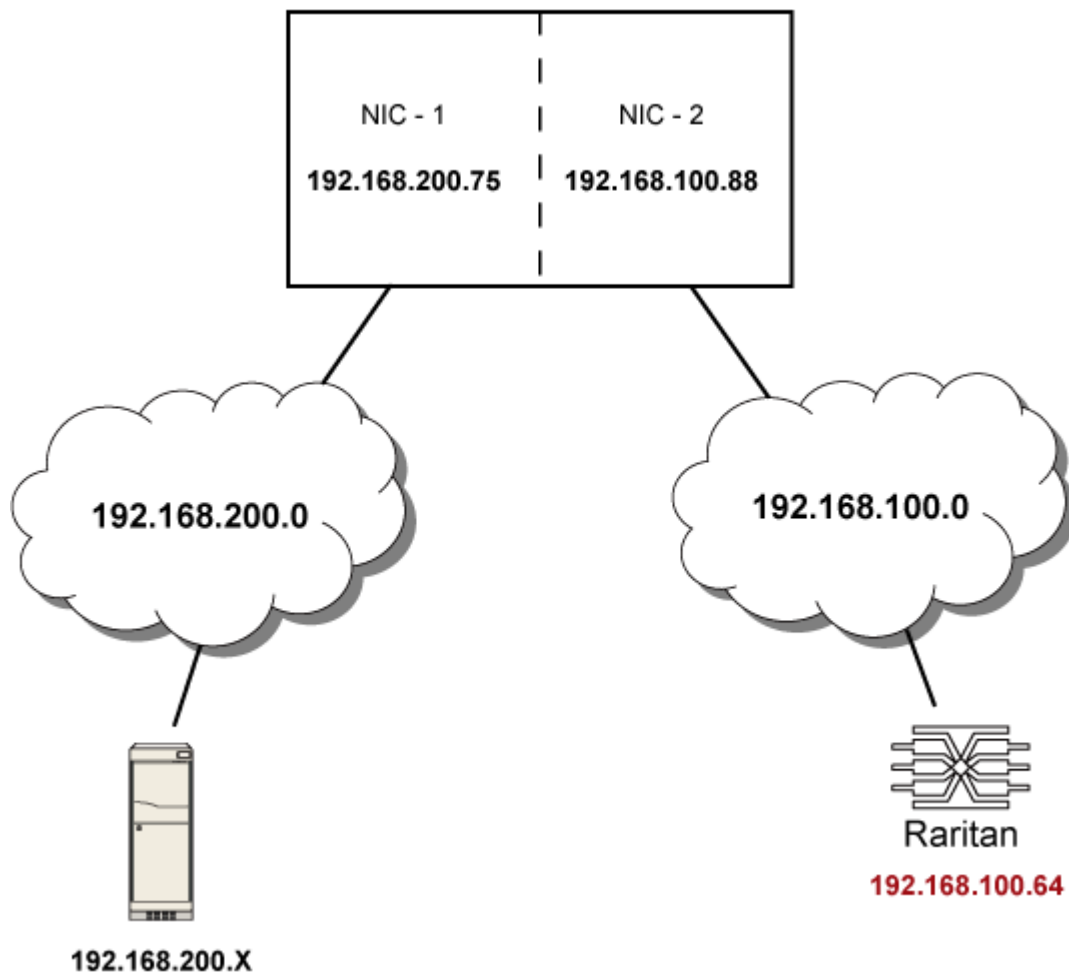
Note: The PXE supports a maximum of 3 DNS servers. If two IPv4 DNS servers and two IPv6 DNS servers are available, the PXE only uses the primary IPv4 and IPv6 DNS servers.

Static Route Examples

This section has two static route examples: IPv4 and IPv6. Both examples assume that two network interface controllers (NIC) have been installed in one network server, leading to two available subnets, and IP forwarding has been enabled. All of the NICs and PXE devices in the examples use static IP addresses.

► **IPv4 example:**

- Your PXE: 192.168.100.64
- Two NICs: 192.168.200.75 and 192.168.100.88
- Two networks: 192.168.200.0 and 192.168.100.0
- Subnet mask: 24

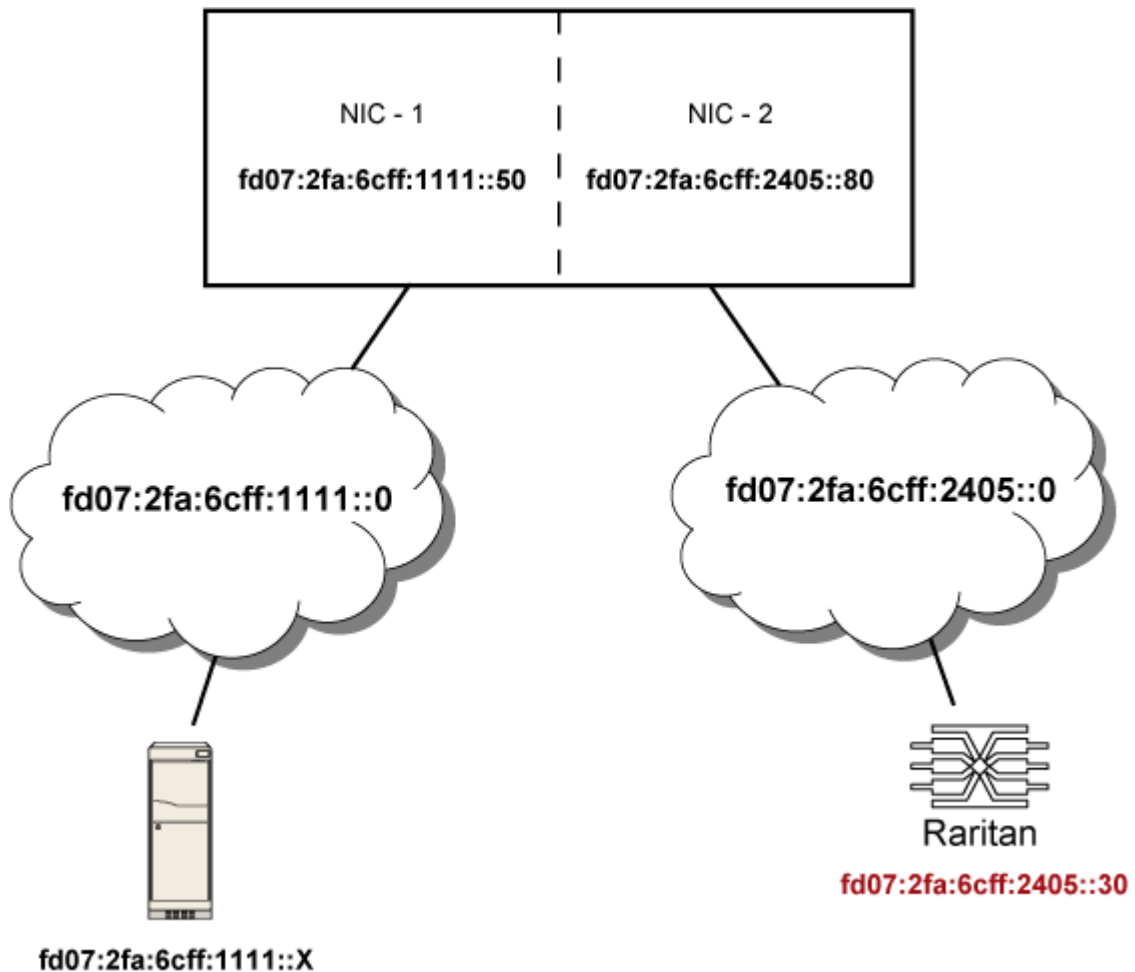


In this example, NIC-2 (192.168.100.88) is the next hop router for your PXE to communicate with any device in the other subnet 192.168.200.0. In the IPv4 'Append new Route' dialog, you should specify:

- Destination: 192.168.200.0/24
- Next Hop: 192.168.100.88

► **IPv6 example:**

- Your PXE: *fd07:2fa:6cff:2405::30*
- Two NICs: *fd07:2fa:6cff:1111::50* and *fd07:2fa:6cff:2405::80*
- Two networks: *fd07:2fa:6cff:1111::0* and *fd07:2fa:6cff:2405::0*
- Prefix length: 64



In this example, NIC-2 (fd07:2fa:6cff:2405::80) is the next hop router for your PXE to communicate with any device in the other subnet fd07:2fa:6cff:1111::0. In the IPv6 'Append new Route' dialog, you should specify:

- Destination: fd07:2fa:6cff:2405::0/64
- Next Hop: fd07:2fa:6cff:2405::80

Role of a DNS Server

As Internet communications are carried out on the basis of IP addresses, appropriate DNS server settings are required for mapping domain names (host names) to corresponding IP addresses, or the PXE may fail to connect to the given host.

Therefore, DNS server settings are important for external authentication. With appropriate DNS settings, the PXE can resolve the external authentication server's name to an IP address for establishing a connection. If the *SSL encryption* is enabled, the DNS server settings become critical since only fully qualified domain name can be used for specifying the LDAP server.

For information on external authentication, see **Setting Up External Authentication** (on page 106).

Modifying Network Service Settings

The PXE supports these network communication services: HTTPS, HTTP, Telnet and SSH.

HTTPS and HTTP enable the access to the web interface, and Telnet and SSH enable the access to the command line interface. See **Using the Command Line Interface** (on page 191).

By default, SSH is enabled, Telnet is disabled, and all TCP ports for supported services are set to standard ports. You can change default settings if necessary.

Note: Telnet access is disabled by default because it communicates openly and is thus insecure.

In addition, the PXE also supports the SNMP and Modbus/TCP protocols.

Changing HTTP(S) Settings

HTTPS uses Secure Sockets Layer (SSL) technology to encrypt all traffic to and from the PXE device so it is a more secure protocol than HTTP.

By default, any access to the PXE device via HTTP is automatically redirected to HTTPS. You can disable this redirection if needed.

► To change HTTP or HTTPS port settings:

1. Choose Device Settings > Network Services > HTTP. The HTTP Settings dialog appears.
2. To use a different port for HTTP or HTTPS, type a new port number in the corresponding field. Valid range is 1 to 65535.

Warning: Different network services cannot share the same TCP port.

3. Enable or disable either or both ports.
 - To enable or disable the HTTP port, select or deselect the "HTTP access" checkbox.
 - To enable or disable the HTTPS port, select or deselect the "HTTPS access" checkbox.

► To enable or disable HTTPS redirection:

In the HTTP Settings dialog, the "Enforce use of HTTPS (redirect to HTTPS)" checkbox determines whether the HTTP access to the PXE is redirected to HTTPS.

- To enable the redirection, select the checkbox.
- To disable the redirection, deselect the checkbox.

Note: The redirection checkbox is configurable only when both HTTP and HTTPS ports have been enabled.

Changing SSH Settings

You can enable or disable the SSH access to the command line interface, or change the default TCP port for the SSH service. In addition, you can decide to log in using either the password or the public key over the SSH connection.

► To change SSH service settings:

1. Choose Device Settings > Network Services > SSH. The SSH Settings dialog appears.
2. To use a different port, type a new port number in the port field. Valid range is 1 to 65535.

3. To enable the SSH application, select the Enable SSH Access checkbox. To disable it, deselect the checkbox.
4. To select a different authentication method, select one of the checkboxes.
 - Password authentication only: Enables the password-based login only.
 - Public key authentication only: Enables the public key-based login only.
 - Password and public key authentication: Enables both the password- and public key-based login. This is the default.
5. Click OK.

If the public key authentication is selected, you must type a valid SSH public key for each user profile to log in over the SSH connection. See ***Creating a User Profile*** (on page 78).

Changing Telnet Settings

You can enable or disable the Telnet access to the command line interface, or change the default TCP port for the Telnet service.

► To change Telnet service settings:

1. Choose Device Settings > Network Services > Telnet. The Telnet Settings dialog appears.
2. To use a different port, type a new port number in the port field. Valid range is 1 to 65535.
3. To enable the Telnet application, select the Enable Telnet Access checkbox. To disable it, deselect the checkbox.
4. Click OK.

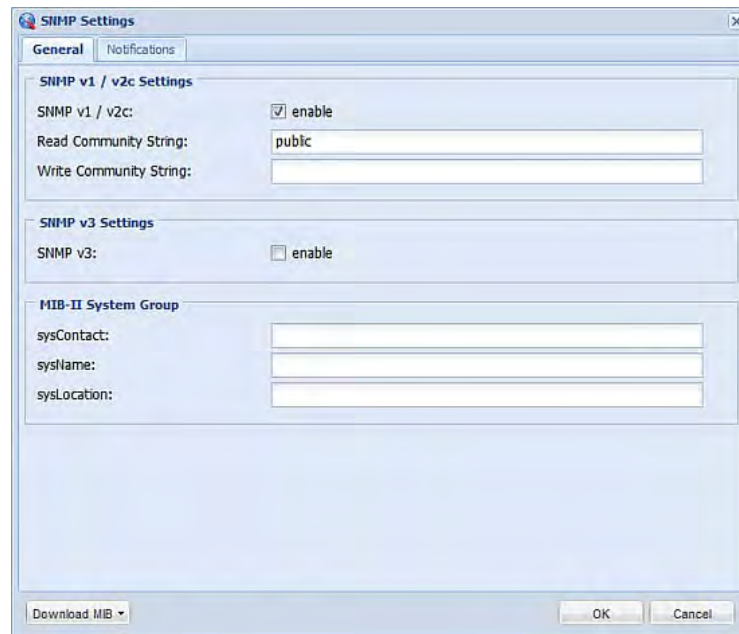
Configuring SNMP Settings

You can enable or disable SNMP communication between an SNMP manager and the PXE device.

Besides, you may need to configure the SNMP destination(s) if the built-in "System SNMP Notification Rule" is enabled and the SNMP destination has not been set yet. See **Event Rules and Actions** (on page 121).

► To configure SNMP communication:

1. Choose Device Settings > Network Services > SNMP. The SNMP Settings dialog appears.

The image shows the 'SNMP Settings' dialog box with two tabs: 'General' and 'Notifications'. The 'General' tab is active. It contains three sections: 'SNMP v1 / v2c Settings', 'SNMP v3 Settings', and 'MIB-II System Group'. In the 'SNMP v1 / v2c Settings' section, the 'enable' checkbox is checked, the 'Read Community String' is 'public', and the 'Write Community String' is empty. In the 'SNMP v3 Settings' section, the 'enable' checkbox is unchecked. In the 'MIB-II System Group' section, the 'sysContact', 'sysName', and 'sysLocation' fields are empty. At the bottom, there is a 'Download MIB' button, and 'OK' and 'Cancel' buttons.

2. Select the "enable" checkbox in the "SNMP v1 / v2c" field to enable communication with an SNMP manager using SNMP v1 or v2c protocol.
 - Type the SNMP read-only community string in the Read Community String field. Usually the string is "public."
 - Type the read/write community string in the Write Community String field. Usually the string is "private."
3. Select the "enable" checkbox in the "SNMP v3" field to enable communication with an SNMP manager using SNMP v3 protocol.

*Tip: You can permit or disallow a user to access the PXE via the SNMP v3 protocol. See **Configuring Users for Encrypted SNMP v3** (on page 186).*

4. Enter the MIB-II system group information, if applicable:
 - a. sysContact - the contact person in charge of the system being contacted
 - b. sysName - the name assigned to the system
 - c. sysLocation - the location of the system
5. Select the MIB to be downloaded. The SNMP MIB for your PXE is used by the SNMP manager.

*Important: You must download the SNMP MIB for your PXE to use with your SNMP manager. Click Download MIB in this dialog to download the desired MIB file. For more details, see **Downloading SNMP MIB** (on page 188).*

6. Click OK.

► **To configure SNMP notification destinations:**

1. Choose Device Settings > Network Services > SNMP. The SNMP Settings dialog appears.
2. Click the Notifications tab.
3. Select the Enabled checkbox.
4. Select an SNMP notification type - SNMP v2c Trap, SNMP v2c Inform, SNMP v3 Trap, and SNMP v3 Inform.
5. Specify the SNMP notification destinations by doing the following:
 - a. Specify the SNMP notification destinations in the Host field(s).
 - b. Specify a port number for the destination in the Port field(s).
 - c. Enter necessary information in other fields, such as the community string for SNMP Trap or authentication pass phrase for SNMP Inform. See **Send an SNMP Notification** (on page 128) for details.
6. Click OK.

*Tip: The SNMP notification destinations can be also set in the Event Rule Settings dialog. See **Modifying an Action** (on page 150).*

Changing Modbus/TCP Settings

You can enable or disable the Modbus/TCP access to the PXE or the read-only mode, or change the default TCP port for the Modbus service.

► **To change the Modbus service settings:**

1. Choose Device Settings > Network Services > Modbus. The Modbus Settings dialog appears.

2. To enable the Modbus access, select the Enable Modbus/TCP Access checkbox. To disable it, deselect the checkbox.
3. To use a different port, type a new port number in the port field. Valid range is 1 to 65535.
4. To enable the Modbus read-only mode, select the "Enable read-only mode" checkbox. To disable it, deselect the checkbox.

Enabling Service Advertisement

The PXE advertises all enabled services that are reachable using the IP network. This feature uses DNS-SD (Domain Name System-Service Discovery) and mDNS (multicast DNS). The advertised services are discovered by clients that have implemented DNS-SD and mDNS.

The advertised services include the following:

- HTTP
- HTTPS
- Telnet
- SSH
- Modbus
- json-rpc
- SNMP

This feature is enabled by default. The service advertisement feature supports both IPv4 and IPv6 protocols.

If you have set a preferred host name for IPv4 and/or IPv6, that host name can be used as the zero configuration .local host name, that is, *<preferred_host_name>.local*, where *<preferred_host_name>* is the preferred host name you have specified for PXE. The IPv4 host name is the first priority. If an IPv4 host name is not available, then use the IPv6 host name.

*Note: For information on configuring IPv4 and/or IPv6 network settings, see **Modifying Network Settings** (on page 56).*

► To enable service advertisement:

1. Choose Device Settings > Network Services to select the Service Advertisement checkbox.
2. Click Yes on the confirmation message to switch to zero configuration advertising. The feature is enabled and the Service Advertisement checkbox is selected in the submenu.




► **To disable service advertisement:**

1. Choose Device Settings > Network Services to deselect the Service Advertisement checkbox.
2. Click Yes on the confirmation message to switch off the zero configuration advertising. The feature is disabled and the Service Advertisement checkbox is deselected in the submenu.

Setting the Date and Time

Set the internal clock on the PXE device manually, or link to a Network Time Protocol (NTP) server and let it set the date and time for the PXE.

► **To set the date and time:**

1. Choose Device Settings > Date/Time. The Configure Date/Time Settings dialog appears.
2. In the Time Zone field, click the drop-down arrow, and select your time zone from the list.
3. If the daylight saving time applies to your time zone, verify the Automatic Daylight Saving Time Adjustment checkbox is selected.
If the daylight saving time rules are not available for the selected time zone, the checkbox is not configurable.
4. Choose one of the methods to set the date and time:
 - To customize the date and time, select the User Specified Time radio button, and then enter the date and time in appropriate fields. Use the yyyy-mm-dd format for the date and the hh:mm:ss format for the time.
 - To set the date, delete existing numbers in the Date field and type new ones, or click the calendar icon  to select a date.
 - The time is measured in 24-hour format so enter 13 for 1:00pm, 14 for 2:00pm, and so on. You can enter the time by deleting existing numbers and typing new ones in the hour, minute and second fields, or clicking the arrows   to adjust each number.
 - To let an NTP server set the date and time, select the "Synchronize with NTP Server" radio button. There are two ways to assign the NTP servers.

- To use the DHCP-assigned NTP servers, make sure the "Always use the servers below and ignore DHCP-provided servers" checkbox is deselected. This method is usable only when either IPv4 or IPv6 DHCP is enabled.
- To use the NTP servers that are manually specified, select the "Always use the servers below and ignore DHCP-provided servers" checkbox, and specify the primary NTP server in the First Time Server field. A secondary NTP server is optional.
You may click Check NTP Servers to verify the validity and accessibility of the specified NTP servers.


Note: If the PXE device's IP address is assigned through IPv4 or IPv6 DHCP, the NTP servers can be automatically discovered. When this occurs, the data you entered in the fields of First and Second Time Server will be overridden.

5. Click OK.

The PXE follows the NTP server sanity check per the IETF RFC. If your PXE has problems synchronizing with a Windows NTP server, see **Windows NTP Server Synchronization Solution** (on page 72).

Note: If you are using Raritan's Power IQ to manage the PXE, you must configure Power IQ and the PXE to have the same date/time or NTP settings.




How to Use the Calendar

The calendar icon  next to the Date field is a convenient tool to quickly change the year, month and date.






► To select a date using the calendar:

1. To change the year shown in the calendar, do either of the following:

- Press Ctrl+Up arrow or Ctrl+Down arrow to switch between years.
- Click , which is adjacent to the year, to show a list of years and months. Select the desired year from the list to the right and click OK. If the list does not show the desired year, click  or  to show additional years.



- To change the month shown in the calendar, do one of the following:
 - Press Ctrl+Right arrow or Ctrl+Left arrow to switch between months.
 - Click  or  on the top of the calendar to switch between months.
 - Click , which is adjacent to the year, to show a list of years and months. Select the desired month from the list to the left and click OK.
- To select a date, click that date on the calendar.
 - Click Today if you want to select today.

Note: On the calendar, the date for today is marked with a red frame.

Windows NTP Server Synchronization Solution

The NTP client on the PXE follows the NTP RFC so the PXE rejects any NTP servers whose root dispersion is more than one second. An NTP server with a dispersion of more than one second is considered an inaccurate NTP server by the PXE.

Note: For information on NTP RFC, visit <http://tools.ietf.org/html/rfc4330> <http://tools.ietf.org/html/rfc4330> to refer to the section 5.

Windows NTP servers may have a root dispersion of more than one second, and therefore cannot synchronize with the PXE. When the NTP synchronization issue occurs, change the dispersion settings to resolve it.

► **To change the Windows NTP's root dispersion settings:**

1. Access the registry settings associated with the root dispersion on the Windows NTP server.

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\W32Time\Config

2. *AnnounceFlags* must be set to 0x05 or 0x06.
 - 0x05 = 0x01 (Always time server) and 0x04 (Always reliable time server)
 - 0x06 = 0x02 (Automatic time server) and 0x04 (Always reliable time server)

Note: Do NOT use 0x08 (Automatic reliable time server) because its dispersion starts at a high value and then gradually decreases to one second or lower.

3. *LocalClockDispersion* must be set to 0.

Setting Default Measurement Units

Default measurement units are applied to the PXE web and CLI interfaces across all users, including users accessing the device via external authentication servers. Default units apply only when users have not set their own preferred measurement units or the administrator has not changed preferred units for any user.

*Note: To set preferred measurement units for your own, see **Setting Up Your Preferred Measurement Units** (on page 83). If your preferences are different from the default measurement units, your preferences rather than the defaults apply to your own PXE user interfaces.*

► To set up default user preferences:

1. Choose User Management > Default User Preferences.
2. Update any of the following as needed:
 - In the Temperature Unit field, select °C (Celsius) or °F (Fahrenheit) as the measurement unit for temperatures.
 - In the Length Unit field, select "Meter" or "Feet" as the measurement unit for length or height.
 - In the Pressure Unit field, select "Pascal" or "psi" as the measurement unit for pressure.
3. Click OK.

Specifying the Device Altitude

You must specify the PXE device's altitude above sea level if a Raritan differential air pressure sensor is attached. This is because the device's altitude is associated with the altitude correction factor. See **Altitude Correction Factors** (on page 347).

The default altitude measurement unit is meter. You can have the measurement unit vary between meter and foot according to user credentials. See **Setting Up Your Preferred Measurement Units** (on page 83).

► To specify the altitude of the PXE device:

1. Click the PDU folder.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

2. Click Setup in the Settings section. The Pdu Setup dialog appears.
3. Type an integer number in the Altitude field. Depending on the measurement unit displayed, the range of valid numbers differs.
 - For meters (m), the value ranges between 0 and 3000.

- For feet (ft), the value ranges between 0 and 9842.
4. Click OK.

Setting Data Logging

The PXE can store 120 measurements for each sensor in a memory buffer. This memory buffer is known as the data log. Sensor readings in the data log can be retrieved using SNMP.

You can configure how often measurements are written into the data log using the Measurements Per Log Entry field. Since the PXE internal sensors are measured every second, specifying a value of 60, for example, would cause measurements to be written to the data log once every minute. Since there are 120 measurements of storage per sensor, specifying a value of 60 means the log can store the last two hours of measurements before the oldest one in the log gets overwritten.

Whenever measurements are written to the log, three values for each sensor are written: the average, minimum and maximum values. For example, if measurements are written every minute, the average of all measurements that occurred during the preceding 60 seconds along with the minimum and maximum measurement values are written to the log.

Note that the outlet-level measurement data is NOT available for Raritan models described in this online help.

*Note: The PXE device's SNMP agent must be enabled for this feature to work. See **Enabling SNMP** (on page 185) for more details. In addition, using an NTP time server ensures accurately time-stamped measurements.*

Enabling Data Logging

By default, data logging is disabled. Only users having the "Administrator" or "Change Pdu, Inlet, Outlet & Overcurrent Protector Configuration" permissions can enable or disable this feature. See **Setting Up Roles** (on page 83).

► **To configure the data logging feature:**

1. Choose Device Settings > Data Logging. The Data Logging Options dialog appears.
2. To enable the data logging feature, select the "enable" checkbox in the Enable Data Logging field.
3. Type a number in the Measurements Per Log Entry field. Valid range is from 1 to 600. The default is 60.
4. Verify that all sensor logging is enabled. If not, click Enable All to have all sensors selected.
5. Click OK.

Important: Although it is possible to selectively enable/disable logging for individual sensors on the PXE in Step 4, it is NOT recommended and this capability may be removed in the future.

Configuring SMTP Settings

The PXE can be configured to send alerts or event messages to a specific administrator by email. To do this, you have to configure the SMTP settings and enter an IP address for your SMTP server and a sender's email address.

*Note: See **Event Rules and Actions** (on page 121) for information on creating event rules to send email notifications.*

► To set SMTP server settings:

1. Choose Device Settings > SMTP Server. The SMTP Server Settings dialog appears.
2. Type the name or IP address of the mail server in the Server Name field.
3. Type the port number for the SMTP server in the Port field. The default is 25.
4. Type an email address for the sender in the Sender Email Address field.
5. Type the number of email retries in the Number of Sending Retries field. The default is 2 retries.
6. Type the time interval between email retries in the "Time Interval Between Sending Retries (in minutes)" field. The time is measured in minutes. The default is 2 minutes.
7. If your SMTP server requires password authentication, do this:
 - a. Select the Server Requires Authentication checkbox.
 - b. Type a user name in the User Name field.
 - c. Type a password in the Password field.
8. Now that you have set the SMTP settings, you can test it to ensure it works properly. Do the following:
 - a. Type the recipient's email address in the Recipient Email Addresses field. Use a comma to separate multiple email addresses.
 - b. Click Send Test Email.
 - c. Check if the recipient(s) receives the email successfully.
9. Click OK.

Setting the EnergyWise Configuration

If a Cisco® EnergyWise energy management architecture is implemented in your place, you can enable the Cisco EnergyWise endpoint implemented on the PXE device so that this device becomes part of the Cisco EnergyWise domain.

The Cisco EnergyWise feature implemented on the PXE is disabled by default.

► **To set the Cisco EnergyWise configuration:**

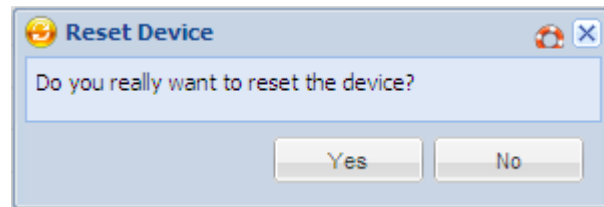
1. Choose Device Settings > EnergyWise. The EnergyWise Configuration dialog appears.
2. In the Enable EnergyWise field, select the "enable" checkbox to enable the Cisco EnergyWise feature.
3. In the "Domain name" field, type the name of a Cisco EnergyWise domain where the PXE belongs. The domain name comprises up to 127 printable ASCII characters.
 - Spaces and asterisks are NOT acceptable.
4. In the "Domain password" field, type the authentication password (secret) for entering the Cisco EnergyWise domain. The password comprises up to 127 printable ASCII characters.
 - Spaces and asterisks are NOT acceptable.
5. In the Port field, type a User Datagram Protocol (UDP) port number for communications in the Cisco EnergyWise domain. The port ranges from 1 to 65535. Default is 43440.
6. In the "Polling interval" field, type a polling interval to determine how often the PXE is queried in the Cisco EnergyWise domain. The polling interval ranges from 30 to 600 seconds. Default is 180 seconds.
7. Click OK.

Rebooting the PXE Device

You can remotely reboot the PXE device via the web interface.

► To reboot the device:

1. Choose Maintenance > Unit Reset. The Reset Device dialog appears.



2. Click Yes to reset the PXE.
3. A message appears with a countdown timer showing the remaining time of the operation. It takes about one minute to complete.
4. When the reset is complete, the Login page opens. Now you can log back in to the PXE device.

Note: If you are not redirected to the Login page after the reset is complete, click the underlined text "this link" in the message.

Resetting All Active Energy Readings

An active energy reading is a value of total accumulated energy, which is never reset, even if the power fails or the PXE is reset. However, you can manually reset this reading to restart the energy accumulation process.

Only users with the 'Admin' role assigned can reset active energy readings.

► To reset all active energy readings of the PXE:

1. Click the PDU folder in the PX Explorer pane to open the PDU page.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

2. Click Reset All Active Energy Counters in the Settings section.
3. Click Yes on the confirmation message. Now all 'Active Energy' readings on the PXE are reset to 0 (zero) Wh.

*Tip: You can also reset the active energy readings of an individual inlet. See **Resetting Inlet Active Energy Readings** (on page 117).*

Internal Beeper State

The PXE does NOT have an internal beeper so the 'Internal Beeper' section on the PDU page always shows "Off."

User Management

The PXE is shipped with one built-in user profile: **admin**, which is used for initial login and configuration. This profile has full permissions, and should be reserved for the system administrator. It cannot be deleted and its permissions are not user-configurable except for the SNMP v3 permission.

All users must have a user profile, which specifies a login name and password, and contains additional (optional) information about the user. Every user profile must have at least a role to determine the user's permissions. See **Setting Up Roles** (on page 83).

Tip: By default, multiple users can log in simultaneously using the same login name.

Creating a User Profile

Creating new users adds a new login to the PXE.

► **To create a user profile:**

1. Choose User Management > Users. The Manage Users dialog appears.
2. Click New. The Create New User dialog appears.
3. Type the information about the user in the corresponding fields. Note that User Name, Password and Confirm Password fields are required.

Field	Type this...
User Name	The name the user enters to log in to the PXE. <ul style="list-style-type: none"> ▪ The name can be 4 to 32 characters long. ▪ It is case sensitive. ▪ Spaces are NOT permitted
Full Name	The user's first and last names.
Password, Confirm Password	The password the user enters to log in. Type it first in the Password field and then again in the Confirm Password field. <ul style="list-style-type: none"> ▪ The password can be 4 to 64 characters

Field	Type this...
	<p>long.</p> <ul style="list-style-type: none"> It is case sensitive. Spaces are permitted.
Telephone Number	A phone number where the user can be reached.
eMail Address	<p>An email address where the user can be reached.</p> <ul style="list-style-type: none"> The email can be up to 64 characters long. It is case sensitive.

4. Select the Enabled checkbox. This is required so the user can log in to the PXE device.
5. Select the "Force password change on next login" checkbox if you prefer a password change by the user when the user logs in for the first time after this checkbox is enabled.
6. Click the SNMPv3 tab to set the SNMPv3 access permission. The permission is disabled by default.
 - a. To permit the SNMPv3 access by this user, select the "Enable SNMPv3 access" checkbox. Otherwise, leave the checkbox disabled.

*Note: The SNMPv3 protocol must be enabled for SNMPv3 access. See **Configuring SNMP Settings** (on page 66).*

- b. Set up SNMPv3 parameters if enabling the SNMPv3 access permission.

Field	Description
Security Level	<p>Click the drop-down arrow to select a preferred security level from the list:</p> <ul style="list-style-type: none"> NoAuthNoPriv: No authentication and no privacy. AuthNoPriv: Authentication and no privacy. AuthPriv: Authentication and privacy. This is the default.
Use Password as Authentication Pass Phrase	<p><i>This checkbox is configurable only if AuthNoPriv or AuthPriv is selected.</i></p> <p>When the checkbox is selected, the authentication pass phrase is identical to the user's password. To specify a different authentication pass phrase, disable the checkbox.</p>

Field	Description
Authentication Pass Phrase	Type the authentication pass phrase in this field if the "Use Password as Authentication Pass Phrase" checkbox is disabled. The pass phrase must consist of 8 to 32 ASCII printable characters.
Confirm Authentication Pass Phrase	Re-type the same authentication pass phrase for confirmation.
Use Authentication Pass Phrase as Privacy Pass Phrase	<i>This checkbox is configurable only if AuthPriv is selected.</i> When the checkbox is selected, the privacy pass phrase is identical to the authentication pass phrase. To specify a different privacy pass phrase, disable the checkbox.
Privacy Pass Phrase	Type the privacy pass phrase in this field if the "Use Authentication Pass Phrase as Privacy Pass Phrase" checkbox is disabled. The pass phrase must consist of 8 to 32 ASCII printable characters.
Confirm Privacy Pass Phrase	Re-type the same privacy pass phrase for confirmation.
Authentication Protocol	Click the drop-down arrow and select the desired authentication protocol from the list. Two protocols are available: <ul style="list-style-type: none"> ▪ MD5 ▪ SHA-1 (default)
Privacy Protocol	Click the drop-down arrow and select the desired privacy protocol from the list. Two protocols are available: <ul style="list-style-type: none"> ▪ DES (default) ▪ AES-128

7. Click the SSH tab to enter the public key if the public key authentication for the SSH service is enabled. See **Changing SSH Settings** (on page 64).
 - a. Open the SSH public key with a text editor.
 - b. Copy and paste all contents in the text editor into the Public Key field on the SSH tab.
8. Click the Roles tab to determine the permissions of the user.

9. Select one or multiple roles by selecting corresponding checkboxes.
 - The Admin role provides full permissions.
 - The Operator role provides limited permissions for frequently-used functions. See **Setting Up Roles** (on page 83) for the scope of permissions. This role is selected by default.
 - If no roles meet your needs, you can:
 - *Modify the permissions of an existing role:* To modify the permissions of any role, double-click the role or highlight it and then click Edit Role. See **Modifying a Role** (on page 84).
 - *Create a new role by clicking the Manage Roles button:* See **Creating a Role** (on page 84).

Note: With multiple roles selected, a user has the union of all roles' permissions.

10. To change any measurement units displayed in the web interface and command line interface for this new user, click the Preferences tab, and do any of the following:
 - In the Temperature Unit field, select °C (Celsius) or °F (Fahrenheit) as the measurement unit for temperatures.
 - In the Length Unit field, select "Meter" or "Feet" as the measurement unit for length or height.
 - In the Pressure Unit field, select "Pascal" or "psi" as the measurement unit for pressure.

A Pascal is equal to one newton per square meter. Psi stands for pounds per square inch.

*Note: The measurement unit change only applies to the web interface and command line interface. Users can change the measurement units at any time by setting up their own user preferences. See **Setting Up Your Preferred Measurement Units** (on page 83).*

Modifying a User Profile

You can change any user profile's information except for the user name.

► To modify a user profile:

1. Choose User Management > Users. The Manage Users dialog appears.
2. Select the user by clicking it.
3. Click Edit or double-click the user. The Edit User 'XXX' dialog appears, where XXX is the user name.

4. Make all necessary changes to the information shown.
To change the password, type a new password in the Password and Confirm Password fields. If the password field is left blank, the password is not changed.
5. To change the SNMPv3 access permissions, click the SNMPv3 tab and make necessary changes. For details, see Step 6 of **Creating a User Profile** (on page 78).
6. To change the permissions, click the Roles tab and do one of these:
 - Select or deselect any role's checkbox.
 - To modify the permissions of any role, double-click the role or highlight it and then click Edit Role. See **Modifying a Role** (on page 84).
7. To change the measurement unit for temperature, length or pressure, click the Preferences tab, and select a different option from the drop-down list.

Note: The measurement unit change only applies to the web interface and command line interface.

8. Click OK.

Deleting a User Profile

Delete outdated or redundant user profiles when necessary.

► **To delete user profiles:**

1. Choose User Management > Users. The Manage Users dialog appears.
2. Select the user you want to delete by clicking it. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
3. Click Delete.
4. A message appears, prompting you to confirm the operation. Click Yes to confirm the deletion.

Changing the User List View

You may change the number of displayed columns or re-sort the list for better viewing the data. See **Changing the View of a List** (on page 48).

Setting Up Your Preferred Measurement Units

The measurement units used in your PXE user interfaces can be changed according to your own preferences regardless of the permissions you have.

*Tip: Preferences can also be changed by administrators for specific users from the Preferences tab of the Manage Users dialog. See **Creating a User Profile** (on page 78).*

*Note: The measurement unit change only applies to the web interface and command line interface. Setting your preferences does not change the default measurement units, which apply to all users before any individual user or the administrator sets preferred measurement units on a per-user basis. See **Setting Default Measurement Units** (on page 73) for information on changing default measurement units.*

► **To change the measurement units applied to your PXE graphical user interfaces:**

1. Choose User Management > User Preferences. The Setup User Preferences dialog opens.
2. Update any of the following as needed:
 - In the Temperature Unit field, select °C (Celsius) or °F (Fahrenheit) as the measurement unit for temperatures.
 - In the Length Unit field, select "Meter" or "Feet" as the measurement unit for length or height.
 - In the Pressure Unit field, select "Pascal" or "psi" as the measurement unit for pressure.
3. Click OK.

Setting Up Roles

A role defines the operations and functions a user is permitted to perform or access. Every user must be assigned at least a role.

The PXE is shipped with two built-in roles: **Admin** and **Operator**.

- The Admin role provides full permissions. You can neither modify nor delete this role.
- The Operator role provides limited permissions for frequently-used functions. You can modify or delete this role. By default, the Operator role contains these permissions:
 - Acknowledge Alarms
 - View Event Settings
 - View Local Event Log

- Change Pdu, Inlet, Outlet & Overcurrent Protector Configuration
- Change Own Password

The Operator role is assigned to a newly created user profile by default. See **Creating a User Profile** (on page 78).

Creating a Role

Create a new role when you need a new combination of permissions.

► **To create a role:**

1. Choose User Management > Roles. The Manage Roles dialog appears.

Tip: You can also access the Manage Roles dialog by clicking the Manage Roles button in the Edit User 'XXX' dialog.

2. Click New. The Create New Role dialog appears.
3. Type the role's name in the Role Name field.
4. Type a description for the role in the Description field.
5. Click the Privileges tab to assign one or multiple permissions.
 - a. Click Add. The "Add Privileges to new Role" dialog appears.
 - b. Select the permission you want from the Privileges list.
 - c. If the permission you selected contains any argument setting, the Arguments list is shown to the right, such as the Switch Actuator permission. Then select one or multiple arguments.
 - d. Click Add to add the selected permission (and arguments if any).
 - e. Repeat Steps a to d until you add all necessary permissions.
6. Click OK.

Now you can assign the new role to any users. See **Creating a User Profile** (on page 78) or **Modifying a User Profile** (on page 81).

Modifying a Role

You can change an existing role's settings except for the name.

► **To modify a role:**

1. Choose User Management > Roles. The Manage Roles dialog appears.

Tip: You can also access the Manage Roles dialog by clicking the Manage Roles button in the Edit User 'XXX' dialog.

2. Select the role you want to modify by clicking it.

3. Click Edit or double-click the role. The Edit Role 'XXX' dialog appears, where XXX is the role name.

Tip: You can also access the Edit Role 'XXX' dialog by clicking the Edit Role button in the Edit User 'XXX' dialog.

4. Modify the text shown in the Description field if necessary.
5. To change the permissions, click the Privileges tab.

Note: You cannot change the Admin role's permissions.

6. To delete any permissions, do this:
 - a. Select the permission you want to remove by clicking it. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - b. Click Delete.
7. To add any permissions, do this:
 - a. Click Add. The Add Privileges to Role 'XXX' dialog appears, where XXX is the role name.
 - b. Select the permission you want from the Privileges list.
 - c. If the permission you selected contains any argument setting, the Arguments list is shown to the right, such as the Switch Actuator permission. Then select one or multiple arguments.
 - d. Click Add to add the selected permission (and arguments if any).
 - e. Repeat Steps a to d until you add all necessary permissions.
8. To change a specific permission's arguments, do this:
 - a. Select the permission by clicking it.
 - b. Click Edit. The "Edit arguments of privilege 'XXX'" dialog appears, where XXX is the privilege name.

Note: If the permission you selected does not contain any arguments, the Edit button is disabled.

- c. Select the argument you want. You can make multiple selections.
 - d. Click OK.
9. Click OK.

Deleting a Role

You can delete any role other than the Admin role.

► **To delete a role:**

1. Choose User Management > Roles. The Manage Roles dialog appears.

Tip: You can also access the Manage Roles dialog by clicking the Manage Roles button in the Edit User 'XXX' dialog.

2. Select the role you want to delete by clicking it. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
3. Click Delete.
4. A message appears, prompting you to confirm the operation. Click Yes to confirm the deletion.

Changing the Role List View

You may re-sort the list for better viewing the data. See **Changing the View of a List** (on page 48).

Forcing HTTPS Encryption

You can force all accesses to the PXE via HTTP to be redirected to HTTPS. See **Changing HTTP(S) Settings** (on page 64).

Access Security Control

The PXE provides tools to control access. You can enable the internal firewall, create firewall rules, and create login limitations.

*Tip: You can also create and install the certificate or set up external authentication servers to control any access. See **Setting Up an SSL Certificate** (on page 101) and **Setting Up External Authentication** (on page 106).*

Configuring the Firewall

The PXE has a firewall that you can configure to prevent specific IP addresses and ranges of IP addresses from accessing the PXE device or to prevent them from receiving any data from the PXE.

The PXE allows you to configure the firewall rules for inbound and outbound traffic respectively. Inbound rules control the data sent to the PXE, and outbound rules control the data sent from the PXE.

By default the firewall is disabled.

► To configure the firewall:

1. Enable the firewall. See **Enabling the Firewall** (on page 87).
2. Set the default policy. See **Changing the Default Policy** (on page 88).
3. Create firewall rules specifying which addresses to accept and which ones to discard. See **Creating Firewall Rules** (on page 89).

Changes made to firewall rules take effect immediately. Any unauthorized IP activities cease instantly.

Note: The purpose of disabling the firewall by default is to prevent users from accidentally locking themselves out of the device.

Enabling the Firewall

The firewall rules, if any, take effect only after the firewall is enabled.

► To enable the PXE firewall:

1. Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.
2. To enable the IPv4 firewall, click the IPv4 tab, and select the Enable IPv4 Access Control checkbox.
3. To enable the IPv6 firewall, click the IPv6 tab, and select the Enable IPv6 Access Control checkbox.
4. Click OK.

Changing the Default Policy

After enabling the firewall, the default policy is to accept traffic from/to all IP addresses. This means only IP addresses discarded by a specific rule will NOT be permitted to access the PXE or receive any data from the PXE.

You can change the default policy to Drop or Reject, in which case traffic to/from all IP addresses is discarded except the IP addresses accepted by a specific rule.

Default policies for inbound and outbound traffic can be different.

► To change the default policy for inbound traffic:

1. Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.
2. To determine the default policy for IPv4 addresses:
 - a. Click the IPv4 tab if necessary.
 - b. Ensure the Enable IPv4 Access Control checkbox is selected.
 - c. Locate the Default Policy field in the Inbound Rules section.
 - d. The default policy is shown in the Default Policy field. To change it, select a different policy from the drop-down list.
 - Accept: Accepts traffic from all IPv4 addresses.
 - Drop: Discards traffic from all IPv4 addresses, without sending any failure notification to the source host.
 - Reject: Discards traffic from all IPv4 addresses, and an ICMP message is sent to the source host for failure notification.
3. To determine the default policy for IPv6 addresses:
 - a. Click the IPv6 tab.
 - b. Ensure the Enable IPv6 Access Control checkbox is selected.
 - c. Locate the Default Policy field in the Inbound Rules section.
 - d. The default policy is shown in the Default Policy field. To change it, select a different policy from the drop-down list.
 - Accept: Accepts traffic from all IPv6 addresses.
 - Drop: Discards traffic from all IPv6 addresses, without sending any failure notification to the source host.
 - Reject: Discards traffic from all IPv6 addresses, and an ICMP message is sent to the source host for failure notification.
4. Click OK. The new default policy is applied.

► **To change the default policy for outbound traffic:**

Locate the Outbound Rules section on the IPv4 or IPv6 tab and then follow the above procedure to set up its Default Policy field by selecting one of the following options.

- **Accept:** Permits traffic sent from the PXE to all IP addresses.
- **Drop:** Discards traffic sent from the PXE to all IP addresses, without sending any failure notification to the destination host.
- **Reject:** Discards traffic sent from the PXE to all IP addresses, and an ICMP message is sent to the destination host for failure notification.

Creating Firewall Rules

Firewall rules determine whether to accept or discard traffic to/from the PXE, based on the IP address of the host sending or receiving the traffic. When creating firewall rules, keep these principles in mind:

- **Rule order is important.**

When traffic reaches or is sent from the PXE device, the rules are executed in numerical order. Only the first rule that matches the IP address determines whether the traffic is accepted or discarded. Any subsequent rules matching the IP address are ignored by the PXE.

- **Subnet mask is required.**

When typing the IP address, you must specify BOTH the address and a subnet mask. For example, to specify a single address in a Class C network, use this format:

`x.x.x.x/24`

where `/24` = a subnet mask of 255.255.255.0.

To specify an entire subnet or range of addresses, change the subnet mask accordingly.

Note: Valid IPv4 addresses range from 0.0.0.0 through 255.255.255.255. Make sure the IPv4 addresses entered are within the scope.

► **To create firewall rules:**

1. Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.
2. Click the IPv4 tab for creating IPv4 firewall rules, or click the IPv6 tab for creating IPv6 firewall rules.
3. Ensure the Enable IPv4 Access Control checkbox is selected on the IPv4 tab, or the Enable IPv6 Access Control checkbox is selected on the IPv6 tab.

4. To set rules for inbound traffic, go to the Inbound Rules section. To set rules for outbound traffic, go to the Outbound Rules section.
5. Create specific rules. See the table for different operations.

Action	Procedure
Add a rule to the end of the rules list	<ul style="list-style-type: none"> ▪ Click Append. The "Append new Rule" dialog appears. ▪ Type an IP address and subnet mask in the IP/Mask field. ▪ Select Accept, Drop or Reject from the drop-down list in the Policy field. <ul style="list-style-type: none"> ▪ Accept: Accepts traffic from/to the specified IP address(es). ▪ Drop: Discards traffic from/to the specified IP address(es), without sending any failure notification to the source or destination host. ▪ Reject: Discards traffic from/to the specified IP address(es), and an ICMP message is sent to the source or destination host for failure notification. ▪ Click OK. <p>The system automatically numbers the rule.</p>
Insert a rule between two existing rules	<ul style="list-style-type: none"> ▪ Select the rule above which you want to insert a new rule. For example, to insert a rule between rules #3 and #4, select #4. ▪ Click Insert. The "Insert new Rule" dialog appears. ▪ Type an IP address and subnet mask in the IP/Mask field. ▪ Select Accept, Drop or Reject from the drop-down list in the Policy field. <ul style="list-style-type: none"> ▪ Accept: Accepts traffic from/to the specified IP address(es). ▪ Drop: Discards traffic from/to the specified IP address(es), without sending any failure notification to the source or destination host. ▪ Reject: Discards traffic from/to the specified IP address(es), and an ICMP message is sent to the source or destination host for failure notification. ▪ Click OK. <p>The system inserts the rule and automatically rennumbers the following rules.</p>

- When finished, the rules appear in the Configure IP Access Control Settings dialog.

Configure IP Access Control Settings

IPv4 | IPv6

Enable IPv4 Access Control: ☒

Inbound Rules

Default Policy: Accept

#	IP/Mask	Policy
1	192.168.80.80/32	ACCEPT
2	192.255.255.255/24	ACCEPT
3	192.155.123.123/32	DROP

Append Insert Edit Delete

Outbound Rules

Default Policy: Accept

#	IP/Mask	Policy
1	192.168.88.88/24	REJECT

Append Insert Edit Delete

OK Cancel

- Click OK. The rules are applied.

Editing Firewall Rules

When an existing firewall rule requires updates of IP address range and/or policy, modify them accordingly.

► To modify a firewall rule:



- Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.

2. To modify the IPv4 firewall rules, click the IPv4 tab. To modify the IPv6 firewall rules, click the IPv6 tab.
3. Ensure the Enable IPv4 Access Control checkbox is selected on the IPv4 tab, or the Enable IPv6 Access Control checkbox is selected on the IPv6 tab.
4. Select the rule to be modified in the rules list.
5. Click Edit or double-click the rule. The Edit Rule dialog appears.
6. Make changes to the information shown.
7. Click OK.
8. Click OK to quit the Configure IP Access Control Settings dialog, or the changes are lost.

Sorting Firewall Rules

The rule order determines which one of the rules matching the same IP address is performed.

► To sort the firewall rules:

1. Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.
2. To sort the IPv4 firewall rules, click the IPv4 tab. To sort the IPv6 firewall rules, click the IPv6 tab.
3. Ensure the Enable IPv4 Access Control checkbox is selected on the IPv4 tab, or the Enable IPv6 Access Control checkbox is selected on the IPv6 tab.
4. Select a specific rule by clicking it.
5. Click  or  to move the selected rule up or down until it reaches the desired location.
6. Click OK.

Deleting Firewall Rules

When any firewall rules become obsolete or unnecessary, remove them from the rules list.

► To delete a firewall rule:

1. Choose Device Settings > Security > IP Access Control. The Configure IP Access Control Settings dialog appears.
2. To delete the IPv4 firewall rules, click the IPv4 tab. To delete the IPv6 firewall rules, click the IPv6 tab.

3. Ensure the Enable IPv4 Access Control checkbox is selected on the IPv4 tab, or the Enable IPv6 Access Control checkbox is selected on the IPv6 tab.
4. Select the rule that you want to delete. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
5. Click Delete.
6. A message appears, prompting you to confirm the operation. Click Yes to remove the selected rule(s) from the rules list.
7. Click OK.

Setting Up User Login Controls

You can set up login controls to make it more difficult for hackers to access the PXE and the devices connected to it. You can arrange to lock persons out after a specified number of failed logins, limit the number of persons who log in using the same user name at the same time, and force users to create strong passwords.

Enabling User Blocking

User blocking determines how many times a user can attempt to log in to the PXE and fail authentication before the user is blocked.

Note that this function applies only to local authentication instead of authentication through external AA servers.

*Note: If any user blocking event occurs, you can unblock that user manually by using the "unblock" CLI command via a local connection. See **Unblocking a User** (on page 315).*

► To enable user blocking:

1. Choose Device Settings > Security > Login Settings. The Login Settings dialog appears.
2. Locate the User Blocking section.
3. To enable the user blocking feature, select the "Block user on login failure" checkbox.
4. Type a number in the "Maximum number of failed logins" field. This is the maximum number of failed logins the user is permitted before the user is blocked from accessing the PXE device.
5. To determine how long the user's login is blocked, select the desired length of time from the drop-down list in the "Block timeout" field. The following describes available options.
 - Infinite: This option sets no time limit on blocking the login.
 - X min: This type of option sets the time limit to X minutes, where X is a number.

- X h: This type of option sets the time limit to X hours, where X is a number.
- 1 d: This option sets the time limit to 1 day.

Tip: If the desired time option is not listed, you can manually type the desired time in this field. For example, you can type "4 min" to set the time to 4 minutes.

6. Click OK.

Enabling Login Limitations

Login limitations determine whether more than one person can use the same login name at the same time, and how long users are permitted to stay idle before being forced to log out.

► To enable login limitations:

1. Choose Device Settings > Security > Login Settings. The Login Settings dialog appears.
2. Locate the Login Limitations section.
3. To prevent more than one person from using the same login at the same time, select the "Prevent concurrent login with same username" checkbox.
4. To adjust how long users can remain idle before they are forcibly logged out by the PXE, select a time option in the Idle Timeout Period field. The default is 10 minutes.
 - X min: This type of option sets the time limit to X minutes, where X is a number.
 - X h: This type of option sets the time limit to X hours, where X is a number.
 - 1 d: This option sets the time limit to 1 day.

Tip: If the desired time option is not listed, you can manually type the desired time in this field. For example, you can type "4 min" to set the time to 4 minutes.

5. Click OK.

Tip: Keep the idle timeout to 20 minutes or less if possible. This reduces the number of idle sessions connected, and the number of simultaneous commands sent to the PXE.

Enabling Strong Passwords

Use of strong passwords makes it more difficult for intruders to crack user passwords and access the PXE device. By default, strong passwords should be at least eight characters long and contain upper- and lower-case letters, numbers, and special characters, such as @ or &.

► **To force users to create strong passwords:**

1. Choose Device Settings > Security > Password Policy. The Password Policy dialog appears.
2. Select the Strong Passwords checkbox to activate the strong password feature. The following are the default settings:

Minimum length	= 8 characters
Maximum length	= 32 characters
At least one lowercase character	= Required
At least one uppercase character	= Required
At least one numeric character	= Required
At least one special character	= Required
Number of restricted passwords in history	= 5

Note: The maximum password length accepted by the PXE is 64 characters.

3. Make necessary changes to the default settings.
4. Click OK.

Enabling Password Aging

Password Aging determines whether users are required to change passwords at regular intervals. The default is to disable this feature.

► **To force users to change passwords regularly:**

1. Choose Device Settings > Security > Password Policy. The Password Policy dialog appears.
2. Select the Password Aging checkbox to enable the password aging feature.
3. To determine how often users are requested to change their passwords, select a number of days in the Password Aging Interval field. Users are required to change their password every time when that number of days has passed.

Tip: If the desired time option is not listed, you can manually type the desired time in this field. For example, you can type "9 d" to set the password aging time to 9 days.

4. Click OK.

Enabling and Editing the Security Banner

Use the PXE restricted service agreement (security banner) if you want to require users to read and accept a security agreement when they log in to the PXE.

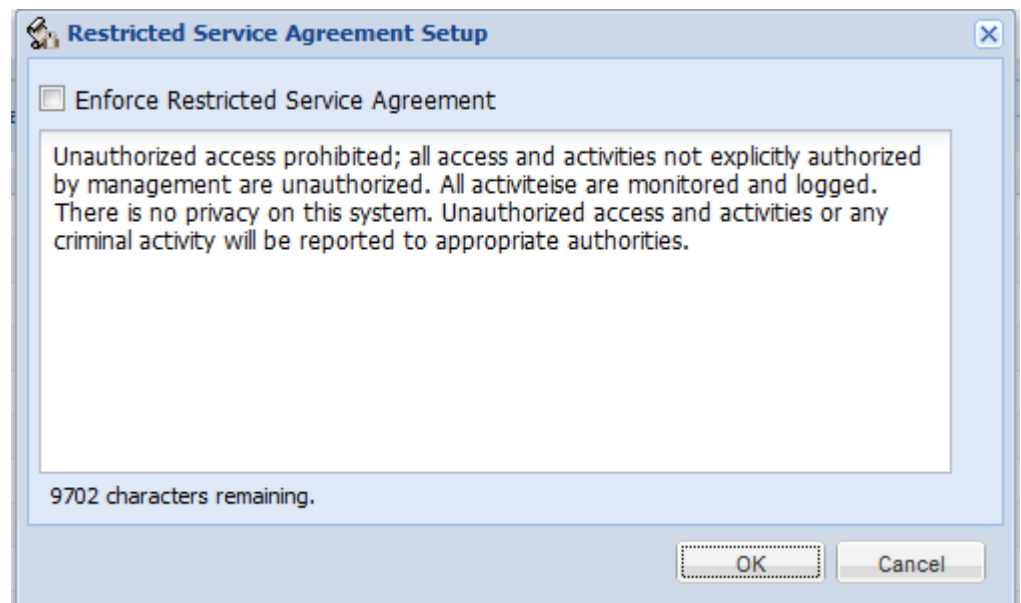
A default agreement is provided. You can edit or replace the default text as needed by typing directly in the security dialog or pasting text into it.

A maximum of 10,000 characters can be entered or pasted into the security banner.

If a user declines the agreement, they cannot log in. An event notifying you if a user has accepted or declined the agreement can be created. See **Default Log Messages** (on page 139)

► To enable the service agreement:

1. Click Device Services > Security > Restricted Service Agreement Banner. The Restricted Service Agreement Setup dialog opens.
2. Select the Enforce Restricted Service Agreement checkbox.
3. Edit the text or replace it as needed.
4. Click OK.



If the Restricted Service Agreement feature is enabled, the Restricted Service Agreement is displayed when any user logs in to the PXE. Do either of the following, or you cannot successfully log in to the PXE:

- In the web interface, select the checkbox labeled "I understand and accept the Restricted Service Agreement."

Tip: To select the agreement checkbox using the keyboard, press the Space bar.

- In the CLI, type `y` when the confirmation message "I understand and accept the Restricted Service Agreement" is displayed.

Setting Up Role-Based Access Control Rules

Role-based access control rules are similar to firewall rules, except they are applied to members sharing a specific role. This enables you to grant system permissions to a specific role, based on their IP addresses.

► To set up role-based access control rules:

1. Enable the feature. See **Enabling the Feature** (on page 97).
2. Set the default policy. See **Changing the Default Policy** (on page 98).
3. Create rules specifying which addresses to accept and which ones to discard when the addresses are associated with a specific role. See **Creating Role-Based Access Control Rules** (on page 98).

Changes made do not affect users currently logged in until the next login.

Enabling the Feature

You must enable this access control feature before any relevant rule can take effect.

► To enable role-based access control rules:

1. Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
2. To enable the IPv4 firewall, click the IPv4 tab, and select the "Enable Role Based Access Control for IPv4" checkbox.
3. To enable the IPv6 firewall, click the IPv6 tab, and select the "Enable Role Based Access Control for IPv6" checkbox.
4. Click OK.

Changing the Default Policy

The default policy is to accept all traffic from all IP addresses regardless of the role applied to the user.

► **To change the default policy:**

1. Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
2. To determine the default policy for IPv4 addresses:
 - a. Click the IPv4 tab if necessary.
 - b. Ensure the "Enable Role Based Access Control for IPv4" checkbox is selected.
 - c. Select the action you want from the Default Policy drop-down list.
 - Allow: Accepts traffic from all IPv4 addresses regardless of the user's role.
 - Deny: Drops traffic from all IPv4 addresses regardless of the user's role.
3. To determine the default policy for IPv6 addresses:
 - a. Click the IPv6 tab.
 - b. Ensure the "Enable Role Based Access Control for IPv6" checkbox is selected.
 - c. Select the action you want from the Default Policy drop-down list.
 - Allow: Accepts traffic from all IPv6 addresses regardless of the user's role.
 - Deny: Drops traffic from all IPv6 addresses regardless of the user's role.
4. Click OK.

Creating Role-Based Access Control Rules

Role-based access control rules accept or drop traffic, based on the user's role and IP address. Like firewall rules, the order of rules is important, since the rules are executed in numerical order.

► **To create role-based access control rules:**

1. Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
2. Click the IPv4 tab for creating IPv4 firewall rules, or click the IPv6 tab for creating IPv6 firewall rules.

3. Ensure the "Enable Role Based Access Control for IPv4" checkbox is selected on the IPv4 tab, or the "Enable Role Based Access Control for IPv6" checkbox is selected on the IPv6 tab.
4. Create specific rules:

Action	Do this...
Add a rule to the end of the rules list	<ul style="list-style-type: none"> ▪ Click Append. The "Append new Rule" dialog appears. ▪ Type a starting IP address in the Starting IP Address field. ▪ Type an ending IP address in the Ending IP Address field. ▪ Select a role from the drop-down list in the Role field. This rule applies to members of this role only. ▪ Select Allow or Deny from the drop-down list in the Policy field. <ul style="list-style-type: none"> ▪ Allow: Accepts traffic from the specified IP address range when the user is a member of the specified role ▪ Deny: Drops traffic from the specified IP address range when the user is a member of the specified role ▪ Click OK. <p>The system automatically numbers the rule.</p>
Insert a rule between two existing rules	<ul style="list-style-type: none"> ▪ Select the rule above which you want to insert a new rule. For example, to insert a rule between rules #3 and #4, select #4. ▪ Click Insert. The "Insert new Rule" dialog appears. ▪ Type a starting IP address in the Starting IP Address field. ▪ Type an ending IP address in the Ending IP Address field. ▪ Select a role from the drop-down list in the Role field. This rule applies to members of this role only. ▪ Select Allow or Deny from the drop-down list in the Policy field. <ul style="list-style-type: none"> ▪ Allow: Accepts traffic from the specified IP address range when the user is a member of the specified role ▪ Deny: Drops traffic from the specified IP address range when the user is a member of the specified role

Action	Do this...
	<ul style="list-style-type: none"> Click OK. <p>The system inserts the rule and automatically renumbers the following rules.</p>

- Click OK.

Editing Role-Based Access Control Rules

You can modify existing rules when these rules do not meet your needs.



► To modify a role-based access control rule:

- Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
- To modify the IPv4 firewall rules, click the IPv4 tab. To modify the IPv6 firewall rules, click the IPv6 tab.
- Ensure the "Enable Role Based Access Control for IPv4" checkbox is selected on the IPv4 tab, or the "Enable Role Based Access Control for IPv6" checkbox is selected on the IPv6 tab.
- Select the rule to be modified in the rules list.
- Click Edit or double-click the rule. The Edit Rule dialog appears.
- Make changes to the information shown.
- Click OK.

Sorting Role-Based Access Control Rules

Similar to firewall rules, the order of role-based access control rules determines which one of the rules matching the IP address and role is performed.

► To sort role-based access control rules:

- Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
- To sort the IPv4 firewall rules, click the IPv4 tab. To sort the IPv6 firewall rules, click the IPv6 tab.
- Ensure the "Enable Role Based Access Control for IPv4" checkbox is selected on the IPv4 tab, or the "Enable Role Based Access Control for IPv6" checkbox is selected on the IPv6 tab.
- Select a specific rule by clicking it.
- Click  or  to move the selected rule up or down until it reaches the desired location.

6. Click OK.

Deleting Role-Based Access Control Rules

When any access control rule becomes unnecessary or obsolete, remove it.

► To delete a role-based access control rule:

1. Choose Device Settings > Security > Role Based Access Control. The Configure Role Based Access Control Settings dialog appears.
2. To delete the IPv4 firewall rules, click the IPv4 tab. To delete the IPv6 firewall rules, click the IPv6 tab.
3. Ensure the "Enable Role Based Access Control for IPv4" checkbox is selected on the IPv4 tab, or the "Enable Role Based Access Control for IPv6" checkbox is selected on the IPv6 tab.
4. Select the rule to be deleted in the rules list. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
5. Click Delete.
6. A message appears, prompting you to confirm the operation. Click Yes to confirm the deletion.
7. Click OK.

Setting Up an SSL Certificate

Having an X.509 digital certificate ensures that both parties in an SSL connection are who they say they are.

To obtain a certificate for the PXE, create a Certificate Signing Request (CSR) and submit it to a certificate authority (CA). After the CA processes the information in the CSR, it provides you with an SSL certificate, which you must install on the PXE device.

Note: If you are using an SSL certificate that is part of a chain of certificates, each part of the chain is signed during the validation process.

*Note: See **Forcing HTTPS Encryption** (on page 86) for instructions on forcing users to employ SSL when connecting to the PXE.*

A CSR is not required in either of the following scenarios:

- You decide to generate and use a *self-signed* certificate on the PXE device.
- Appropriate, valid certificate and key files are already available.

Certificate Signing Request

When appropriate certificate and key files for the PXE are NOT available, one of the alternatives is to create a CSR and private key on the PXE device, and send the CSR to a CA for signing the certificate.

Creating a Certificate Signing Request

Follow this procedure to create the CSR for your PXE device.

► **To create a CSR:**

1. Choose Device Settings > Security > SSL Certificate. The Manage SSL Certificate dialog appears.
2. Click the New SSL Certificate tab.
3. Provide the information requested.
 - In the Subject section:

Field	Type this information
Country (ISO Code)	The country where your company is located. Use the standard ISO country code. For a list of ISO codes, visit the ISO website (http://www.iso.org/iso/country_codes/iso_3166_code_lists.htm).
State or Province	The full name of the state or province where your company is located.
Locality	The city where your company is located.
Organization	The registered name of your company.
Organizational Unit	The name of your department.
Common Name	The fully qualified domain name (FQDN) of your PXE device.
Email Address	An email address where you or another administrative user can be reached.

Note: All fields in the Subject section are mandatory, except for the Organization, Organizational Unit and Email Address fields. If you generate a CSR without values entered in the required fields, you cannot obtain third-party certificates.

- In the Key Creation Parameters section:

Field	Do this
Key Length	Select the key length (bits) from the drop-down list in this field. A larger key length enhances the security, but slows down the PXE device's response.
Self Sign	For requesting a certificate signed by the CA, ensure this checkbox is NOT selected.

Field	Do this
Challenge	Type a password. The password is used to protect the certificate or CSR. This information is optional, and the value should be 4 to 64 characters long. The password is case sensitive, so ensure you capitalize the letters correctly.
Confirm Challenge	Type the same password again for confirmation.

4. Click Create New SSL Key to create both the CSR and private key. This may take several minutes to complete.
5. To download the newly-created CSR to your computer, click Download Certificate Signing Request.
 - a. You are prompted to open or save the file. Click Save to save it onto your computer.
 - b. After the file is stored on your computer, submit it to a CA to obtain the digital certificate.
 - c. If intended, click Delete Certificate Signing Request to remove the CSR file permanently from the PXE device.
6. To store the newly-created private key on your computer, click Download Key. You are prompted to open or save the file. Click Save to save it onto your computer.
7. Click Close to quit the dialog.

Installing a CA-Signed Certificate

After the CA provides a signed certificate according to the CSR you submitted, you must install it on the PXE device.

► To install the certificate:

1. Choose Device Settings > Security > SSL Certificate. The Manage SSL Certificate dialog appears.
2. Click the New SSL Certificate tab.
3. In the Certificate File field, click Browse to select the certificate file provided by the CA.
4. Click Upload. The certificate is installed on the PXE device.

Tip: To verify whether the certificate has been installed successfully, click the Active SSL Certificate tab.

5. Click Close to quit the dialog.

Creating a Self-Signed Certificate

When appropriate certificate and key files for the PXE device are unavailable, the alternative, other than submitting a CSR to the CA, is to generate a self-signed certificate.

► **To create and install a self-signed certificate:**

1. Choose Device Settings > Security > SSL Certificate. The Manage SSL Certificate dialog appears.
2. Click the New SSL Certificate tab.
3. Provide the information requested.

Field	Type this information
Country (ISO Code)	The country where your company is located. Use the standard ISO country code. For a list of ISO codes, visit the ISO website (http://www.iso.org/iso/country_codes/iso_3166_code_lists.htm).
State or Province	The full name of the state or province where your company is located.
Locality	The city where your company is located.
Organization	The registered name of your company.
Organizational Unit	The name of your department.
Common Name	The fully qualified domain name (FQDN) of your PXE device.
Email Address	An email address where you or another administrative user can be reached.
Key Length	Select the key length (bits) from the drop-down list in this field. A larger key length enhances the security, but slows down the PXE device's response.
Self Sign	Ensure this checkbox is selected, which indicates that you are creating a self-signed certificate.
Validity in days	This field appears after the Self Sign checkbox is selected. Type the number of days for which the self-signed certificate will be valid.

Note: All fields in the Subject section are mandatory, except for the Organization, Organizational Unit and Email Address fields.

A password is not required for a self-signed certificate so the Challenge and Confirm Challenge fields disappear after the Self Sign checkbox is selected.

4. Click Create New SSL Key to create both the self-signed certificate and private key. This may take several minutes to complete.
5. You can also do any of the following:

- Click "Install Key and Certificate" to immediately install the self-signed certificate and private key. When any confirmation and security messages appear, click Yes to continue.

Tip: To verify whether the certificate has been installed successfully, click the Active SSL Certificate tab.

- To download the self-signed certificate or private key, click Download Certificate or Download Key. You are prompted to open or save the file. Click Save to save it onto your computer.
 - To remove the self-signed certificate and private key permanently from the PXE device, click "Delete Key and Certificate".
6. If you installed the self-signed certificate in Step 5, after the installation completes, the PXE device resets and the login page re-opens.

Installing Existing Key and Certificate Files

If the SSL certificate and private key files are already available, you can install them directly without going through the process of creating a CSR or a self-signed certificate.

Note: If you are using an SSL certificate that is part of a chain of certificates, each part of the chain is signed during the validation process.

► To install existing key and certificate files:

1. Choose Device Settings > Security > SSL Certificate. The Manage SSL Certificate dialog appears.
2. Click the New SSL Certificate tab.
3. Select the "Upload Key and Certificate" checkbox. The Key File and Certificate File fields appear.
4. In the Key File field, click Browse to select the private key file.
5. In the Certificate File field, click Browse to select the certificate file.
6. Click Upload. The selected files are installed on the PXE device.

Tip: To verify whether the certificate has been installed successfully, click the Active SSL Certificate tab.

7. Click Close to quit the dialog.

Downloading Key and Certificate Files

You can download the key and certificate files currently installed on the PXE device for backup or other operations. For example, you can install the files on a replacement PXE device, add the certificate to your browser and so on.

► **To download the certificate and key files from the PXE device:**

1. Choose Device Settings > Security > SSL Certificate. The Manage SSL Certificate dialog appears.
2. The Active SSL Certificate tab should open. If not, click it.
3. Click Download Key to download the private key file installed on the PXE device. You are prompted to open or save the file. Click Save to save it onto your computer.
4. Click Download Certificate to download the certificate file installed on the PXE device. You are prompted to open or save the file. Click Save to save it onto your computer.
5. Click Close to quit the dialog.

Setting Up External Authentication

For security purposes, users attempting to log in to the PXE must be authenticated. The PXE supports the access using one of the following authentication mechanisms:

- Local database of user profiles on the PXE device
- Lightweight Directory Access Protocol (LDAP)
- Remote Access Dial-In User Service (RADIUS) protocol

By default, the PXE is configured for local authentication. If you stay with this method, you do not need to do anything other than create user profiles for each authorized user.

If you prefer external authentication, you must provide the PXE with information about the external authentication server.

If both local and external authentication is needed, create user profiles on the PXE in addition to providing the external authentication server data.

When configured for external authentication, all PXE users must have an account on the external authentication server. Local-authentication-only users will have no access to the PXE except for the admin, who always can access the PXE.

Gathering the External Authentication Information

No matter which type of external authentication is preferred, the first step is to gather the data of all external authentication servers that you want to use.

Gathering the LDAP Information

It requires knowledge of your LDAP server and directory settings to configure the PXE for LDAP authentication. If you are not familiar with the settings, consult your LDAP administrator for help.

To configure LDAP authentication, you need to check:

- The IP address or hostname of the LDAP server
- Whether the Secure LDAP protocol (LDAP over SSL) is being used
 - If Secure LDAP is in use, consult your LDAP administrator for the CA certificate file.
- The network port used by the LDAP server
- The type of the LDAP server, usually one of the following options:
 - *OpenLDAP*
 - If using an OpenLDAP server, consult the LDAP administrator for the Bind Distinguished Name (DN) and password.
 - *Microsoft Active Directory® (AD)*
 - If using a Microsoft Active Directory server, consult your AD administrator for the name of the Active Directory Domain.
- Bind Distinguished Name (DN) and password (if anonymous bind is NOT used)
- The Base DN of the server (used for searching for users)
- The login name attribute (or AuthorizationString)
- The user entry object class
- The user search subfilter (or BaseSearch)

Gathering the RADIUS Information

To configure RADIUS authentication, you need to collect the RADIUS information. If you are not familiar with the remote RADIUS information, consult your RADIUS administrator for help.

Below is the RADIUS information to gather:

- The IP address or host name of the RADIUS server
- Authentication protocol used by the RADIUS server
- Shared secret for a secure communication
- UDP authentication port used by the RADIUS server
- UDP accounting port used by the RADIUS server

Adding Authentication Servers

Add all external authentication servers that you want to use to the PXE. Later you can use the sequence of the server list to control the authentication servers' access priority.

Adding LDAP Server Settings

To activate and use external LDAP/LDAPS server authentication, enable LDAP authentication and enter the information you have gathered for any LDAP/LDAPS server.

Note: An LDAPS server refers to an SSL-secured LDAP server.

► To add new LDAP/LDAPS server settings:

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the LDAP radio button to activate the LDAP/LDAPS authentication.
3. Click New to add an LDAP/LDAPS authentication server. The "Create new LDAP Server Configuration" dialog appears.
4. IP Address / Hostname - Type the IP address or hostname of your LDAP/LDAPS authentication server.

Important: Without the SSL encryption enabled, you can type either the domain name or IP address in this field, but you must type the fully qualified domain name if the SSL encryption is enabled.

5. Type of LDAP server. Choose one of the following options:
 - OpenLDAP

- Microsoft Active Directory. Active Directory is an implementation of LDAP/LDAPS directory services by Microsoft for use in Windows environments.
6. LDAP over SSL - Select this checkbox if you would like to use SSL. Secure Sockets Layer (SSL) is a cryptographic protocol that allows the PXE to communicate securely with the LDAP/LDAPS server.
 7. Port - The default Port is 389. Either use the standard LDAP TCP port or specify another port.
 8. SSL Port - The default is 636. Either use the default port or specify another port. This field is enabled when the "LDAP over SSL" checkbox is selected.
 9. Enable verification of LDAP Server Certificate - Select this checkbox if you would like the PXE to verify whether the selected LDAP server certificate is valid.
 10. CA Certificate - Consult your authentication server administrator to get the CA certificate file for the LDAP/LDAPS server. Use the Browse button to navigate to the certificate file.
 11. Anonymous Bind - For "OpenLDAP," use this checkbox to enable or disable anonymous bind.
 - To use anonymous bind, select this checkbox.
 - When a Bind DN and password are required to bind to the external LDAP/LDAPS server, deselect this checkbox.
 12. Use Bind Credentials - For "Microsoft Active Directory," use this checkbox to enable or disable anonymous bind.
 - To use anonymous bind, deselect this checkbox. By default it is deselected.
 - When a Bind DN and password are required to bind to the external LDAP/LDAPS server, select this checkbox.
 13. Bind DN - Specify the DN of the user who is permitted to search the LDAP directory in the defined search base. This information is required only when the Use Bind Credentials checkbox is selected.
 14. Bind Password and Confirm Bind Password - Enter the Bind password in the Bind Password field first and then the Confirm Bind Password field. This information is required only when the Use Bind Credentials checkbox is selected.
 15. Base DN for Search - Enter the name you want to bind against the LDAP/LDAPS (up to 31 characters), and where in the database to begin searching for the specified Base DN. An example Base Search value might be: `cn=Users,dc=raritan,dc=com`. Consult your authentication server administrator for the appropriate values to enter into these fields.
 16. Type the following information in the corresponding fields. LDAP needs this information to verify user names and passwords.

- Login name attribute (also called AuthorizationString)
- User entry object class
- User search subfilter (also called BaseSearch)

Note: The PXE will preoccupy the login name attribute and user entry object class with default values, which should not be changed unless required.

17. Active Directory Domain - Type the name of the Active Directory Domain. For example, testradius.com. Consult with your Active Directory Administrator for a specific domain name.
18. To verify if the authentication configuration is set correctly, you may click Test Connection to check whether the PXE can connect to the remote authentication server successfully.

Tip: You can also do this by using the Test Connection button in the Authentication Settings dialog.

19. Click OK. The new LDAP server is listed in the Authentication Settings dialog.
20. To add additional LDAP/LDAPS servers, repeat Steps 3 to 19.
21. Click OK. The LDAP authentication is now in place.

► **To duplicate LDAP/LDAPS server settings:**

If you have added any LDAP/LDAPS server information to the PXE, and the server you are adding shares the same settings with an existing server, the most convenient way is to duplicate that LDAP/LDAPS server's data.

1. Repeat Steps 1 to 4 in the above procedure to add the LDAP/LDAPS server you want.
2. Select the "Use settings from LDAP Server" checkbox.
3. Click the drop-down arrow below the checkbox to select the LDAP/LDAPS server whose settings you want to copy.
4. Click OK.

Note: If the PXE clock and the LDAP server clock are out of sync, the certificates are considered expired and users are unable to authenticate using LDAP. To ensure proper synchronization, administrators should configure the PXE and the LDAP server to use the same NTP server.

More Information about AD Configuration

For more information about the LDAP configuration using Microsoft Active Directory, see **LDAP Configuration Illustration** (on page 330).

Adding RADIUS Server Settings

To activate and use external RADIUS server authentication, enable RADIUS authentication and enter the information you have gathered for any RADIUS server.

► **To set up RADIUS authentication:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the Radius radio button to enable the RADIUS authentication.
3. Click New to add a RADIUS authentication server. The "Create new RADIUS Server Configuration" dialog appears.
4. Type the IP address or host name of the RADIUS server in the IP Address / Hostname field.
5. Select an authentication protocol in the "Type of RADIUS Authentication" field. Your choices include:
 - PAP (Password Authentication Protocol)
 - CHAP (Challenge Handshake Authentication Protocol)

CHAP is generally considered more secure because the user name and password are encrypted, while in PAP they are transmitted in the clear.
6. By default, the PXE uses the standard RADIUS port 1812 (authentication) and 1813 (accounting). If you prefer to use non-standard ports, change the ports.
7. Type the timeout period in seconds in the Timeout field. This sets the maximum amount of time to establish contact with the RADIUS server before timing out. Default is 1 second.
8. Type the number of retries permitted in the Retries field. Default is 3.
9. Type the shared secret in the Shared Secret and Confirm Shared Secret fields. The shared secret is necessary to protect communication with the RADIUS server.
10. To verify if the authentication configuration is set correctly, you may click Test Connection to check whether the PXE can connect to the remote authentication server successfully.

Tip: You can also do this by using the Test Connection button in the Authentication Settings dialog.

11. Click OK. The new RADIUS server is listed in the Authentication Settings dialog.
12. To add additional RADIUS servers, repeat Steps 3 to 11.
13. Click OK. RADIUS authentication is now in place.

Sorting the Access Order

The order of the authentication server list determines the access priority of remote authentication servers. The PXE first tries to access the top server in the list for authentication, then the next one if the access to the first one fails, and so on until the PXE device successfully connects to one of the listed servers.

Note: After successfully connecting to one external authentication server, the PXE STOPS trying to access the remaining authentication servers in the list regardless of the user authentication result.

► **To re-sort the authentication server access list:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the remote authentication server whose priority you want to change.
3. Click "Move up" or "Move down" until the selected server reaches the desired position in the list.
4. Click OK.

Testing the Server Connection

You can test the connection to any external authentication server to verify the server accessibility or the validity of the authentication settings.

► **To test the connection to an authentication server:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the remote authentication server that you want to test.
3. Click Test Connection to start the connection test.

Editing Authentication Server Settings

If the configuration of any external authentication server has been changed, such as the port number, you must modify the authentication settings on the PXE device accordingly, or the authentication fails.

► **To modify the external authentication configuration:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the remote authentication server that you want to edit.
3. Click Edit or double-click that server.

4. Make necessary changes to the information shown.
5. Click OK.

Deleting Authentication Server Settings

You can delete the settings of a specific authentication server when that server is no longer available or used for remote authentication.

► **To remove one or multiple authentication servers:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the remote authentication server that you want to remove. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
3. Click Delete.
4. A message appears, prompting you to confirm the operation. Click Yes to confirm the deletion.
5. Click OK.

Disabling External Authentication

When the remote authentication service is disabled, the PXE authenticates users against the local database stored on the PXE device.

► **To disable the external authentication service:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the Local Authentication radio button.
3. Click OK.

Enabling External and Local Authentication Services

To make authentication function properly all the time - even when external authentication is not available, you can enable both the local and remote authentication services.

When both authentication services are enabled, the PXE follows these rules for authentication:

- When any of the remote authentication servers in the access list is accessible, the PXE authenticates against the connected authentication server only.
- When the connection to all remote authentication servers fails, the PXE allows authentication against the local database.

► **To enable both authentication services:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Make sure you have selected one external authentication radio button, such as the LDAP radio button.
3. Select the "Use Local Authentication if Remote Authentication service is not available" checkbox.
4. Click OK.

Outlet Management

The PXE allows you to remotely customize the name of each outlet or check the receptacle type of each outlet through the web interface.

Naming Outlets

You can give each outlet a unique name up to 32 characters long to identify the equipment connected to it. The customized name is followed by the label in parentheses.

Note: In this context, a label is an outlet number, such as 1, 2, 3 and so on.

► **To name an outlet:**

1. Click Outlets in the PX Explorer pane, and the Outlets page opens in the right pane.
2. Select the outlet you want in the right pane. Or you can select the desired outlet in the PX Explorer pane to open that outlet's page.
3. Click Setup in the right pane. The setup dialog for the selected outlet appears.

4. Type a name in the Outlet Name field.
5. Click OK.

Checking Outlet-Specific Data

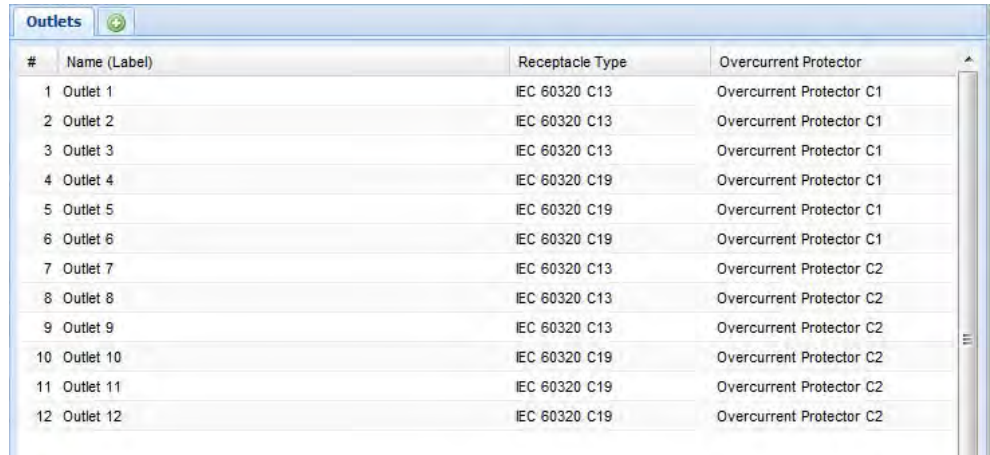
To find out each outlet's name, label, and receptacle type, you can check the Outlets page or each individual outlet's page.

*Tip: More outlet information is available by choosing Maintenance > Device Information. See **Displaying PDU Information** (on page 54).*

► To check the information of all outlets:

- Click Outlets in the PX Explorer pane, and the Outlets page opens in the right pane.

All outlets are listed with outlet-specific information.



#	Name (Label)	Receptacle Type	Overcurrent Protector
1	Outlet 1	IEC 60320 C13	Overcurrent Protector C1
2	Outlet 2	IEC 60320 C13	Overcurrent Protector C1
3	Outlet 3	IEC 60320 C13	Overcurrent Protector C1
4	Outlet 4	IEC 60320 C19	Overcurrent Protector C1
5	Outlet 5	IEC 60320 C19	Overcurrent Protector C1
6	Outlet 6	IEC 60320 C19	Overcurrent Protector C1
7	Outlet 7	IEC 60320 C13	Overcurrent Protector C2
8	Outlet 8	IEC 60320 C13	Overcurrent Protector C2
9	Outlet 9	IEC 60320 C13	Overcurrent Protector C2
10	Outlet 10	IEC 60320 C19	Overcurrent Protector C2
11	Outlet 11	IEC 60320 C19	Overcurrent Protector C2
12	Outlet 12	IEC 60320 C19	Overcurrent Protector C2

► To check the information of an individual outlet:

1. Expand the Outlets folder to show all outlets in the PX Explorer pane. See **Expanding the Tree** (on page 42).
2. Click the desired outlet in the PX Explorer pane. Its page opens in the right pane, with that outlet's details shown.

Inlet and Overcurrent Protector Management

You can name each inlet and overcurrent protector or monitor the inlet status. Or you can reset the inlet's active energy reading.

Naming the Inlet

You can customize the inlet's name for your own purpose. For example, you can name an inlet to identify its power source. The customized name is followed by the label in parentheses.

Note: In this context, the label refers to the inlet number, such as I1.

This function is especially useful if there are multiple inlets on your PXE device.

► **To name the inlet:**

1. Click Inlet I1 in the PX Explorer pane, and the Inlet I1 page opens in the right pane.
2. Click Setup. The Inlet I1 Setup dialog appears.
3. Type a new name in the Name field.
4. Click OK.

Monitoring the Inlet

You can view the inlet's details, including its:

- Label (number)
- Customized name
- Inlet sensor readings:
 - RMS current per line (A)
 - RMS voltage per line pair (V)
 - Active power (W)
 - Apparent power (VA)
 - Power factor
 - Active energy (Wh)
 - Unbalanced load percentage (for 3-phase models)
 - Line frequency (Hz), if available on your PDU

*Note: If a sensor row is colored, it means the sensor reading already crosses one of the thresholds or the sensor enters the alarmed state. See **The Yellow- or Red-Highlighted Sensors** (on page 46).*

There are two ways to access the inlet information.

► **To get the overview of the inlet status:**

1. Click the Dashboard icon in the PX Explorer pane, and the Dashboard page opens in the right pane.

2. Locate the Inlet section on the Dashboard page.

► **To view the inlet's details:**

Click Inlet I1 in the PX Explorer pane, and the Inlet I1 page opens in the right pane.

Naming Overcurrent Protectors

You can name each overcurrent protector for easily identifying them. The customized name is followed by the label in parentheses.

Note: In this context, a label is an overcurrent protector number, such as C1 for a circuit breaker or F1 for a fuse.

► **To name an overcurrent protector:**

1. Expand the Overcurrent Protectors folder in the PX Explorer pane if needed. See **Expanding the Tree** (on page 42).
2. In the PX Explorer pane, click the desired overcurrent protector. The page specific to that overcurrent protector opens in the right pane.
3. Click Setup. The Overcurrent Protector Setup dialog appears.

Tip: You can also trigger the same dialog by selecting the Overcurrent Protectors folder, then selecting an overcurrent protector and clicking Setup on the Overcurrent Protectors page.

4. Type a new name in the Name field.
5. Click OK.

Resetting Inlet Active Energy Readings

You can manually reset the active energy readings of an individual inlet instead of resetting all active energy readings of the PDU. This is especially useful when your PXE has more than one inlet.

Only users with the 'Admin' role assigned can reset active energy readings.

► **To reset active energy readings of one inlet:**

1. If your PXE has multiple inlets, expand the Inlet folder in the PX Explorer pane to show all inlets. See **Expanding the Tree** (on page 42). If your PXE has only one inlet, skip this step.
2. Select the inlet whose active energy you want to reset.
3. Click Reset Active Energy in the Power section.
4. Click Yes on the confirmation message. The 'Active Energy' reading of the selected inlet now shows 0 (zero) Wh.

*Tip: You can reset all active energy readings at any time. See **Resetting All Active Energy Readings** (on page 77).*

Disabling an Inlet (for Multi-Inlet PDUs)

The PXE, if it has more than one inlet, enables all inlets by default so that the PXE detects and displays all sensors' readings and states, and reports or shows warnings, events or alarm notifications associated with all inlets, outlets and overcurrent protectors (if available).

After disabling an inlet, the following information or feature is no longer available:

- All of the sensor readings, states, warnings, event or alarm notifications associated with the disabled inlet
- All of the sensor readings, states, warnings, event or alarm notifications for the outlets and overcurrent protectors associated with the disabled inlet
- The outlet-switching functionality, if available, for those outlets associated with the disabled inlet

Exception: All active energy sensors continue to accumulate data regardless of whether any inlet has been disabled.

Warning: A disabled inlet, if remaining connected to a power source, continues to receive power from the connected power source and supplies power continuously to the associated outlets and overcurrent protectors.

► **To disable an inlet:**

1. Click the Inlets folder in the PX Explorer pane, and the Inlets page opens in the right pane.
2. Select the inlet that you want to disable.
3. Click Setup.
4. Select the "Disable this inlet" checkbox.
5. To disable additional inlets, repeat the above steps.

6. If disabling an inlet will result in all inlets being disabled, a confirmation dialog appears, indicating that all inlets will be disabled. Then click Yes to confirm this operation or No to abort it.



Setting Power Thresholds

Setting and enabling the thresholds causes the PXE to generate alert notifications when it detects that any component's power state crosses the thresholds. See **The Yellow- or Red-Highlighted Sensors** (on page 46).

There are four thresholds for each sensor: Lower Critical, Lower Warning, Upper Warning and Upper Critical.

- Upper and Lower Warning thresholds indicate the sensor reading enters the warning level.
- Upper and Lower Critical thresholds indicate the sensor reading enters the critical level.

To avoid generating a large amount of alert events, you can set the assertion timeout and deassertion hysteresis.

For detailed information, see **Sensor Threshold Settings** (on page 349).

*Note: After setting the thresholds, remember to configure event rules. See **Event Rules and Actions** (on page 121).*

Setting Inlet Thresholds

You can set the inlet thresholds so that the alerts are generated when the inlet current and/or voltage crosses the thresholds.

► To set the inlet thresholds:

1. Click Inlet I1 in the PX Explorer pane, and the Inlet I1 page opens in the right pane.
2. Click Setup. The Inlet I1 Setup dialog appears.
3. In the Threshold Configuration table, click the sensor whose thresholds you want to configure.
4. Click Edit or double-click the desired sensor. A threshold setup dialog appears.

5. Configure the Lower Critical, Lower Warning, Upper Warning and Upper Critical thresholds respectively.
 - To enable any threshold, select the corresponding checkbox. To disable a threshold, deselect the checkbox.
 - After any threshold is enabled, type an appropriate numeric value in the accompanying text box.
6. To set the deassertion hysteresis, type a numeric value in the Deassertion Hysteresis field. See ***"To De-assert" and Deassertion Hysteresis*** (on page 354).
7. To set the assertion timeout, type a numeric value in the Assertion Timeout (samples) field. See ***"To Assert" and Assertion Timeout*** (on page 352).
8. Click OK in the threshold setup dialog to retain the changes.
9. To set the thresholds for other sensors, repeat Steps 4 to 8.
10. Click OK.

Important: The final step is required or the threshold changes are not saved.

Event Rules and Actions

A benefit of the product's intelligence is its ability to notify you of and react to a change in conditions. This event notification or reaction is an "event rule."

The PXE is shipped with four built-in event rules, which cannot be deleted.

- **System Event Log Rule:** This causes ANY event occurred to the PXE to be recorded in the internal log. It is enabled by default.
- **System SNMP Notification Rule:** This causes SNMP traps or informs to be sent to specified IP addresses or hosts when ANY event occurs to the PXE. It is disabled by default.
- **System Tamper Detection Alarmed:** This causes the PXE to send alarm notifications if a DX-PIR tamper sensor has been connected and the PXE detects that the tamper sensor enters the alarmed state.
- **System Tamper Detection Unavailable:** This causes the PXE to send alarm notifications if a DX-PIR tamper sensor has been connected and the PXE detects that the communication with the connected tamper sensor is lost.

If these do not satisfy your needs, you can create additional rules to respond to different events. You need the Administrator Privileges to configure event rules.

Note: Internet Explorer® 8 (IE8) does not use compiled JAVA script. When using IE8 to create or change event rules, the CPU performance may be degraded, resulting in the appearance of the connection time out message. When this occurs, click Ignore to continue.

Components of an Event Rule

An event rule defines what the PXE does in certain situations and is composed of two parts:

- **Event:** This is the situation where the PXE or part of it meets a certain condition. For example, the inlet's voltage exceeds the warning threshold.
- **Action:** This is the response to the event. For example, the PXE notifies the system administrator of the event and records the event in the log.

Creating an Event Rule

The best way to create a new set of event rules in sequence is to:

- Create actions for responding to one or multiple events
- Create rules to determine what actions are taken when these events occur

Creating Actions

The PXE comes with three built-in actions:

- **System Event Log Action:** This action records the selected event in the internal log when the event occurs.
- **System SNMP Notification Action:** This action sends SNMP notifications to one or multiple IP addresses after the selected event occurs.
- **System Tamper Alarm:** This action causes the PXE to show the alarm for the DX-PIR tamper sensor in the Alarms section of the Dashboard until a person acknowledges it. By default, this action has been assigned to the built-in tamper detection event rules. For information on acknowledging an alarm, see **Alarms List** (on page 52).

Note: No IP addresses are specified in the "System SNMP Notification Action" by default so you must specify IP addresses before applying this action to any event rule.

The built-in actions cannot be deleted.

► To create new actions:

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action:

Action	Function
Execute an action group	Creates a group of actions comprising existing actions. See Action Group (on page 124).

Action	Function
Alarm	Requires the user to acknowledge the alert when it is generated. If needed, you can have the alert notifications regularly generated when no one takes the acknowledgment action. See Alarm (on page 125).
Log event message	Records the selected events in the internal log. See Log an Event Message (on page 126).
Send SMTP message	Emails a textual message. See Send EMail (on page 127).
Send SNMP notification	Sends SNMP traps or informs to one or multiple SNMP destinations. See Send an SNMP Notification (on page 128).
Syslog message	Makes the PXE automatically forward event messages to the specified syslog server. See Syslog Message (on page 130).
Send Sensor Report	Reports the readings or status of the selected sensors, including internal or external sensors. See Send Sensor Report (on page 131).
Switch Peripheral Actuator	Switches on or off the mechanism or system connected to the specified actuator. See Switch Peripheral Actuator (on page 132).

Note: The PXE does NOT support the connection of an external beeper, modem, or webcam so do NOT select unsupported actions, including "External Beeper," "Send Snapshots via SMTP," "Send SMS Message" and "Record Snapshots to Webcam Storage."

6. Click OK to save the new action.


Note: If you do not click OK before quitting the current settings page, a message appears. Then click Yes to save the changes, Discard to abort or Cancel to return to the current settings page.


7. To create additional actions, repeat the above steps.
8. Click Close to quit the dialog.


Action Group

You can create an action group that performs up to 32 actions. After creating such an action group, you can easily assign this set of actions to an event rule rather than selecting all needed actions one by one per rule.

► To create an action group:

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Execute an action group.
6. To mark an action as part of the action group, select it from the Available Actions list box, and click  to move it to the Used Actions list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To move all actions to the Used Actions list box, click . A maximum of 32 actions can be grouped.

7. To remove an action from the action group, select it from the Used Actions list box, and click  to move it to the Available Actions list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To remove all actions, click .

8. Click OK.
9. To create additional action groups, repeat Steps 3 to 8.

Alarm

The Alarm is an action that requires users to acknowledge an alert, which helps ensure that the user is aware of the alert.

If the Alarm action has been included in a specific event rule and no one acknowledges that alert after it occurs, the PXE resends or regenerates an alert notification regularly until the alert is acknowledged or it reaches the maximum number of alert notifications.

For information on acknowledging an alarm, see **Alarms List** (on page 52).

► To create an Alarm action:



1. Click the Actions tab.
2. Click New.
3. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
4. In the Action field, click the drop-down arrow and select the desired action: Alarm.
5. In the Alarm Notifications list box, specify one or multiple ways to issue the alert notifications.



- a. In the Available Actions field, select the method to send alert notifications. Available methods vary, depending on how many notification-based actions have been created.

Notification-based action types include:

- External Beeper
- Syslog message
- Send SMTP message
- Send SMS message

If no notification-based actions are available, click Create New Notification Action to immediately create these actions.

- b. Click the Add button  to add the selected method to the Alarm Notifications list box.
- c. Repeat the above steps to add more methods if needed.
 - To remove any method from the Alarm Notifications list box, select that method and click the Delete button .
6. In the Notification Options section, configure the notification-resending or -regenerating feature.

- a. To enable the notification-resending feature, select the "Enable re-scheduling of alarm notifications" checkbox. To disable this feature, deselect the checkbox.
 - b. In the "Period in Minutes" field, specify the time interval (in minutes) at which the alert notification is resent or regenerated regularly. You can either directly type a numeric value or click the Up/Down arrow keys to adjust the time.
 - c. In the "Max. numbers" field, specify the maximum number of times the alert notification is resent. Values range from 1 to infinite.
7. If needed, you can instruct the PXE to send the acknowledgment notification after the alarm is acknowledged in the Acknowledgment Notifications list box. **(Optional)**
 - a. In the Available Actions field, select the method to send the acknowledge notification. Available methods are identical to those for generating alarm notifications.
 - b. Click the Add button  to add the selected method to the Acknowledgment Notifications list box.
 - c. Repeat the above steps to add more methods if needed.
 - To remove any method from the Acknowledgment Notifications list box, select that method and click the Delete button .
8. Click OK.

Log an Event Message

This option records the selected events in the internal log.

► To create a log event message:

1. Choose Device Settings > Event Rules. The Event Rules Settings dialog opens.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Log event message.
6. Click OK.

Send Email

You can configure emails to be sent when an event occurs and can customize the message.

Messages consist of a combination of free text and PXE placeholders. The placeholders represent information is pulled from the PXE and inserted into the message.

For example:

```
[USERNAME] logged into the device on [TIMESTAMP]
```

translates to

```
JQPublic logged into the device on 2012-January-30 21:00
```

See **Email and SMS Message Placeholders** (on page 144) for a list and definition of available variables.


► **To configure sending emails:**

1. Choose Device Settings > Event Rules. The Event Rules Settings dialog opens.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Send SMTP message.
6. In the "Recipients email addresses" field, specify the email address(es) of the recipient(s). Use a comma to separate multiple email addresses.
7. To use the SMTP server specified in the SMTP Server Settings dialog, select the Use Default SMTP Server checkbox.

To use a different SMTP server, select the Use Custom SMTP Settings checkbox.

If the SMTP server settings are not configured yet, click Configure. See **Configuring SMTP Settings** (on page 75) for the information of each field. Default messages are sent based on the event. See **Default Log Messages** (on page 139) for a list of default log messages and events that trigger them.

8. If needed, select the Use Custom Log Message checkbox, and then create a custom message in the provided field.

Click the Information icon  to open the Event Context Information dialog, which contains a list of placeholders and their definitions. See **Email and SMS Message Placeholders** (on page 144) for more details.

9. Click OK.

Send an SNMP Notification

This option sends an SNMP notification to one or multiple SNMP destinations.

► **To configure sending an SNMP notification:**

1. Choose Device Settings > Event Rules. The Event Rules Settings dialog opens.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Send SNMP notification.
6. Select the type of SNMP notification. See either procedure below according to your selection.

► **To send SNMP v2c notifications:**

1. From the Notification Type drop-down, select SNMPv2c Trap or SNMPv2c Inform.
2. For SNMP INFORM communications, leave the resend settings at their default or:
 - a. In the Timeout (sec) field, enter the interval of time, in seconds, after which a new inform communication is resent if the first is not received. For example, resend a new inform communication once every 3 seconds.
 - b. In the Number of Retries field, enter the number of times you want to resend the inform communication if it fails. For example, inform communications are resent up to 5 times when the initial communication fails.
3. In the Host fields, enter the IP address of the device(s) you want to access. This is the address to which notifications are sent by the SNMP system agent.
4. In the Port fields, enter the port number used to access the device(s).

5. In the Community fields, enter the SNMP community string to access the device(s). The community is the group representing the PXE and all SNMP management stations.

Tip: An SNMP v2c notification action only permits entering a maximum of three SNMP destinations. To assign more than three SNMP destinations to a specific rule, first create several SNMP v2c notification actions, each of which contains completely different SNMP destinations, and then add all of these SNMP v2c notification actions to the same rule.

► **To send SNMP v3 notifications:**

1. From the Notification Type drop-down, select SNMPv3 Trap or SNMPv3 Inform.
2. For SNMP TRAPS, the engine ID is prepopulated.
3. For SNMP INFORM communications, leave the resend settings at their default or:
 - a. In the Timeout (sec) field, enter the interval of time, in seconds, after which a new inform communication is resent if the first is not received. For example, resend a new inform communication once every 3 seconds.
 - b. In the Number of Retries field, enter the number of times you want to resend the inform communication if it fails. For example, inform communications are resent up to 5 times when the initial communication fails.
4. For both SNMP TRAPS and INFORMS, enter the following as needed and then click OK to apply the settings:
 - a. Host name
 - b. Port number
 - c. User ID needed to access the host
 - d. Select the host security level

Security level	Description
"noAuthNoPriv"	Select this if no authorization or privacy protocols are needed.
"authNoPriv"	Select this if authorization is required but no privacy protocols are required. <ul style="list-style-type: none"> • Select the authentication protocol - MD5 or SHA • Enter the authentication passphrase and then confirm the authentication passphrase
"authPriv"	Select this if authentication and privacy protocols are required. <ul style="list-style-type: none"> • Select the authentication protocol - MD5 or SHA • Enter the authentication passphrase and confirm the authentication passphrase • Select the Privacy Protocol - DES or AES • Enter the privacy passphrase and then confirm the privacy passphrase

Syslog Message

Use this action to automatically forward event messages to the specified syslog server.

► **To configure a syslog message action:**

1. Choose Device Settings > Event Rules. The Event Rules Settings dialog opens.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Syslog message.
6. In the "Syslog server" field, specify the IP address to which the syslog is forwarded.
7. In the Port field, specify an appropriate port number.
8. Click OK.

Send Sensor Report


You may set the PXE so that it automatically reports the latest readings or states of one or multiple sensors by sending a message or email or simply recording the report in a log. These sensors can be either internal or environmental sensors as listed below.


- Inlet sensors, including RMS current, RMS voltage, active power, apparent power, power factor and active energy.
- Outlet sensors, including RMS current, RMS voltage, active power, apparent power, power factor, active energy and outlet state (for outlet-switching capable PDUs only).
- Overcurrent protector sensors, including RMS current and tripping state.
- Peripheral device sensors, which can be any Raritan environmental sensor packages connected to the PXE, such as temperature or humidity sensors.


► **To configure a sensor report action:**

1. Choose Device Settings > Event Rules. The Event Rules Settings dialog opens.
2. Click the Actions tab.
3. Click New.
4. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.
5. In the Action field, click the drop-down arrow and select the desired action: Send Sensor Report.
6. In the Destination Actions field, select the method(s) to report sensor readings or states. The number of available methods vary, depending on how many messaging actions have been created.

The messaging action types include:


- Log event message
 - Syslog message
 - Send SMTP message
 - Send SMS message
- a. If no messaging actions are available, click Create New Destination Action to immediately create them.
 - b. To select any method, select it in the right list box, and click  to move it to the left list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To select all methods, simply click .


- c. To delete any method, select it in the left list box, and click  to move it back to the right list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To remove all methods, simply click .

7. In the Available Sensors field, select the desired sensor.
 - a. Select the sensor type from the field to the left.
 - b. Select the specific sensor from the field to the right.

- c. Click the Add button  to add the selected sensor to the Report Sensors list box.

For example, to monitor the current reading of the Inlet 1, select Inlet 1 from the left field, and then select RMS Current from the right field.

8. To report additional sensors simultaneously, repeat the above step to add more sensors.
 - To remove any sensor from the Report Sensors list box, select it and click the Delete button . To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
9. To immediately send out the sensor report, click Send Report Now. A message appears, indicating whether the sensor report is sent successfully.
10. To save this action, click OK.

*Note: When intending to send a sensor report using custom messages, use the placeholder [SENSORREPORT] to report sensor readings. See **Email and SMS Message Placeholders** (on page 144).*


Switch Peripheral Actuator

If you have any actuator connected to the PXE, you can set up the PXE so it automatically turns on or off the system controlled by this actuator when a specific event occurs.


*Note: For information on connecting actuators to the PXE, see **DX Sensor Packages** (on page 25).*

► To switch on or off the system connected to an actuator:

1. Click the Actions tab.
2. Click New.
3. In the "Action name" field, type a new name for the action. The default name is New Action <number>, where <number> is a sequential number starting at 1.

4. In the Action field, click the drop-down arrow and select the desired action: Switch Peripheral Actuator.
5. From the Operation drop-down list, select an operation for the selected actuator.
 - Turn On: Turns on the selected actuator.
 - Turn Off: Turns off the selected actuator.
6. To select the actuator where this action will be applied, select it from the Available Actuators list and click  to add it to the Switched Actuators list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To add all actuators to the Switched Actuators list box, click .

7. To remove any actuator from the Switched Actuators list, select it and click  to move it back to the Available Actuators list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

To remove all actuators, click .

8. Click OK.

Creating Rules

After required actions are available, you can create event rules to determine what actions are taken to respond to specific events.

By default, the PXE provides four built-in event rules - System Event Log Rule, System SNMP Notification Rule, System Tamper Detection Alarmed, and System Tamper Detection Unavailable. If the built-in rules do not satisfy your needs, create new ones.

► To create event rules:

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. On the Rules tab, click New.
3. In the "Rule name" field, type a new name for identifying the rule. The default name is New Rule <number>, where <number> is a sequential number.
4. Select the Enabled checkbox to activate this event rule.
5. Click Event to select an event for which you want to trigger an action. A pull-down menu showing various types of events appears.
 - Select the desired event type from the pull-down menu, and if a submenu appears, continue the navigation until the desired event is selected.

Note: To select all items or events listed on the same submenu, select the option enclosed in brackets, such as <Any sub-event>, <Any Server> and <Any user>.



6. According to the event you selected in the previous step, the "Trigger condition" field containing three radio buttons may or may not appear.



Event types	Radio buttons
Numeric sensor threshold-crossing events, or the occurrence of the selected event -- true or false	<p>Available radio buttons include "Asserted," "Deasserted" and "Both."</p> <ul style="list-style-type: none"> ▪ Asserted: The PXE takes the action only when the event occurs. This means the status of the described event transits from FALSE to TRUE. ▪ Deasserted: The PXE takes the action only when the event condition disappears. This means the status of the described event transits from TRUE to FALSE. ▪ Both: The PXE takes the action both when the event occurs (asserts) and when the event condition disappears (deasserts).
Discrete (on/off) sensor state change	<p>Available radio buttons include "Alarmed," "No longer alarmed" and "Both."</p> <ul style="list-style-type: none"> ▪ Alarmed/Open/On: The PXE takes the action only when the chosen sensor enters the alarmed, open or on state. ▪ No longer alarmed/Closed/Off: The PXE takes the action only when the chosen sensor returns to the normal, closed or off state. ▪ Both: The PXE takes the action whenever the chosen sensor switches its state.
Sensor availability	<p>Available radio buttons include "Unavailable," "Available" and "Both."</p> <ul style="list-style-type: none"> ▪ Unavailable: The PXE takes the action only when the chosen sensor is NOT detected and becomes unavailable. ▪ Available: The PXE takes the action only when the chosen sensor is detected and becomes available. ▪ Both: The PXE takes the action both when the chosen sensor becomes unavailable or available.

Event types	Radio buttons
Network interface link state	<p>Available radio buttons include "Link state is up," "Link state is down" and "Both."</p> <ul style="list-style-type: none"> ▪ Link state is up: The PXE takes the action only when the network link state changes from down to up. ▪ Link state is down: The PXE takes the action only when the network link state changes from up to down. ▪ Both: The PXE takes the action whenever the network link state changes.
Function enabled or disabled	<p>Available radio buttons include "Enabled," "Disabled" and "Both."</p> <ul style="list-style-type: none"> ▪ Enabled: The PXE takes the action only when the chosen function is enabled. ▪ Disabled: The PXE takes the action only when the chosen function is disabled. ▪ Both: The PXE takes the action when the chosen function is either enabled or disabled.
User logon state	<p>Available radio buttons include "Logged in," "Logged out," and "Both."</p> <ul style="list-style-type: none"> ▪ Logged in: The PXE takes the action only when the selected user logs in. ▪ Logged out: The PXE takes the action only when the selected user logs out. ▪ Both: The PXE takes the action both when the selected user logs in and logs out.
Restricted service agreement	<p>Available radio buttons include "Accepted," "Declined," and "Both."</p> <ul style="list-style-type: none"> ▪ Accepted: The PXE takes the action only when the specified user accepts the restricted service agreement. ▪ Declined: The PXE takes the action only when the specified user rejects the restricted service agreement. ▪ Both: The PXE takes the action both when the specified user accepts or rejects the restricted service agreement

Event types	Radio buttons
Server monitoring event	<p>Available radio buttons include "Monitoring started," "Monitoring stopped," and "Both."</p> <ul style="list-style-type: none"> Monitoring started: The PXE takes the action only when the monitoring of any specified server starts. Monitoring stopped: The PXE takes the action only when the monitoring of any specified server stops. Both: The PXE takes the action when the monitoring of any specified server starts or stops.
Server reachability	<p>Available radio buttons include "Unreachable," "Reachable," and "Both."</p> <ul style="list-style-type: none"> Unreachable: The PXE takes the action only when any specified server becomes inaccessible. Reachable: The PXE takes the action only when any specified server becomes accessible. Both: The PXE takes the action when any specified server becomes either inaccessible or accessible.
Device connection or disconnection, such as a USB-cascaded slave device	<p>Available radio buttons include "Connected," "Disconnected" and "Both."</p> <ul style="list-style-type: none"> Connected: PXE takes the action only when the selected device is physically connected to it. Disconnected: PXE takes the action only when the selected device is physically disconnected from it. Both: PXE takes the action both when the selected device is physically connected to it and when it is disconnected.

Note: The PXE does NOT support events related to asset management, modem, webcam, USB-cascading and Schroff LHX/SHX devices.

- In the Actions field, select the desired action from the "Available actions" list box, and click  to move it to the "Selected actions" list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - To add all actions, simply click .

- If the desired action is not available yet, click Create New Action to immediately create it. Upon complete, the newly-created action is moved to the "Selected actions" list box.
8. To remove any action, select it from the "Selected actions" list box, and click  to move it back to the "Available actions" list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - To remove all actions, click .
 9. Click OK to save the new event rule.

Note: If you do not click OK before quitting the current settings page, a message appears. Then click Yes to save the changes, Discard to abort or Cancel to return to the current settings page.

10. Repeat Steps 2 to 10 to create additional event rules.
11. Click Close to quit the dialog.

Scheduling an Action

An action can be regularly performed at a preset time interval instead of being triggered by a specific event. For example, you can make the PXE report the reading or state of a specific environmental sensor regularly by scheduling the "Send Sensor Report" action.

When scheduling an action, make sure you have a minimum of 1-minute buffer time between this action's execution time and creation time. Otherwise, the scheduled action will NOT be performed at the specified time if the buffer time is too short. For example, if you want an action to be performed at 11:00 am, you should finish scheduling this action at 10:59 am or earlier.




Note: It may be meaningless to schedule certain actions like "Log event message" or "Syslog message" so consider about the usability when scheduling an action.


► To schedule any action(s):

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. Click the Scheduled Actions tab.
3. Click New.
4. In the "Timer name" field, type a name for this scheduled action. The default name is New Timer <n>, where <n> is the sequential number starting at 1.
5. Make sure the Enabled checkbox is selected, or the PXE will not carry out this scheduled action.

6. Select the desired time frequency from the Execution Time field and then specify the time interval or a specific date and time in the Time field.

Time options	Frequency settings
Minutes	The frequency in minutes ranges from every minute, every 5 minutes, every 10 minutes and so on until every 30 minutes.
Hourly	The hourly option sets the frequency to either of the following: <ul style="list-style-type: none"> One hour - then set the Minute field to 0 (zero). Between one and two hours, such as one hour and one minute, one hour and thirty minutes, or one hour and 59 minutes. In this case, specify a non-zero number in the Minute field.
Daily	You need to specify the time for this daily option. For example, if you specify 13:30 in the Time field, the action is performed at 13:30 every day.
Weekly	Both the day and time must be specified for the weekly option. Days range from Sunday to Monday.
Monthly	Both the date and time must be specified for the monthly option. The dates range from 1 to 31, and the time is specified in 24-hour format. Note that NOT every month has the date 31, and February in particular does not have the date 30 and probably even 29. Check the calendar when selecting 29, 30 or 31.
Yearly	This option requires three settings: <ul style="list-style-type: none"> Month - January through December. Date - 1 to 31. Time - the value is specified in 24-hour format.

7. In the Actions field, select the desired action from the "Available actions" list box, and click  to move it to the "Selected actions" list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
- To add all actions, simply click .
 - If the desired action is not available yet, click Create New Action to immediately create it. Upon complete, the newly-created action is moved to the "Selected actions" list box. See **Creating Actions** (on page 122).
8. To remove any action, select it from the "Selected actions" list box, and click  to move it back to the "Available actions" list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.

- To remove all actions, click .
9. Click OK.

Default Log Messages

Following are default log messages triggered and emailed to specified recipients when PXE events occur (are TRUE) or, in some cases, do not occur (are FALSE). See **Send Email** (on page 127) for information configuring email messages to be sent when specified events occur.

Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
Asset Management > State	State of asset strip [STRIPID] ('[STRIPNAME]') changed to '[STATE]'.	
Asset Management > Rack Unit > * > Tag Connected	Asset tag with ID '[TAGID]' connected at rack unit [RACKUNIT], slot [RACKSLOT] of asset strip [STRIPID] ('[STRIPNAME]').	Asset tag with ID '[TAGID]' disconnected at rack unit [RACKUNIT], slot [RACKSLOT] of asset strip [STRIPID] ('[STRIPNAME]').
Asset Management > Rack Unit > * > Blade Extension Connected	Blade extension with ID '[TAGID]' connected at rack unit [RACKUNIT] of asset strip [STRIPID] ('[STRIPNAME]').	Blade extension with ID '[TAGID]' disconnected at rack unit [RACKUNIT] of asset strip [STRIPID] ('[STRIPNAME]').
Asset Management > Firmware Update	Firmware update for asset strip [STRIPID] ('[STRIPNAME]'): status changed to '[STATE]'.	
Asset Management > Device Config Changed	Config parameter '[PARAMETER]' of asset strip [STRIPID] ('[STRIPNAME]') changed to '[VALUE]' by user '[USERNAME]'.	
Asset Management > Rack Unit Config Changed	Config of rack unit [RACKUNIT] of asset strip [STRIPID] ('[STRIPNAME]') changed by user '[USERNAME]' to: LED Operation Mode '[LEDOPMODE]', LED Color '[LEDCOLOR]', LED Mode '[LEDMODE]'	
Asset Management > Blade Extension Overflow	Blade extension overflow occurred on strip [STRIPID] ('[STRIPNAME]').	Blade extension overflow cleared for strip [STRIPID] ('[STRIPNAME]').
Asset Management > Composite Asset Strip Composition Changed	Composition changed on composite asset strip [STRIPID] ('[STRIPNAME]').	
Card Reader Management > Card inserted	Card Reader with id '[CARDREADERID]' connected.	

Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
Card Reader Management > Card Reader attached	Card Reader with id '[CARDREADERID]' disconnected.	
Card Reader Management > Card Reader detached	Card of type '[SMARTCARDTYPE]' with ID '[SMARTCARDID]' inserted.	
Card Reader Management > Card removed	Card of type '[SMARTCARDTYPE]' with ID '[SMARTCARDID]' removed.	
Device > System started	System started.	
Device > System reset	System reset performed by user '[USERNAME]' from host '[USERIP]'.	
Device > Firmware validation failed	Firmware validation failed by user '[USERNAME]' from host '[USERIP]'.	
Device > Firmware update started	Firmware upgrade started from version '[OLDVERSION]' to version '[VERSION]' by user '[USERNAME]' from host '[USERIP]'.	
Device > Firmware update completed	Firmware upgraded successfully from version '[OLDVERSION]' to version '[VERSION]' by user '[USERNAME]' from host '[USERIP]'.	
Device > Firmware update failed	Firmware upgrade failed from version '[OLDVERSION]' to version '[VERSION]' by user '[USERNAME]' from host '[USERIP]'.	
Device > Device identification changed	Config parameter '[PARAMETER]' changed to '[VALUE]' by user '[USERNAME]' from host '[USERIP]'.	
Device > Device settings saved	Device settings saved from host '[USERIP]'	
Device > Device settings restored	Device settings restored from host '[USERIP]'	
Device > Event log cleared	Event log cleared by user '[USERNAME]' from host '[USERIP]'.	
Device > Bulk configuration saved	Bulk configuration saved from host '[USERIP]'.	
Device > Bulk configuration copied	Bulk configuration copied from host '[USERIP]'.	
Device > Network interface link state is up	The [IFNAME] network interface link is now up.	The [IFNAME] network interface link is now down.

Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
Device > Peripheral Device Firmware Update	Firmware update for peripheral device [EXTSENSORSERIAL] from [OLDVERSION] to [VERSION] [SENSORSTATENAME].	
Device > Sending SMTP message failed	Sending SMTP message to '[RECIPIENTS]' using server '[SERVER]' failed.	
Device > An LDAP error occurred	An LDAP error occurred: [LDAPERRORDESC].	
Device > An Radius error occurred	An Radius error occurred: [RADIUSERRORDESC].	
Device > Unknown peripheral device attached	An unknown peripheral device with rom code '[ROMCODE]' was attached at position '[PERIPHDEVPOSITION]'.	
Device > USB slave connected	USB slave connected.	USB slave disconnected.
Device > Features > Schroff LHX / SHX Support	Schroff LHX / SHX support enabled.	Schroff LHX / SHX support disabled.
Energywise > Enabled	User '[USERNAME]' from host '[USERIP]' enabled EnergyWise.	User '[USERNAME]' from host '[USERIP]' disabled EnergyWise.
Peripheral Device Slot > * > Numeric Sensor > Unavailable	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' unavailable.	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' available.
Peripheral Device Slot > * > Numeric Sensor > Above upper critical threshold	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' asserted 'above upper critical' at [READING].	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' deasserted 'above upper critical' at [READING].
Peripheral Device Slot > * > Numeric Sensor > Above upper warning threshold	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' asserted 'above upper warning' at [READING].	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' deasserted 'above upper warning' at [READING].
Peripheral Device Slot > * > Numeric Sensor > Below lower warning threshold	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' asserted 'below lower warning' at [READING].	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' deasserted 'below lower warning' at [READING].

Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
Peripheral Device Slot > * > Numeric Sensor > Below lower critical threshold	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' asserted 'below lower critical' at [READING].	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' deasserted 'below lower critical' at [READING].
Peripheral Device Slot > * > State Sensor > Unavailable	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' unavailable.	Peripheral device '[EXTSENSORNAME]' in slot '[EXTSENSORSLOT]' available.
Peripheral Device Slot > * > State Sensor > Alarmed / Open / On	Peripheral device '[EXTSENSORNAME]' in slot [EXTSENSORSLOT] is [SENSORSTATENAME].	Peripheral device '[EXTSENSORNAME]' in slot [EXTSENSORSLOT] is [SENSORSTATENAME].
Inlet > * > Enabled	Inlet '[INLET]' has been enabled by user '[USERNAME]' from host '[USERIP]'.	Inlet '[INLET]' has been disabled by user '[USERNAME]' from host '[USERIP]'.
Inlet > * > Sensor > * > Unavailable	Sensor '[INLETSENSOR]' on inlet '[INLET]' unavailable.	Sensor '[INLETSENSOR]' on inlet '[INLET]' available.
Inlet > * > Sensor > * > Above upper critical threshold	Sensor '[INLETSENSOR]' on inlet '[INLET]' asserted 'above upper critical'.	Sensor '[INLETSENSOR]' on inlet '[INLET]' deasserted 'above upper critical'.
Inlet > * > Sensor > * > Above upper warning threshold	Sensor '[INLETSENSOR]' on inlet '[INLET]' asserted 'above upper warning'.	Sensor '[INLETSENSOR]' on inlet '[INLET]' deasserted 'above upper warning'.
Inlet > * > Sensor > * > Below lower warning threshold	Sensor '[INLETSENSOR]' on inlet '[INLET]' asserted 'below lower warning'.	Sensor '[INLETSENSOR]' on inlet '[INLET]' deasserted 'below lower warning'.
Inlet > * > Sensor > * > Below lower critical threshold	Sensor '[INLETSENSOR]' on inlet '[INLET]' asserted 'below lower critical'.	Sensor '[INLETSENSOR]' on inlet '[INLET]' deasserted 'below lower critical'.
Inlet > * > Sensor > * > Reset	Sensor '[INLETSENSOR]' on inlet '[INLET]' has been reset by user '[USERNAME]' from host '[USERIP]'.	
Inlet > * > Pole > * > Sensor > * > Unavailable	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' unavailable.	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' available.
Inlet > * > Pole > * > Sensor > * > Above upper critical threshold	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' asserted 'above upper critical'.	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' deasserted 'above upper critical'.
Inlet > * > Pole > * > Sensor > * > Above upper warning	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]'	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' deasserted 'above upper

Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
threshold	asserted 'above upper warning'.	warning'.
Inlet > * > Pole > * > Sensor > * > Below lower warning threshold	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' asserted 'below lower warning'.	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' deasserted 'below lower warning'.
Inlet > * > Pole > * > Sensor > * > Below lower critical threshold	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' asserted 'below lower critical'.	Sensor '[POLESENSOR]' on pole '[INLETPOLE]' of inlet '[INLET]' deasserted 'below lower critical'.
Modem > Dial-in link established	An incoming call from caller '[CALLERID]' was received.	The incoming call from caller '[CALLERID]' was disconnected: [CALLENDREASON].
Modem > Modem attached	A [MODEMTYPE] modem was attached.	
Modem > Modem detached	A [MODEMTYPE] modem was removed.	
Server Monitoring > * > Error	Error monitoring server '[MONITOREDHOST]': [ERRORDESC]	
Server Monitoring > * > Monitored	Server '[SERVER]' is now being monitored.	Server '[SERVER]' is no longer being monitored.
Server Monitoring > * > Unreachable	Server '[SERVER]' is unreachable.	Server '[SERVER]' is reachable.
Server Monitoring > * > Unrecoverable	Connection to server '[MONITOREDHOST]' could not be restored.	
User Activity > * > User logon state	User '[USERNAME]' from host '[USERIP]' logged in.	User '[USERNAME]' from host '[USERIP]' logged out.
User Activity > * > Authentication failure	Authentication failed for user '[USERNAME]' from host '[USERIP]'.	
User Activity > * > User accepted the Restricted Service Agreement	User '[USERNAME]' from host '[USERIP]' accepted the Restricted Service Agreement.	User '[USERNAME]' from host '[USERIP]' declined the Restricted Service Agreement.
User Activity > * > User blocked	User '[USERNAME]' from host '[USERIP]' was blocked.	
User Activity > * > Session timeout	Session of user '[USERNAME]' from host '[USERIP]' timed out.	
User Administration > User added	User '[TARGETUSER]' added by user '[USERNAME]' from host '[USERIP]'.	
User Administration > User	User '[TARGETUSER]' modified by user '[USERNAME]' from host	


Event/Context	Default Assertion Message when the Event = TRUE	Default Assertion Message when the Event = FALSE*
modified	'[USERIP]'. 	
User Administration > User deleted	User '[TARGETUSER]' deleted by user '[USERNAME]' from host '[USERIP]'. 	
User Administration > Password changed	Password of user '[TARGETUSER]' changed by user '[USERNAME]' from host '[USERIP]'. 	
User Administration > Password settings changed	Password settings changed by user '[USERNAME]' from host '[USERIP]'. 	
User Administration > Role added	Role '[TARGETROLE]' added by user '[USERNAME]' from host '[USERIP]'. 	
User Administration > Role modified	Role '[TARGETROLE]' modified by user '[USERNAME]' from host '[USERIP]'. 	
User Administration > Role deleted	Role '[TARGETROLE]' deleted by user '[USERNAME]' from host '[USERIP]'. 	
Webcam Management > Webcam attached	Webcam '[WEBCAMNAME]' ('[WEBCAMUVCID]') added to port '[WEBCAMUSBPORT]'. 	
Webcam Management > Webcam detached	Webcam '[WEBCAMNAME]' ('[WEBCAMUVCID]') removed from port '[WEBCAMUSBPORT]'. 	
Webcam Management > Webcam settings changed	Webcam '[WEBCAMNAME]' settings changed by user '[USERNAME]'. 	

**Note: Not set for 'trigger' events.*

Note: The PXE does NOT support events related to asset management, modem, webcam, USB-cascading and Schroff LHX/SHX devices.

Email and SMS Message Placeholders

Following are placeholders that can be used in custom event email messages.

Note: Click the Information icon  to open the Event Context Information dialog, which contains a list of placeholders and their definitions. Then select the desired placeholder, and either double-click it or click the "Paste into Message" button to insert it into the customized message.

Placeholder	Definition
[ACTIVEINLET]	The label of the newly activated inlet
[AMSBLADESLOTPOSITION]	The (horizontal) slot position, an action applies to
[AMSLEDCOLOR]	The RGB LED color
[AMSLEDMODE]	The LED indication mode
[AMSLEDOPMODE]	The LED operating mode
[AMSNAME]	The name of an asset strip
[AMSNUMBER]	The numeric ID of an asset strip
[AMSRACKUNITPOSITION]	The (vertical) rack unit position, an action applies to
[AMSSTATE]	The human readable state of an asset strip
[AMSTAGID]	The asset tag ID
[CONFIGPARAM]	The name of a configuration parameter
[CONFIGVALUE]	The new value of a parameter
[DATETIME]	The human readable timestamp of the event occurrence
[DEVICEIP]	The IP address of the device, the event occurred on
[DEVICENAME]	The name of the device, the event occurred on
[ERRORDESC]	The error message
[EVENTRULENAME]	The name of the matching event rule
[EXTSENSORNAME]	The name of a peripheral device
[EXTSENSORSLOT]	The ID of a peripheral device slot
[EXTSENSOR]	The peripheral device identifier
[IFNAME]	The human readable name of a network interface
[INLETPOLE]	The inlet power line identifier
[INLETSENSOR]	The inlet sensor name
[INLET]	The power inlet label
[ISASSERTED]	Boolean flag whether an event condition was entered (1) or left (0)
[LDAPERRORDESC]	An LDAP error occurred
[LHXFANID]	The ID of a fan connected to an LHX
[LHXPOWERSUPPLYID]	The ID of an LHX power supply
[LHXSENSORID]	The ID of an LHX sensor probe
[MONITOREDHOST]	The name or IP address of a monitored host

Placeholder	Definition
[OCPSENSOR]	The overcurrent protector sensor name
[OCP]	The overcurrent protector label
[OLDVERSION]	The firmware version the device is being upgraded from
[OUTLETPOLE]	The outlet power line identifier
[OUTLETSENSOR]	The outlet sensor name
[OUTLET]	The outlet label
[PDUPOLESENSOR]	The sensor name for a certain power line
[PDUSENSOR]	The PDU sensor name
[PERIPHDEVPOSITION]	The position of an attached peripheral device
[PORTID]	The label of the external port, the event triggering device is connected to
[PORTTYPE]	The type of the external port (for example, 'feature' or 'auxiliary'), the event triggering device is connected to
[RADIUSERRORDESC]	A Radius error occurred
[ROMCODE]	The rom code of an attached peripheral device
[SENSORREADINGUNIT]	The unit of a sensor reading
[SENSORREADING]	The value of a sensor reading
[SENSORREPORT]	The formatted sensor report contents
[SENSORSTATENAME]	The human readable state of a sensor
[SMTPRECIPIENTS]	The list of recipients, an SMTP message was sent to
[SMTPSERVER]	The name or IP address of an SMTP server
[TIMEREVENTID]	The id of a timer event
[TIMESTAMP]	The timestamp of the event occurrence
[TRANSFERSWITCHREASON]	The transfer reason
[TRANSFERSWITCHSENSOR]	The transfer switch sensor name
[TRANSFERSWITCH]	The transfer switch label
[UMTARGETROLE]	The name of a user management role, an action was applied on
[UMTARGETUSER]	The user, an action was triggered for
[USERIP]	The IP address, a user connected from
[USERNAME]	The user who triggered an action

Placeholder	Definition
[VERSION]	The firmware version the device is upgrading to

Sample Event Rules

Sample PDU-Level Event Rule

In this example, we want the PXE to record the firmware upgrade failure in the internal log when it happens. The sample event rule looks like this:

- Event: Device > Firmware update failed
- Actions: System Event Log Action

► To create the above event rule:

1. Select Event > Device to indicate we are specifying an event at the PDU level.
2. Select "Firmware update failed" in the submenu because we want the PXE to respond to the event related to firmware upgrade failure.
3. Select System Event Log Action as we intend to record the firmware update failure event in the internal log.

Sample Inlet-Level Event Rule

In this example, we want the PXE to send SNMP notifications to the SNMP manager for any sensor change event of the Inlet I1.

*Note: The SNMP notifications may be SNMP v2c or SNMP v3 traps or informs, depending on the settings for the System SNMP Notification Action. See **Configuring SNMP Notifications** (on page 187).*

The event rule is set like this:

- Event: Inlet > Inlet I1 > Sensor > Any sub-event
- Actions: System SNMP Notification Action

► To create the above event rule:

1. Select Event > Inlet to indicate we are specifying an event at the inlet level.
2. Select "Inlet I1" from the submenu because that is the inlet in question.
3. Select "Sensor" to refer to sensor events.
4. Select "Any sub-event" because we want to specify all events related to all types of inlet sensors and thresholds, such as current, voltage, upper critical threshold, upper warning threshold, lower critical threshold, lower warning threshold, and so on.

5. Select "System SNMP Notification Action" to send SNMP notifications to respond to the specified event.

Then the SNMP notifications are sent when:

- Any numeric sensor's reading moves past any threshold into the warning or critical range.
- Any sensor reading or state returns to normal.
- Any sensor becomes unavailable.
- The active energy sensor is reset.

For example, when the Inlet I1's voltage enters the upper warning range, the SNMP notifications are sent, and when the voltage drops below the upper warning threshold, returning to the normal state, the SNMP notifications are sent again.

A Note about Infinite Loop

You should avoid building an infinite loop when creating event rules.

The infinite loop refers to a condition where the PDU keeps busy because the action or one of the actions taken for a certain event triggers an identical or similar event which will result in an action triggering one event again.

Example 1

This example illustrates an event rule which continuously causes the PDU to send out SMTP messages.

Event selected	Action included
Device > Sending SMTP message failed	Send SMTP message

Example 2

This example illustrates an event rule which continuously causes the PDU to send out SMTP messages when one of the selected events listed on the Device menu occurs. Note that <Any sub-event> under the Device menu includes the event "Sending SMTP message failed."

Event selected	Action included
Device > Any sub-event	Send SMTP message

Modifying an Event Rule





You can change an event rule's event, action, trigger condition and other settings, if any.

Exception: Events and actions selected in the built-in event rules are not changeable, including System Event Log Rule, System SNMP Notification Rule, System Tamper Detection Alarmed, and System Tamper Detection Unavailable.

► To modify an event rule:

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. On the Rules tab, select the event rule that you want to modify and click Edit, or simply double-click that rule.
3. To disable the event rule, deselect the Enabled checkbox.
4. To change the event, click the desired tab in the Event field and select a different item from the pull-down menu or submenu.

For example, in a user activity event rule for the "admin" user, you can click the "admin" tab to display a pull-down submenu showing all user names, and then select a different user name or all users (shown as <Any user>).

5. If the 'Trigger condition' field is available, you may select a radio button other than the current selection to change the rule triggering condition.
6. To change the action(s), do any of the following in the Actions field:
 - To add any action, select it from the "Available actions" list box, and click . To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - To add all actions, click .
 - To remove any action, select it from the "Selected actions" list box, and click  to move it back to the "Available actions" list box. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - To remove all actions, click .
 - To create a new action, click Create New Action. The newly created action will be moved to the "Selected actions" list box once it is created. See **Creating Actions** (on page 122) for information on creating an action.
7. Click OK to save the changes.

Note: If you do not click OK before quitting the current settings page, a message appears. Then click Yes to save the changes, Discard to abort or Cancel to return to the current settings page.

8. Click Close to quit the dialog.

Modifying an Action

An existing action can be changed so that all event rules where this action is involved change their behavior accordingly.

Exception: The built-in actions "System Event Log Action" and "System Tamper Alarm" are not user-configurable.

► **To modify an action:**

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. Click the Actions tab.
3. Select the action that you want to modify and click Edit, or simply double-click that action.
4. Make necessary changes to the information shown.
5. Click OK to save the changes.

Note: If you do not click OK before quitting the current settings page, a message appears. Then click Yes to save the changes, Discard to abort or Cancel to return to the current settings page.

6. Click Close to quit the dialog.

Deleting an Event Rule or Action

If any event rule or action is obsolete, simply remove it.

Note: You cannot delete the built-in event rules and actions.

► **To delete an event rule or action:**

1. Choose Device Settings > Event Rules. The Event Rule Settings dialog appears.
2. To delete an event rule:
 - a. Ensure the Rules tab is selected. If not, click the Rules tab.
 - b. Select the desired rule from the list. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - c. Click Delete.
 - d. Click Yes on the confirmation message.

3. To delete an action:
 - a. Click the Actions tab.
 - b. Select the desired action from the list. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
 - c. Click Delete.
 - d. Click Yes on the confirmation message.
4. Click Close to quit the dialog.

A Note about Untriggered Rules

In some cases, a measurement exceeds a threshold causing the PXE to generate an alert. The measurement then returns to a value within the threshold, but the PXE does not generate an alert message for the Deassertion event. Such scenarios can occur due to the hysteresis tracking the PXE uses. See **"To De-assert" and Deassertion Hysteresis** (on page 354).

Managing Event Logging

By default, the PXE captures certain system events and saves them in a local (internal) event log.

Viewing the Local Event Log

You can view up to 2,000 historical events that occurred to the PXE device in the local event log.





When the log already contains 2,000 entries, each new entry overwrites the oldest entry.

► To display the local log:

1. Choose Maintenance > View Event Log. The Event Log dialog appears.



Each event entry in the local log consists of:


- Date and time of the event
- Type of the event
- A description of the event
- ID number of the event

2. The dialog shows the final page by default. You can:
 - Switch between different pages by doing one of the following:
 - Click  or  to go to the first or final page.
 - Click  or  to go to the prior or next page.

- Type a number in the Page text box and press Enter to go to a specific page.

- Select a log entry from the list and click Show Details, or simply double-click the log entry to view detailed information.

Note: Sometimes when the dialog is too narrow, the icon  takes the place of the Show Details button. In that case, click  and select Show Details to view details.

- Click  to view the latest events.
- View a specific type of events only by selecting an event type in the Filter Event Class field.

Clearing Event Entries

If it is not necessary to keep existing event history, you can remove all of it from the local log.

► **To delete all event entries:**

1. Choose Maintenance > View Event Log. The Event Log dialog appears.
2. Click Clear Event Log.
3. Click Yes on the confirmation message.

Viewing Connected Users

You can see which users are connected to the PXE device and their status. If you have administrator privileges, you can terminate any user's connection to the PXE device.

► **To view connected users:**

1. Choose Maintenance > Connected Users. The Connected Users dialog appears, showing a list of connected users with the following information:

Column	Description
User Name	The login name used by each connected user.
IP Address	The IP address of each user's host. For the login via a local connection (serial RS-232 or USB), <local> is displayed instead of an IP address.

Column	Description
Client Type	<p>The interface through which the user is being connected to the PXE.</p> <ul style="list-style-type: none"> ▪ Web GUI: Refers to the PXE web interface. ▪ CLI: Refers to the command line interface (CLI). <p>The information in parentheses following "CLI" indicates how this user is connected to the CLI.</p> <ul style="list-style-type: none"> - <i>Serial</i>: Represents the local connection (serial RS-232 or USB). - <i>SSH</i>: Represents the SSH connection. - <i>Telnet</i>: Represents the Telnet connection.
Idle Time	<p>The length of time for which a user remains idle.</p> <p>The unit "min" represents minutes.</p>

2. To disconnect any user, click the corresponding Disconnect button.
 - a. A dialog appears, prompting you to confirm the operation.
 - b. Click Yes to disconnect the user or No to abort the operation. If clicking Yes, the connected user is forced to log out.
3. You may change the sorting order of the list if necessary. See ***Changing the Sorting*** (on page 49).
4. Click Close to quit the dialog.

Monitoring Server Accessibility

You can monitor whether specific IT devices are alive by having the PXE device continuously ping them. An IT device's successful response to the ping commands indicates that the IT device is still alive and can be remotely accessed.

Adding IT Devices for Ping Monitoring

You can have the PXE monitor the accessibility of any IT equipment, such as DB servers, remote authentication servers or any power distribution unit (PDU). The PXE supports monitoring a maximum of 8 devices.

The default ping settings may not be suitable for monitoring devices that require high connection reliability so it is strongly recommended that you should adjust the ping settings to meet your own needs.

*Tip: To make the PXE automatically log, send notifications or perform other actions for any server accessibility or inaccessibility events, you can create event rules associated with server monitoring. See **Event Rules and Actions** (on page 121).*

► To add IT equipment for ping monitoring:

1. Choose Device Settings > Server Reachability. The Server Reachability dialog appears.
2. Click New. The Add New Server dialog appears.
3. By default, the "Enable ping monitoring for this server" checkbox is selected. If not, select it to enable this feature.
4. Provide the information required.

Field	Description
IP address/hostname	IP address or host name of the IT equipment which you want to monitor.
Number of successful pings to enable feature	The number of successful pings required to declare that the monitored equipment is "Reachable." Valid range is 0 to 200.
Wait time (in seconds) after successful ping	The wait time before sending the next ping if the previous ping was successfully responded. Valid range is 5 to 600 (seconds).
Wait time (in seconds) after unsuccessful ping	The wait time before sending the next ping if the previous ping was not responded. Valid range is 3 to 600 (seconds).
Number of consecutive unsuccessful pings for failure	The number of consecutive pings without any response before the monitored equipment is declared "Unreachable." Valid range is 1 to 100.

Field	Description
Wait time (in seconds) before resuming pinging after failure	The wait time before the PXE resumes pinging after the monitored equipment is declared unreachable. Valid range is 1 to 1200 (seconds).
Number of consecutive failures before disabling feature (0 = unlimited)	The number of times the monitored equipment is declared unreachable consecutively before the PXE disables the ping monitoring feature for the monitored equipment. Valid range is 0 to 100.

5. Click OK.
6. To add more IT devices, repeat Steps 2 to 5.
7. Click Close to quit the dialog.

In the beginning, the status of the monitored equipment shows "Waiting for reliable connection," which means the requested number of consecutive successful or unsuccessful pings has not reached before the PXE can declare that the monitored device is reachable or unreachable.

Editing Ping Monitoring Settings

You can edit the ping monitoring settings for any IT device whenever needed.

► To modify the ping monitoring settings for an IT device:

1. Choose Device Settings > Server Reachability. The Server Reachability dialog appears.
2. Select the IT device whose settings you want to modify.
3. Click Edit or double-click that IT device. The Edit Server 'XXX' dialog appears, where XXX is the IP address or host name of the IT device.
4. Make changes to the information shown.
5. Click OK.

Deleting Ping Monitoring Settings

When it is not necessary to monitor the accessibility of any IT device, just remove it.

► To delete ping monitoring settings for an IT device:



1. Choose Device Settings > Server Reachability. The Server Reachability dialog appears.
2. Select the IT device that you want to remove. To make multiple selections, press Ctrl+click or Shift+click to highlight multiple ones.
3. Click Delete.

4. Click Yes on the confirmation message.
5. Click Close to quit the dialog.

Checking Server Monitoring States

Server monitoring results are available in the Server Reachability dialog after specifying IT devices for the PXE device to monitor their network accessibility.

► **To check the server monitoring states and results:**

1. Choose Device Settings > Server Reachability. The Server Reachability dialog appears.
2. The column labeled "Ping Enabled" indicates whether the monitoring for the corresponding IT device is activated or not.
 -  : This icon denotes that the monitoring for the corresponding device is enabled.
 -  : This icon denotes that the monitoring for the corresponding device is disabled.
3. The column labeled "Status" indicates the accessibility of each monitored equipment.

Status	Description
Reachable	The monitored equipment is accessible.
Unreachable	The monitored equipment is inaccessible.
Waiting for reliable connection	The connection between the PXE device and the monitored equipment is not reliably established yet.

4. You may change the sorting order of the list if necessary. Or hide some columns. See **Changing the View of a List** (on page 48).
5. Click Close to quit the dialog.

Environmental Sensors and Actuators

The PXE can monitor the environmental conditions, such as temperature and humidity, where environmental sensors are placed. If an actuator is connected to the PXE, you can use it to control a system or mechanism.

► **To add environmental sensors and actuators:**

1. Physically connect environmental sensor packages to the PXE device. See **Connecting Environmental Sensor Packages** (see "**Connecting Environmental Sensor Packages (Optional)**" on page 18).

2. Log in to the PXE web interface. The PXE should have detected the connected sensors and actuators, and display them in the web interface.
3. Identify each sensor and actuator. See **Identifying Environmental Sensors and Actuators** (on page 157).
4. The PXE should automatically manage the detected sensors and actuators. Verify whether detected sensors and actuators are managed. If not, have them managed. See **Managing Environmental Sensors or Actuators** (on page 160).
5. Configure the sensors and actuators. See **Configuring Environmental Sensors or Actuators** (on page 162). The steps include:
 - a. Name the sensor or actuator.
 - b. If the connected sensor is a Raritan contact closure sensor, specify an appropriate sensor type.
 - c. Mark the sensor or actuator's physical location on the rack or in the room.
 - d. For a numeric sensor, configure the sensor's threshold, hysteresis and assertion timeout settings.

Note: Numeric sensors show both numeric readings and sensor states to indicate environmental or internal conditions while discrete (on/off) sensors show sensor states only to indicate state changes. Only numeric sensors have the threshold settings. As for actuators, they are used to control a device or system so they show state changes only.

Identifying Environmental Sensors and Actuators

Raritan has developed three types of environmental sensor packages - DPX, DPX2 and DX series. The ways to identify each type of environmental sensor packages in the web interface are different.

- DPX series: This type of environmental sensor package can be identified through its serial number.
- DPX2 and DX series: This type of environmental sensor package can be identified either through its serial number or through its chain position, which consists of the sensor port and its location in the daisy chain.

See **Matching the Serial Number** (on page 158) and **Matching the Position** (on page 159) in the PXE Online Help.

*Note: For detailed information on each sensor package, download the Environmental Sensors Guide from Raritan website's **PX2 Support Files** page (<https://www.raritan.com/support/product/px2/px2-support-files>).*

Matching the Serial Number

A DPX environmental sensor package includes a serial number tag on the sensor cable.



A DPX2 or DX sensor has a serial number tag attached to its rear side.



The serial number for each sensor or actuator appears listed in the web interface after each sensor or actuator is detected by the PXE.

► **To identify each detected environmental sensor or actuator via serial numbers:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.

Peripheral Devices									
<input type="checkbox"/>	ID	Name	Position	Serial Number	Type	Channel	Actuator	Reading	State
<input type="checkbox"/>	1	Temperature 1	Port 1	AEI7A00022	Temperature			24.2 °C	normal
<input type="checkbox"/>	2	Humidity 1	Port 1	AEI7A00022	Humidity			60 %	normal
<input type="checkbox"/>	3	Temperature 2	Port 1	AEI7A00021	Temperature			24.4 °C	normal
<input type="checkbox"/>	4	Humidity 2	Port 1	AEI7A00021	Humidity			59 %	normal
<input type="checkbox"/>	5	On/Off 1	Port 1	PRC0190292	Contact (On/Off)	1			normal
<input type="checkbox"/>	6	On/Off 2	Port 1	PRC0190292	Contact (On/Off)	2			normal

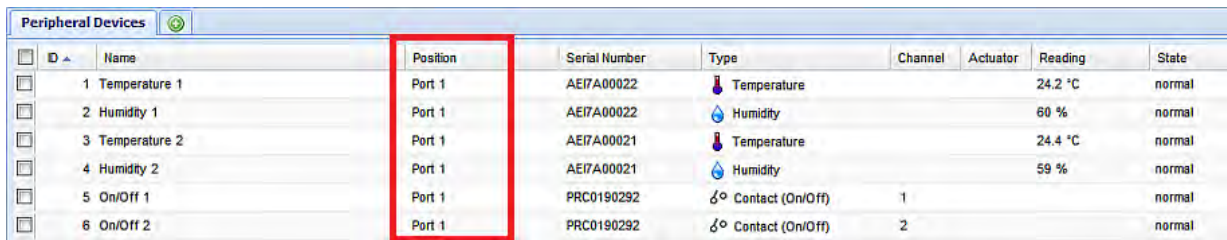
2. Match the serial number from the tag to those listed in the sensor table.

Matching the Position

Both DPX2 and DX sensor packages can be daisy chained. The PXE can indicate each sensor or actuator's position by showing the sensor port where the environmental sensor package is connected as well as its sequence in a sensor daisy chain.

► **To identify an environmental sensor or actuator through its position:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Locate the Position column, which shows one or two pieces of position information - the sensor port number and, if the sensor package is DPX2 or DX, the sensor or actuator's location in a chain.



	Name	Position	Serial Number	Type	Channel	Actuator	Reading	State
<input type="checkbox"/>	1 Temperature 1	Port 1	AEI7A00022	Temperature			24.2 °C	normal
<input type="checkbox"/>	2 Humidity 1	Port 1	AEI7A00022	Humidity			60 %	normal
<input type="checkbox"/>	3 Temperature 2	Port 1	AEI7A00021	Temperature			24.4 °C	normal
<input type="checkbox"/>	4 Humidity 2	Port 1	AEI7A00021	Humidity			59 %	normal
<input type="checkbox"/>	5 On/Off 1	Port 1	PRC0190292	Contact (On/Off)	1			normal
<input type="checkbox"/>	6 On/Off 2	Port 1	PRC0190292	Contact (On/Off)	2			normal

- For DPX, the PXE only displays the sensor port where it is physically connected.

For example, if a DPX environmental sensor package is connected to the SENSOR port numbered 1, its Position column shows "Port 1."

Note: For the PXE devices with only one SENSOR port, it always shows 'Port 1.'

- For DPX2 and DX, the PXE displays the sensor package's position in the chain in addition to the sensor port number.

For example, if a sensor or actuator is located on the second sensor package in the sensor chain connected to the SENSOR port 1, its Position column shows "Port 1, Chain Position 2."

Managing Environmental Sensors or Actuators

The PXE starts to retrieve an environmental sensor's reading and/or state and records the state transitions after the environmental sensor is managed. To control an actuator, you also need to have it managed.

The PXE device can manage a maximum of 32 environmental sensors or actuators.

When there are less than 32 managed sensors or actuators, the PXE automatically brings detected environmental sensors or actuators under management by default. You have to manually manage a sensor or actuator only when it is not under management.

*Tip: You can disable the automatic management feature so that newly connected environmental sensors or actuators are NOT brought under management automatically. See **Disabling the Automatic Management Function** (on page 172).*

► **To manually manage an environmental sensor or actuator:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Select the checkbox of the desired sensor or actuator on the Peripheral Devices page. To manage multiple ones, select multiple checkboxes.

*Note: To identify all detected sensors or actuators, see **Identifying Environmental Sensors and Actuators** (on page 157).*

3. Click Manage. If you selected only one sensor or actuator, the "Manage peripheral device <serial number> (<sensor type>)" dialog appears, where <serial number> is the sensor or actuator's serial number and <sensor type> is its type.

Note: For a sensor package with contact closure (CC) or dry contact (DC) channels, a channel number is added to the end of the <sensor type>.

4. There are two ways to manage a sensor or actuator:
 - To manage it by letting the PXE assign a number to it, select "Automatically assign a sensor number." This method does not release any managed sensors or actuators.
 - To manage it by assigning the number you want to it, select "Manually select a sensor number." Then click the drop-down arrow to select a number.

If the number you selected was already assigned to a sensor or actuator, that sensor or actuator becomes released after losing this ID number.

Tip: The information in parentheses following each ID number indicates whether the number has been assigned to any sensor or actuator. If it has been assigned to a sensor or actuator, it shows its serial number. Otherwise, it shows the word "unused."

The manual assignment method is unavailable if you selected multiple sensors or actuators in Step 2.

5. Click OK. The PXE starts to display the managed sensor or actuator's reading and state.
6. To manage additional ones, repeat Steps 2 to 5.

*Note: When the total number of managed sensors and actuators reaches the maximum, you CANNOT manage additional sensors or actuators unless you remove or replace any managed ones. To remove a sensor or actuator, see **Unmanaging Environmental Sensors or Actuators** (on page 171).*

Identifying Sensor or Actuator Channels

A sensor package may have multiple contact closure (CC) or dry contact (DC) channels, such as DX-D2C6 or DX-PD2C5.

When the PXE initially detects and automatically manages a sensor package with multiple channels, all channels are assigned with ID numbers in sequence.

If you manually manage these channels by selecting "Automatically assign a sensor number," the PXE assigns ID numbers randomly because this option assumes that users do not care about the sequence. In this case, see the Channel column to identify each channel correctly. For example, CC1 or DC1 is Channel 1, CC2 or DC2 is Channel 2, and so on.

ID	Name	Position	Serial Number	Type	Channel	Actuator	Reading	State
1	On/Off 1	Port 1, Chain Position 1	QU74592507	Contact (On/Off)	5			normal
2	On/Off 2	Port 1, Chain Position 1	QU74592507	Contact (On/Off)	4			normal
3	On/Off 3	Port 1, Chain Position 1	QU74592507	Contact (On/Off)	3			normal
4	On/Off 4	Port 1, Chain Position 1	QU74592507	Contact (On/Off)	2			normal
5	On/Off 5	Port 1, Chain Position 1	QU74592507	Contact (On/Off)	1			normal
6	Powered Dry Contact 1	Port 1, Chain Position 1	QU74592507	Powered Dry Contact	2	✓		off
7	Powered Dry Contact 2	Port 1, Chain Position 1	QU74592507	Powered Dry Contact	1	✓		off

Configuring Environmental Sensors or Actuators

You may change the default name for easily identifying the managed sensor or actuator, and describe its location with X, Y and Z coordinates.

► **To configure environmental sensors or actuators:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Select the sensor or actuator that you want to configure.
3. Click Setup. The "Setup of peripheral device <serial number> (<sensor type>)" dialog appears, where <serial number> is its serial number and <sensor type> is its type.

Tip: You can also trigger the same setup dialog by selecting the desired environmental sensor or actuator icon in the navigation tree and then clicking Setup in the right pane.

4. If the selected environmental sensor is the Raritan contact closure sensor connected with a third-party detector/switch, select the appropriate sensor type in the Binary Sensor Subtype field.
 - Contact: The detector/switch is designed to detect the door lock or door open/closed status.
 - Smoke Detection: The detector/switch is designed to detect the appearance of smoke.
 - Water Detection: The detector/switch is designed to detect the appearance of water on the floor.
 - Vibration: The detector/switch is designed to detect the vibration in the floor.
5. Type a new name in the Name field.
6. Describe the sensor or actuator's location by assigning alphanumeric values to the X, Y and Z coordinates. See **Describing the Sensor or Actuator's Location** (on page 164).

Note: When the term "Rack Units" appears inside the parentheses in the Z location field, indicating that the Z coordinate format is set to Rack Units, you must type an integer number.

7. If the sensor is the DX-PIR presence detector, a field labeled "Alarmed to Normal Delay" is available. This field determines the wait time before the PX announces that the presence detector returns to the normal state after it is back to normal.

Type both the time and measurement units in this field. For example, type '30 s' for 30 seconds, or '2 min' for 2 minutes.

8. If the selected environmental sensor is a numeric sensor, its threshold settings are displayed in the dialog. See **Sensor Threshold Settings** (on page 349) for detailed information.

There are two types of thresholds: sensor-specific thresholds and default thresholds.

To use the sensor-specific threshold settings, select the Use Sensor Specific Thresholds radio button.

- Click Edit or double-click the threshold setting row to open the threshold setup dialog.
- To enable any threshold, select the corresponding checkbox. To disable a threshold, deselect the checkbox.
- After any threshold is enabled, type an appropriate numeric value in the accompanying text box.
- To set the deassertion hysteresis, type a numeric value in the Deassertion Hysteresis field. See **"To De-assert" and Deassertion Hysteresis** (on page 354).
- To set the assertion timeout, type a numeric value in the Assertion Timeout (samples) field. See **"To Assert" and Assertion Timeout** (on page 352).

To use the default threshold settings, select the Use Default Thresholds radio button. To modify the default threshold settings, see **Changing Default Thresholds** (on page 165).

Note: The Upper Critical and Lower Critical values are points at which the PX considers the operating environment critical and outside the range of the acceptable threshold.

9. Click OK.
10. Repeat Steps 2 through 8 to configure additional ones.

*Tip: You can configure thresholds of multiple sensors at a time as long as these sensors are of the same type. See **Setting Thresholds for Multiple Sensors** (on page 166).*

Setting the Z Coordinate Format

You can use either the number of rack units or a descriptive text to describe the vertical locations (Z coordinates) of environmental sensors and actuators.

► To determine the Z coordinate format:

1. Click the PDU folder.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

2. Click Setup in the Settings section. The Pdu Setup dialog appears.
3. In the Peripheral Device Z Coordinate Format field, click the drop-down arrow and select an option from the list.
 - Rack Units: The height of the Z coordinate is measured in standard rack units. When this is selected, you can type a numeric value in the rack unit to describe the Z coordinate of any environmental sensors or actuators.
 - Free-Form: Any alphanumeric string can be used for specifying the Z coordinate.
4. Click OK.

Describing the Sensor or Actuator's Location

Use the X, Y and Z coordinates to describe each sensor or actuator's physical location. You can use these location values to track records of environmental conditions in fixed locations around your IT equipment. The X, Y and Z values act as additional attributes and are not tied to any specific measurement scheme. If you choose to, you can use non-measurement values. For example:

X = Brown Cabinet Row

Y = Third Rack

Z = Top of Cabinet

Values for the X, Y and Z coordinates may consist of:

- For X and Y: Any combination of alphanumeric characters. The coordinate value can be 0 to 24 characters long.
- For Z when the Z coordinate format is set to *Rack Units*, any numeric value ranging from 0 to 60.
- For Z when the Z coordinate format is set to *Free-Form*, any alphanumeric characters from 0 to 24 characters.

*Tip: To configure and retrieve these coordinate values over SNMP, see the PXM MIB. To configure and retrieve these values over the CLI, see **Using the Command Line Interface** (on page 191).*

Changing Default Thresholds

The default thresholds are the initial threshold values that automatically apply to numeric environmental sensors. These values are configured on a sensor type basis, which include:

- Temperature sensors
- Humidity sensors
- Air pressure sensors
- Air flow sensors

Note that changing the default thresholds re-determine the initial thresholds applying to the environmental sensors that are added or detected later on.

In addition, changing the default thresholds also change the thresholds of those environmental sensors where the default thresholds have been selected as their threshold option. See ***Configuring Environmental Sensors or Actuators*** (on page 162).

► To change the default threshold settings:

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Click Default Thresholds Setup on the Peripheral Devices page. A dialog appears, showing a list of all numeric environmental sensor types.
3. Select the desired sensor type.
4. Click Edit or double-click that sensor type to adjust its threshold settings, deassertion hysteresis or assertion timeout.
 - To enable any threshold, select the corresponding checkbox. To disable a threshold, deselect the checkbox.
 - After any threshold is enabled, type an appropriate numeric value in the accompanying text box.
 - To set the deassertion hysteresis, type a numeric value in the Deassertion Hysteresis field. See ***"To De-assert" and Deassertion Hysteresis*** (on page 354).
 - To set the assertion timeout, type a numeric value in the Assertion Timeout (samples) field. See ***"To Assert" and Assertion Timeout*** (on page 352).
5. Repeat the above step to modify the threshold settings of other numeric sensor types.
6. Click OK.

Setting Thresholds for Multiple Sensors

You can configure thresholds for multiple environmental sensors of *the same type* at a time. For example, if you want all temperature sensors to have identical upper and lower thresholds, follow the procedure below to set up all temperature sensors together.

► **To configure thresholds of multiple environmental sensors:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Select the checkboxes of those environmental sensors whose threshold settings should be the same. Make sure the selected sensors belong to the same type.
 - To select all those listed on the Peripheral Devices page, simply select the checkbox in the header row.



3. Click Setup. Note that the Setup button is disabled if any of the selected sensors belongs to a different type.
4. Configure the thresholds as described in **Configuring Environmental Sensors or Actuators** (on page 162).
5. Click OK.

Viewing Sensor or Actuator Data

Readings and states of the environmental sensors or actuators will display in the web interface after the sensors and actuators are properly connected and managed.

The Dashboard page shows the information of managed environmental sensors and actuators only, while the Peripheral Devices page shows the information of both managed and unmanaged ones.

Both pages indicate an environmental sensor or actuator's position in either of the following manners:

- **Port <n>**, where <n> is the number of the SENSOR port on the PDU where a specific environmental sensor package is connected. DPX sensor packages show this information.
- **Port <n>, Chain Position <pos_num>**, where <pos_num> is the sensor package's sequential position in a sensor daisy chain. DPX2 and DX sensor packages show this information.

If a sensor row is colored, it means the sensor reading already crosses one of the thresholds, the sensor enters an alarmed state, or the overcurrent protector has tripped or blown. See ***The Yellow- or Red-Highlighted Sensors*** (on page 46).

► To view managed environmental sensors and actuators only:


1. Click the Dashboard icon in the PX Explorer pane, and the Dashboard page opens in the right pane.
2. Locate the Peripheral Devices section on the Dashboard page. The section shows:
 - Total number of managed sensors and actuators
 - Total number of unmanaged sensors and actuators
 - Information of each managed sensor and actuator, including:
 - Name
 - Position
 - Reading (for numeric sensors)
 - State

► To view both managed and unmanaged ones:

Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.

Detailed information for each connected sensor or actuator is displayed, including:

- ID number
- Name

- Position
- Serial number
- Type
- Channel (for a sensor package with contact closure or dry contact channels)
- Whether the sensor is an 'Actuator' or not (if yes, this icon  appears in the Actuator column)
- Reading
- State

States of Managed Sensors

An environmental sensor shows the state after being managed.

Available sensor states vary depending on the sensor type -- numeric or discrete sensors. For example, a contact closure sensor is a discrete (on/off) sensor so it switches between three states only -- unavailable, alarmed and normal.

Note: Numeric sensors show both numeric readings and sensor states to indicate environmental or internal conditions while discrete (on/off) sensors show sensor states only to indicate state changes.

Sensor state	Applicable to
unavailable	All sensors
alarmed	Discrete sensors
normal	All sensors
below lower critical	Numeric sensors
below lower warning	Numeric sensors
above upper warning	Numeric sensors
above upper critical	Numeric sensors

"unavailable" State

The *unavailable* state means the connectivity or communications with the sensor is lost.

The PXE pings all managed sensors at regular intervals in seconds. If it does not detect a particular sensor for three consecutive scans, the *unavailable* state is displayed for that sensor.

When the communication with a contact closure sensor's processor is lost, all detectors (that is, all switches) connected to the same sensor package show the "unavailable" state.

Note: When the sensor is deemed unavailable, the existing sensor configuration remains unchanged. For example, the ID number assigned to the sensor remains associated with it.

The PXE continues to ping unavailable sensors, and moves out of the *unavailable* state after detecting the sensor for two consecutive scans.

Connected sensors always show *unavailable* if they are NOT under management.

For DPX2 or DX sensor packages, all of the connected sensor packages also enter the *unavailable* states if any of them is upgrading its sensor firmware.

"normal" State

This state indicates the sensor is in the normal state.

For a contact closure sensor, usually this state is the normal state you have set.

- If the normal state is set to Normally Closed, the *normal* state means the contact closure switch is closed.
- If the normal state is set to Normally Open, the *normal* state means the contact closure switch is open.

For a Raritan's floor water sensor, the normal state must be set to Normally Closed, which means no water is detected.

*Note: See Environmental Sensors Guide for information on setting the normal state or dip switch. This guide can be downloaded from the Raritan website's **PX2 Support Files** page (<https://www.raritan.com/support/product/px2/px2-support-files>).*

For a numeric sensor, this state means the sensor reading is within the acceptable range as indicated below:

$$\text{Lower Warning threshold} \leq \text{Reading} < \text{Upper Warning threshold}$$

Note: The symbol \leq means smaller than ($<$) or equal to ($=$).

"alarmed" State

This state means a discrete (on/off) sensor is in the "abnormal" state.

Usually for a contact closure sensor, the meaning of this state varies based on the sensor's normal state setting.

- If the normal state is set to Normally Closed, the *alarmed* state means the contact closure switch is open.
- If the normal state is set to Normally Open, the *alarmed* state means the contact closure switch is closed.

For a Raritan's floor water sensor, the normal state must be set to Normally Closed, which means no water is detected. The *alarmed* state indicates that the presence of water is detected.

*Note: See Environmental Sensors Guide for information on setting the normal state or dip switch. This guide can be downloaded from the Raritan website's **PX2 Support Files page** (<https://www.raritan.com/support/product/px2/px2-support-files>).*

Tip: A contact closure sensor's LED is lit after entering the alarmed state. Determine which contact closure switch is in the "abnormal" status according to the corresponding LED.

"below lower critical" State

This state means a numeric sensor's reading is below the lower critical threshold as indicated below:

$$\text{Reading} < \text{Lower Critical Threshold}$$

"below lower warning" State

This state means a numeric sensor's reading is below the lower warning threshold as indicated below:

$$\text{Lower Critical Threshold} \leq \text{Reading} < \text{Lower Warning Threshold}$$

Note: The symbol \leq means smaller than ($<$) or equal to ($=$).

"above upper warning" State

This state means a numeric sensor's reading is above the upper warning threshold as indicated below:

$$\text{Upper Warning Threshold} \leq \text{Reading} < \text{Upper Critical Threshold}$$

Note: The symbol \leq means smaller than ($<$) or equal to ($=$).

"above upper critical" State

This state means a numeric sensor's reading is above the upper critical threshold as indicated below:

$$\text{Upper Critical Threshold} <= \text{Reading}$$

Note: The symbol $<=$ means smaller than ($<$) or equal to ($=$).

States of Managed Actuators

DX sensor packages with dry contact channels allow you to connect actuators. An actuator has only three states described below. Note that an actuator is never highlighted in red or yellow regardless of the actuator states.

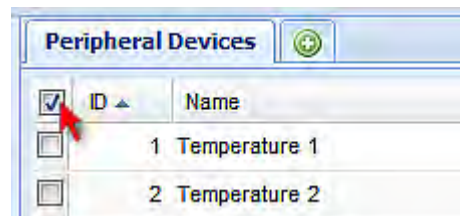
- Unavailable: The actuator is not managed or the communication with it is lost.
- On: The actuator has been turned on.
- Off: The actuator has been turned off.

Unmanaging Environmental Sensors or Actuators

When it is unnecessary to monitor a particular environmental factor, you can unmanage or release the corresponding environmental sensor so that the PXE device stops retrieving the sensor's reading and/or state. This procedure also applies if you want to unmanage an actuator.

► **To release a managed sensor or actuator:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Select the checkbox of the desired sensor or actuator on the Peripheral Devices page. To release multiple ones, select multiple checkboxes.
 - To select all those listed on the Peripheral Devices page, simply select the checkbox in the header row.



3. Click Release.

After a sensor or actuator is removed from management, the ID number assigned to it is released and can be automatically assigned to any newly-detected sensor or actuator.

Disabling the Automatic Management Function

The factory default is to enable the automatic management feature for environmental sensors and actuators. Therefore, when the total number of managed sensors and actuators has not reached 32 yet, the PXE automatically brings newly-connected environmental sensors and actuators under management after detecting the connection of these sensors and actuators.

When this feature is disabled, the PXE no longer automatically manages any newly detected environmental sensors and actuators, and therefore neither ID numbers are assigned nor sensor readings or states are available for newly-added sensors and actuators.

► **To disable the automatic management feature:**

1. Click the PDU folder.

*Note: The PDU folder is named "my PX" by default. The name can be customized. See **Naming the PDU** (on page 55).*

2. Click Setup in the Settings section. The Pdu Setup dialog appears.
3. Deselect the Peripheral Device Auto Management checkbox.
4. Click OK.

Controlling Actuators


If you have any DX sensor packages with actuators connected, which can move or control a mechanism or system, you can remotely turn on or off the actuators to control the connected mechanism or system.

► **To turn on or off an individual actuator:**

1. Expand the Peripheral Devices folder. See **Expanding the Tree** (on page 42).
2. Click the desired actuator from the navigation tree. That actuator's page opens in the right pane.
3. Click "Switch on" to turn on the actuator, or "Switch off" to turn it off.

► **To turn on or off multiple actuators:**

1. Click Peripheral Devices in the PX Explorer pane, and the Peripheral Devices page opens in the right pane.
2. Select the checkboxes of the desired actuators on the Peripheral Devices page.

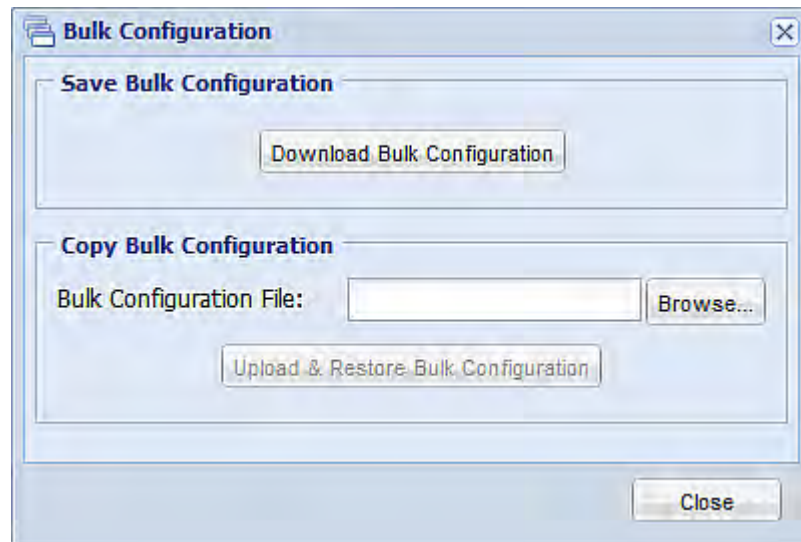
Tip: An actuator is indicated with the icon  displayed in the 'Actuator' column.

3. Click "Switch on" or "Switch off" to turn on or off the selected actuators.

Bulk Configuration

The Bulk Configuration feature lets you save the settings of a configured PXE device to your PC. You can use this configuration file to copy that configuration to other PXE devices of the same model and firmware version.

You must have the administrator privileges to save and copy the PXE configurations.



*Note: No device-specific data is saved to the Bulk Configuration file, such as environmental sensor or certain network settings. To back up or restore a specific PXE device's all settings, use the Backup/Restore feature instead. See **Backup and Restore of PXE Device Settings** (on page 176).*

Saving the PXE Configuration

A source device is an already configured PXE device that is used to create a configuration file containing the settings that can be shared between PXE devices. These settings include user and role configurations, thresholds, event rules, security settings, and so on.

This file does NOT contain device-specific information, including:

- Device name
- System name, system contact and system location
- Network settings (IP address, gateway, netmask and so on)
- Device logs
- Outlet names
- Outlet status
- Environmental sensor and actuator names
- States and values of environmental sensors and actuators
- SSL certificate

Because the date and time settings are saved in the configuration file, users should exercise caution when distributing the configuration file to the PXE devices in a different time zone than the source device.

► **To save a configuration file:**

1. Choose Maintenance > Bulk Configuration. The Bulk Configuration dialog appears.
2. Click Download Bulk Configuration.
3. When the web browser prompts you to open or save the configuration file, click Save. Choose a suitable location and save the configuration file to your PC.

The file is saved in the XML format, and its content is encrypted using the AES-128 encryption algorithm.

Copying the PXE Configuration

A target device is the PXE device that loads another PXE device's configuration file.

Copying a source PXE device's configuration to a target device adjusts the target PXE device's settings to match those of the source PXE device. In order to successfully copy a source PXE device's configuration:

- The user must be the Admin user. Or the Admin role is assigned to the user.
- The target PXE device must be running the same firmware version as the source PXE device.
- The target PXE device must be of the same model type as the source PXE device.

Bulk configuration is permitted if the differences between the target and source device are only mechanical designs which are indicated in a model name's suffix as listed below. In the following list, *n* represents a number.

- PDU chassis color, which is indicated as *Kn*, such as K1 and K601
- Line cord color, which is indicated as *Bn*, such as B2 and B5
- Line cord length (meters), which is indicated as *An*, such as A0 and A14
- Line cord length (centimeters), which is indicated as *Ln*

For example, Raritan's PX2-4724-E2N1K2 and PX2-4724-E2N1K9 share the same specifications, and the only difference is their chassis colors represented by K2 (blue) and K9 (gray).

► To copy a PXE configuration:

1. Log in to the target device's web interface.
2. If the target device's firmware version does not match that of the source device, update the target's firmware. See **Firmware Upgrade** (on page 178).
3. Choose Maintenance > Bulk Configuration. The Bulk Configuration dialog appears.
4. In the Copy Bulk Configuration section, click Browse to select the configuration file stored on your PC.
5. Click Upload & Restore Bulk Configuration to copy the file.
A message appears, prompting you to confirm the operation and enter the admin password.
6. Enter the admin password, then click Yes to confirm the operation.
7. Wait until the PXE device resets and the Login page re-appears, indicating that the configuration copy is complete.

Note: On startup, the PXE performs all of its functions, including event rules and logs, based on the new configuration file you have selected instead of the previous configuration prior to the device reset. For example, "Bulk configuration copied" is logged only when the new configuration file contains the "Bulk configuration copied" event rule.

Backup and Restore of PXE Device Settings

Different from the Bulk Configuration file, the backup file contains device-specific data like network settings. To back up or restore PXE device settings, you should perform the Backup/Restore feature.

All PXE information is captured in the XML backup file except for the device logs and SSL certificate.

*Note: To perform the bulk configuration among multiple PXE devices, perform the Bulk Configuration feature instead. See **Bulk Configuration** (on page 173).*

► **To download a backup PXE XML file:**

1. Choose Maintenance > Backup/Restore. The Backup/Restore of Device Settings dialog opens.
2. In the Save Device Settings section, click Download Device Settings. Save the file to your computer.

The file is saved in the XML format, and its content is encrypted using the AES-128 encryption algorithm.

► **To restore the PXE using a backup XML file:**

1. Choose Maintenance > Backup/Restore. The Backup/Restore of Device Settings dialog opens.
2. In the Copy Device Settings section, click Browse to locate the file.
3. Click Upload & Restore Device Settings to upload the file.

A message appears, prompting you to confirm the operation and enter the admin password.

4. Enter the admin password, then click Yes to confirm the operation.
5. Wait until the PXE device resets and the Login page re-appears, indicating that the restore is complete.

Note: On startup, the PXE performs all of its functions, including event rules and logs, based on the new configuration file you have selected instead of the previous configuration prior to the device reset. For example, "Bulk configuration copied" is logged only when the new configuration file contains the "Bulk configuration copied" event rule.

Network Diagnostics

The PXE provides the following tools in the web interface for diagnosing potential networking issues.

- Ping
- Trace Route
- List TCP Connections

*Tip: These network diagnostic tools are also available through CLI. See **Network Troubleshooting** (on page 317).*

Pinging a Host

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.

Tracing the Network Route

Trace Route lets you find out the route over the network between two hosts or systems.

► **To trace the route for a host:**

1. Choose Maintenance > Network Diagnostics > Trace Route. The "Trace Route to Host" dialog appears.
2. Type the IP address or name of the host whose route you want to check in the Host Name field.
3. In the Timeout (s) field, type a timeout value in seconds to end the trace route operation. Note that if the timeout value is too small, the trace route results may be incomplete.
4. To use the Internet Control Message Protocol (ICMP) packets to perform the trace route command, select the Use ICMP Packets checkbox.

5. Click Run. A dialog appears, displaying the Trace Route results.

Listing TCP Connections

You can use the "List TCP Connections" to display a list of TCP connections.

► **To list TCP connections:**

1. Choose Maintenance > Network Diagnostics > List TCP Connections. The TCP Connections window appears.
2. Click Close to quit the dialog.

Downloading Diagnostic Information

Important: This function is for use by Raritan Field Engineers or when you are directed by Raritan Technical Support.

You can download the diagnostic file from the PXE device to a client machine. The file is compressed into a .tgz file and should be sent to Raritan Technical Support for interpretation.

This feature is accessible only by users with Administrative Privileges.

► **To retrieve a diagnostic file:**

1. Choose Maintenance > Download Diagnostic Information. You are then prompted to save or open the file.
2. Click Save to save the file.
3. E-mail this file as instructed by Raritan Technical Support.

Firmware Upgrade

You may upgrade your PXE device to benefit from the latest enhancements, improvements and features.

The PXE firmware files are available on the Raritan website's **Support page** (<http://www.raritan.com/support/>).

Updating the PXE Firmware

When performing the firmware upgrade, the PXE keeps each outlet's power status unchanged so no server operation is interrupted.

You must be the system administrator or log in to the user profile with the Firmware Update permission to update the PXE firmware.

If applicable to your model, download the latest firmware file from the Raritan website's **Support page** (<http://www.raritan.com/support/>), read the release notes, then start the upgrade. If you have any questions or concerns about the upgrade, contact Raritan Technical Support BEFORE upgrading.

Warning: Do NOT perform the firmware upgrade over a wireless network connection.

There are two methods to update the PXE firmware:

- **Firmware Update via Web Interface** (on page 179)
- **Firmware Update via SCP** (on page 180)

Firmware Update via Web Interface

After downloading the latest firmware, log in to the PXE web interface to upgrade the firmware.

► To update the firmware using the web interface:

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 PXE 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 PXE shows three digits: 'FuP' or 'FUP.'

- No users can successfully log in to the PXE.
 - 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 PXE 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 PXE 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** (on page 185) in the online help.*

Firmware Update via SCP

You can perform a Secure Copy (SCP) command to update the PXE firmware. Same as any PXE firmware update, all user management operations are suspended and all login attempts fail during the firmware update. For details, see **Firmware Update via Web Interface** (on page 179).

► To update the firmware using the SCP command:

1. Type the following SCP command and press Enter.

```
scp <firmware file> <user name>@<device ip>:/fwupdate
```

 - *<firmware file>* is the PXE firmware's filename. If the firmware file is not in the current directory, you must include the path in the filename.
 - *<user name>* is the 'admin' or any user profile with the Firmware Update permission.
 - *<device ip>* is the IP address of the PXE that you want to update.
2. When the system prompts you to enter the password for the specified user profile, type it and press Enter.
3. The system transmits the specified firmware file to the PXE, and shows the transmission speed and percentage.
4. When the transmission is complete, it shows the following message, indicating that the PXE starts to update its firmware now. Wait until the upgrade completes.

Starting firmware update. The connection will be closed now.

► **SCP command example:**

```
scp pdu-px2-030000-41270.bin
admin@192.168.87.50:/fwupdate
```

Tip: The PSCP works in a similar way to the SCP so the PSCP syntax for firmware update is the same as SCP. That is:

```
pscp <firmware file> <user name>@<device ip>:/fwupdate
```

A Note about Firmware Upgrade Time

The PDU firmware upgrade time varies from unit to unit, depending on various external and internal factors.

External factors include, but are not limited to: network throughput, firmware file size, and speed at which the firmware is retrieved from the storage location. Internal factors include: the necessity of upgrading the firmware on the microcontroller and the number of microcontrollers that require upgrade (which depends on the number of outlets). The microcontroller is upgraded only when required. Therefore, the length of firmware upgrade time ranges from approximately 3 minutes (without any microcontroller updated) to almost 7 minutes (with all microcontrollers for 48 outlets updated). Take the above factors into account when estimating the PDU's firmware upgrade time.

The time indicated in this note is for PXE web-interface-based upgrades. Upgrades through other management systems, such as Raritan's Power IQ, may take additional time beyond the control of the PDU itself. This note does not address the upgrades using other management systems.

Viewing Firmware Update History

The firmware upgrade history, if available, is permanently stored on the PXE device.

This history indicates when a firmware upgrade event occurred, the prior and new versions associated with the firmware upgrade event, and the upgrade result.

► **To view the firmware update history:**

1. Choose Maintenance > View Firmware Update History. The Firmware Update History dialog appears, with the following information displayed.
 - Date and time of the firmware upgrade event
 - Previous firmware version
 - Update firmware version
 - Firmware upgrade result

2. You may change the number of displayed columns or re-sort the list for better viewing the data.
3. To view the details of any firmware upgrade event, select it and click Details, or simply double-click the event. The Firmware Update Details dialog appears, showing detailed information of the selected event.
4. Click Close to quit the dialog.

Full Disaster Recovery

If the firmware upgrade fails, causing the PXE device to stop working, you can recover it by using a special utility rather than returning the device to Raritan.

Contact Raritan Technical Support for the recovery utility, which works in Windows XP/Vista/7 and Linux. In addition, an appropriate PXE firmware file is required in the recovery procedure.

Accessing the Help

The Help menu provides:

- Current firmware and software packages information
- A link to the PXE Online Help

Retrieving Software Packages Information

You can check the current firmware version and the information of all open source packages embedded in the PXE device through the web interface.

► **To retrieve the embedded software packages information:**









1. Choose Help > About PX iPDU. The About PX iPDU dialog appears, with a list of open source packages displayed.
2. You can click any link in the dialog to access related information or download any software package.



Browsing through the Online Help

The PXE Online Help is accessible over the Internet.

To use online help, Active Content must be enabled in your browser. If you are using Internet Explorer 7, you must enable Scriptlets. Consult your browser help for information on enabling these features.

► To use the PXE online help:

1. Choose Help > User Guide. The online help opens in the default web browser.
2. To view the content of any topic, click the topic in the left pane. Then its content is displayed in the right pane.
3. To select a different topic, do any of the following:
 - To view the next topic, click the Next icon  in the toolbar.
 - To view the previous topic, click the Previous icon .
 - To view the first topic, click the Home icon .
4. To expand or collapse a topic that contains sub-topics, do the following:
 - To expand any topic, click the white arrow  prior to the topic, or double-click that topic. The arrow turns into a black, gradient arrow , and sub-topics appear below the topic.
 - To collapse any expanded topic, click the black, gradient arrow  prior to the topic, or double-click the expanded topic. The arrow then turns into a white arrow , and all sub-topics below that topic disappear.
5. To search for specific information, type the key word(s) or string(s) in the Search text box, and press Enter or click the Search icon  to start the search.
 - If necessary, select the "Match partial words" checkbox to include information matching part of the words entered in the Search text box.

The search results are displayed in the left pane.
6. To have the left pane show the list of topics, click the Contents tab at the bottom.
7. To show the Index page, click the Index tab.
8. To email any URL link to the currently selected topic to any person, click the "Email this page" icon  in the toolbar.
9. To email your comments or suggestions regarding the online help to Raritan, click the "Send feedback" icon .

10. To print the currently selected topic, click the "Print this page" icon



Chapter 7 Using SNMP

This SNMP section helps you set up the PXE for use with an SNMP manager. The PXE can be configured to send traps or informs to an SNMP manager, as well as receive GET and SET commands in order to retrieve status and configure some basic settings.

In This Chapter

Enabling SNMP	185
Configuring Users for Encrypted SNMP v3	186
Configuring SNMP Notifications	187
SNMP Gets and Sets	188

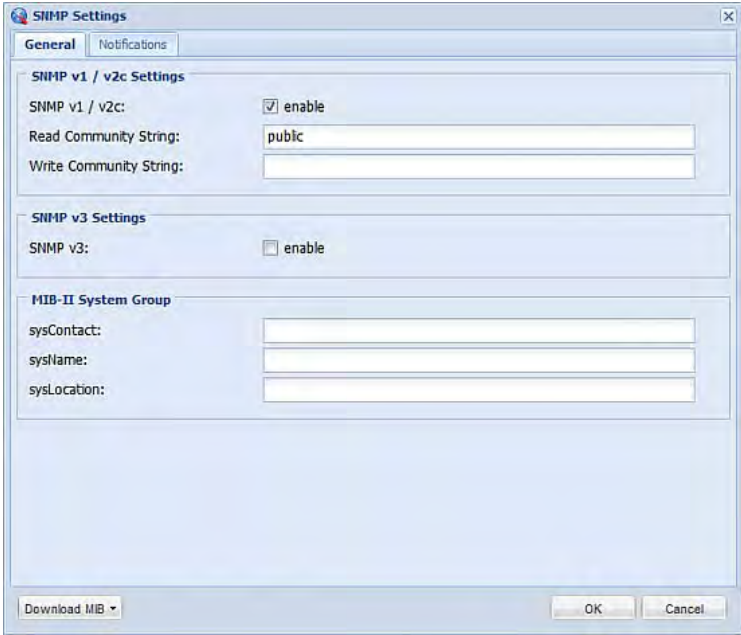
Enabling SNMP

By default, SNMP v1/v2c is enabled on the PXE so the PXE can communicate with an SNMP manager. If you have disabled the SNMP, it must be enabled to communicate with an SNMP manager.

Note that read-only access is enabled and the community string is public.

► To enable SNMP:

1. Choose Device Settings > Network Services > SNMP. The SNMP Settings dialog appears.

The image shows the 'SNMP Settings' dialog box with the 'General' tab selected. It contains three main sections: 'SNMP v1 / v2c Settings' where 'enable' is checked and the 'Read Community String' is 'public'; 'SNMP v3 Settings' where 'enable' is unchecked; and 'MIB-II System Group' with empty text boxes for 'sysContact:', 'sysName:', and 'sysLocation:'. At the bottom, there is a 'Download MIB' button and 'OK' and 'Cancel' buttons.

SNMP Settings

General Notifications

SNMP v1 / v2c Settings

SNMP v1 / v2c: ☒ enable

Read Community String: public

Write Community String:

SNMP v3 Settings

SNMP v3: ☐ enable

MIB-II System Group

sysContact:

sysName:

sysLocation:

Download MIB

OK Cancel

2. Select the "enable" checkbox in the "SNMP v1 / v2c" field to enable communication with an SNMP manager using SNMP v1 or v2c protocol.
 - Type the SNMP read-only community string in the Read Community String field. Usually the string is "public."
 - Type the read/write community string in the Write Community String field. Usually the string is "private."
3. Select the "enable" checkbox in the "SNMP v3" field to enable communication with an SNMP manager using SNMP v3 protocol.

*Tip: You can permit or disallow a user to access the PXE via the SNMP v3 protocol. See **Configuring Users for Encrypted SNMP v3** (on page 186).*

4. Enter the MIB-II system group information, if applicable:
 - a. sysContact - the contact person in charge of the system being contacted
 - b. sysName - the name assigned to the system
 - c. sysLocation - the location of the system
5. Select the MIB to be downloaded. The SNMP MIB for your PXE is used by the SNMP manager.

*Important: You must download the SNMP MIB for your PXE to use with your SNMP manager. Click Download MIB in this dialog to download the desired MIB file. For more details, see **Downloading SNMP MIB** (on page 188).*

6. Click OK.

Configuring Users for Encrypted SNMP v3

The SNMP v3 protocol allows for encrypted communication. To take advantage of this, users need to have an Authentication Pass Phrase and Privacy Pass Phrase, which act as shared secrets between them and the PXE.

► **To configure users for SNMP v3 encrypted communication:**

1. Choose User Management > Users. The Manage Users dialog appears.
2. Select the user by clicking it.
3. Click Edit or double-click the user. The Edit User 'XXX' dialog appears, where XXX is the user name.
4. To change the SNMPv3 access permissions, click the SNMPv3 tab and make necessary changes. For details, see Step 6 of **Creating a User Profile** (on page 78).

5. Click OK. The user is now set up for encrypted SNMP v3 communication.

Configuring SNMP Notifications

The PXE automatically keeps an internal log of events that occur. See **Event Rules and Actions** (on page 121). These events can also be used to send SNMP v2c or v3 notifications to a third-party destination.

The PXE provides you with the ability to create SNMPv2c and SNMPv3 TRAP communications, or SNMPv2c and SNMPv3 INFORM communications.

SNMP TRAP communications capture and send information via SNMP, but no confirmation that the communication between the devices has succeeded is provided by the receiving device.

SNMP INFORM communications capture and send information via SNMP, and an acknowledgment that the communication was received by the receiving device is provided. If the inform communication fails, it is resent. You can define the number of times and the intervals to resend the inform communication, or leave the defaults of five (5) resends in three (3) second intervals.

Note: SNMP INFORM communications may take up slightly more network resources than SNMP TRAP communications since there are additional communications between the devices, and due to additional network traffic created should the initial communication fail and another is sent.

Use SNMP TRAP rules if you do not need confirmation that the communication has succeeded, and if you need to conserve network resources. Use SNMP INFORM communications to ensure more reliable communications, and if network resources can be managed with the potential additional network traffic.

*Note: You should update the MIB used by your SNMP manager when updating to a new PXE release. This ensures your SNMP manager has the correct MIB for the release you are using. See **Downloading SNMP MIB** (on page 188).*

SNMP Gets and Sets

In addition to sending traps, the PXE is able to receive SNMP get and set requests from third-party SNMP managers.

- Get requests are used to retrieve information about the PXE, such as the system location, and the current on a specific outlet.
- Set requests are used to configure a subset of the information, such as the SNMP system name.

Note: The SNMP system name is the PXE device name. When you change the SNMP system name, the device name shown in the web interface is also changed.

The PXE does NOT support configuring IPv6-related parameters using the SNMP set requests.

Valid objects for these requests are limited to those found in the SNMP MIB-II System Group and the custom PXE MIB.

The PXE MIB

The SNMP MIB file is required for using your PXE device with an SNMP manager. An SNMP MIB file describes the SNMP functions.

Downloading SNMP MIB

The SNMP MIB file for the PXE can be easily downloaded from the web interface. There are two ways to download the SNMP MIB file.

Note: The PXE device does not support the asset management feature so you can ignore the Asset Management-related function.

► **To download the file from the SNMP Settings dialog:**

1. Choose Device Settings > Network Services > SNMP. The SNMP Settings dialog appears.
2. Click Download MIB. A submenu of MIB files appears.
3. Select the desired MIB file to download.
 - PDU2-MIB: The SNMP MIB file for PXE power management.
 - ASSETMANAGEMENT-MIB: The SNMP MIB file for asset management.
4. Click Save to save the file onto your computer.

► **To download the file from the Device Information dialog:**

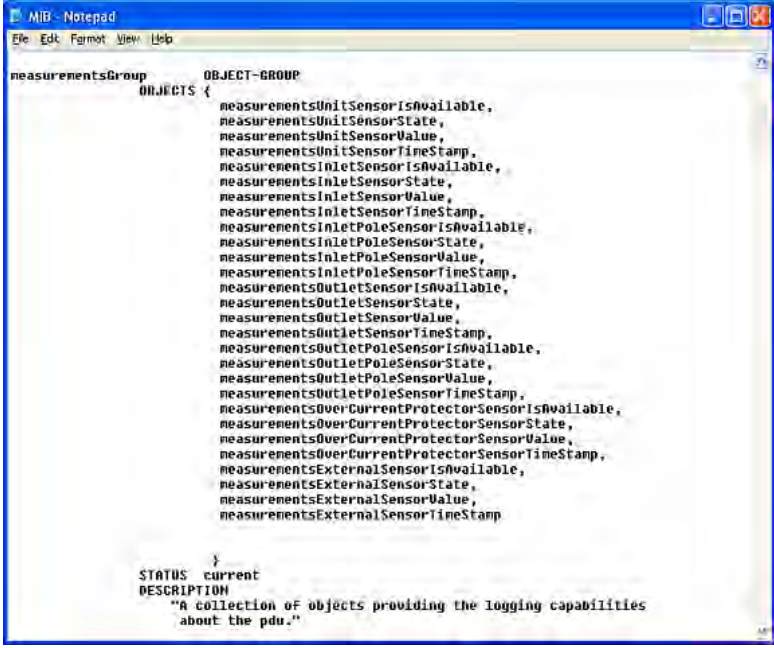
1. Choose Maintenance > Device Information. The Device Information dialog appears.

2. Click the "download" link in the PDU2-MIB or ASSETMANAGEMENT-MIB field to download the desired SNMP MIB file.
3. Click Save to save the file onto your computer.

Layout

Opening the MIB reveals the custom objects that describe the PXE system at the unit level as well as at the individual-outlet level.

As standard, these objects are first presented at the beginning of the file, listed under their parent group. The objects then appear again individually, defined and described in detail.



```
measurementsGroup OBJECT-GROUP
OBJECTS {
    measurementsUnitSensorIsAvailable,
    measurementsUnitSensorState,
    measurementsUnitSensorValue,
    measurementsUnitSensorTimeStamp,
    measurementsInletSensorIsAvailable,
    measurementsInletSensorState,
    measurementsInletSensorValue,
    measurementsInletSensorTimeStamp,
    measurementsInletPoleSensorIsAvailable,
    measurementsInletPoleSensorState,
    measurementsInletPoleSensorValue,
    measurementsInletPoleSensorTimeStamp,
    measurementsOutletSensorIsAvailable,
    measurementsOutletSensorState,
    measurementsOutletSensorValue,
    measurementsOutletSensorTimeStamp,
    measurementsOutletPoleSensorIsAvailable,
    measurementsOutletPoleSensorState,
    measurementsOutletPoleSensorValue,
    measurementsOutletPoleSensorTimeStamp,
    measurementsOverCurrentProtectorSensorIsAvailable,
    measurementsOverCurrentProtectorSensorState,
    measurementsOverCurrentProtectorSensorValue,
    measurementsOverCurrentProtectorSensorTimeStamp,
    measurementsExternalSensorIsAvailable,
    measurementsExternalSensorState,
    measurementsExternalSensorValue,
    measurementsExternalSensorTimeStamp
}
STATUS current
DESCRIPTION
    "A collection of objects providing the logging capabilities
    about the pdu."
```

For example, the measurementsGroup group contains objects for sensor readings of PXE as a whole. One object listed under this group, measurementsUnitSensorValue, is described later in the MIB as "The sensor value". pduRatedCurrent, part of the configGroup group, describes the PDU current rating.

SNMP Sets and Thresholds

Some objects can be configured from the SNMP manager using SNMP set commands. Objects that can be configured have a MAX-ACCESS level of "read-write" in the MIB.

These objects include threshold objects, which causes the PXE to generate a warning and send an SNMP notification when certain parameters are exceeded. See **Setting Power Thresholds** (on page 119) for a description of how thresholds work.

Note: When configuring the thresholds via SNMP set commands, ensure the value of upper critical threshold is higher than that of upper warning threshold.

A Note about Enabling Thresholds

When enabling previously disabled thresholds via SNMP, make sure you set a correct value for all thresholds that are supposed to be enabled prior to actually enabling them. Otherwise, you may get an error message.

Chapter 8 Using the Command Line Interface

This section explains how to use the command line interface (CLI) to administer a PXE device.

In This Chapter

About the Interface	191
Logging in to CLI	192
Logging out of CLI	194
Help Command.....	195
Querying Available Parameters for a Command.....	196
Showing Information	196
Clearing Information	218
Configuring the PXE Device and Network.....	219
Actuator Control Operations.....	312
Unblocking a User	315
Resetting the PXE	315
Network Troubleshooting.....	317
Retrieving Previous Commands.....	320
Automatically Completing a Command	320

About the Interface

The PXE provides a command line interface that enables data center administrators to perform some basic management tasks.

Using this interface, you can do the following:

- Reset the PXE device
- Display the PXE and network information, such as the device name, firmware version, IP address, and so on
- Configure the PXE and network settings
- Troubleshoot network problems

You can access the interface over a local connection using a terminal emulation program such as HyperTerminal, or via a Telnet or SSH client such as PuTTY.

*Note: Telnet access is disabled by default because it communicates openly and is thus insecure. To enable Telnet, see **Modifying Network Service Settings** (on page 63).*

Logging in to CLI

Logging in via HyperTerminal over a local connection is a little different than logging in using SSH or Telnet.

If a security login agreement has been enabled, you must accept the agreement in order to complete the login. Users are authenticated first and the security banner is checked afterwards.

With HyperTerminal

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 log in using HyperTerminal:**

1. Connect your computer to the PXE 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

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 PXE. The Username prompt appears.

Username: _

4. Type a name and press Enter. The name is case sensitive. Then you are prompted to enter a password.

```
Username: admin
Password: _
```

5. Type a password and press Enter. The password is case sensitive.

After properly entering the password, the # or > system prompt appears. See **Different CLI Modes and Prompts** (on page 194) 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 once used to log in to this product's web interface or CLI.

6. You are now logged in to the command line interface and can begin administering the PXE.

With SSH or Telnet

You can remotely log in to the command line interface 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** (on page 63) in the online help.
2. Launch an SSH or Telnet client and open a console window. A login prompt appears.

```
login as: █
```

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.

```
login as: admin
admin@192.168.84.88's 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** (on page 194) 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 once used to log in to this product's web interface or CLI.

6. You are now logged in to the command line interface and can begin administering the PXE.

Different CLI Modes and Prompts

Depending on the login name you use and the mode you enter, the system prompt in the CLI varies.

- User Mode: When you log in as a normal user, who may not have full permissions to configure the PXE device, the **>** prompt appears.
- Administrator Mode: When you log in as an administrator, who has full permissions to configure the PXE device, the **#** prompt appears.
- Configuration Mode: You can enter the configuration mode from the administrator or user mode. In this mode, the prompt changes to **config:#** or **config:>** and you can change PXE device and network configurations. See **Entering Configuration Mode** (on page 219).
- Diagnostic Mode: You can enter the diagnostic mode from the administrator or user mode. In this mode, the prompt changes to **diag:#** or **diag:>** and you can perform the network troubleshooting commands, such as the ping command. See **Entering Diagnostic Mode** (on page 317).

Closing a Local Connection

Close the window or terminal emulation program when you finish accessing a PXE device over the local connection.

When accessing or upgrading multiple PXE devices, do not transfer the local connection cable from one device to another without closing the local connection window first.

Logging out of CLI

After completing your tasks using the CLI, always log out of the CLI to prevent others from accessing the CLI.

► **To log out of the CLI:**

1. Ensure you have entered administrator mode and the **#** prompt is displayed.
2. Type `exit` and press Enter.

Help Command

The help (?) command shows a list of main CLI commands available for the current mode. This is helpful when you are not familiar with CLI commands.

► **Help command under the administrator mode:**

```
#                ?
```

► **Help command under the configuration mode:**

```
config:#        ?
```

► **Help command under the diagnostic mode:**

```
diag:#          ?
```

Press Enter after typing the help command, and a list of main commands for the current mode is displayed.

*Tip: You can check what parameters are available for a specific CLI command by adding the help command to the end of the queried command. See **Querying Available Parameters for a Command** (on page 196).*

Querying Available Parameters for a Command

If you are not sure what commands or parameters are available for a particular type of CLI command or its syntax, you can have the CLI show them by adding a space and the help command (?) to the end of that command. A list of available parameters and their descriptions will be displayed.

The following shows a few query examples.

► **To query available parameters for the "show" command:**

```
# show ?
```

► **To query available parameters for the "show user" command:**

```
# show user ?
```

► **To query available network configuration parameters:**

```
config:# network ?
```

► **To query available role configuration parameters:**

```
config:# role ?
```

► **To query available parameters for the "role create" command:**

```
config:# role create ?
```

Showing Information

You can use the show commands to view current settings or status of the PXE device or part of it, such as the IP address, networking mode, firmware version, states or readings of internal or external sensors, user profiles, and so on.

Some "show" commands have two formats: one with the parameter "details" and the other without. The difference is that the command without the parameter "details" displays a shortened version of information while the other displays in-depth information.

After typing a "show" command, press Enter to execute it.

*Note: Depending on your login name, the # prompt may be replaced by the > prompt. See **Different CLI Modes and Prompts** (on page 194).*

Network Configuration

This command shows all network configuration, such as the IP address, networking mode, and MAC address.

```
# show network
```

IP Configuration

This command shows the IP-related configuration only, such as IPv4 and IPv6 configuration, address(es), gateway, and subnet mask.

```
# show network ip <option>
```

Variables:

- <option> is one of the options: *all*, *v4* or *v6*.

Option	Description
all	This options shows both IPv4 and IPv6 settings. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
v4	This option shows the IPv4 settings only.
v6	This option shows the IPv6 settings only.

LAN Interface Settings

This command shows the LAN interface information only, including LAN interface speed, duplex mode, current LAN interface status and LAN interface MAC address.

```
# show network interface
```

Networking Mode

This command shows whether the current networking mode is wired or wireless.

```
# show network mode
```

Note: If the PXE is a slave device connected to the LAN via the master PXE device, the `show network mode` command displays wired(USB) instead of wired.

The PXE device does NOT support the wireless networking mode so the network mode never shows "wireless."

Network Service Settings

This command shows the network service settings only, including the Telnet setting, TCP ports for HTTP, HTTPS, SSH and Modbus/TCP services, and SNMP settings.

```
# show network services <option>
```

Variables:

- <option> is one of the options: *all*, *http*, *https*, *telnet*, *ssh*, *snmp*, *modbus* and *zeroconfig*.

Option	Description
all	Displays the settings of all network services, including HTTP, HTTPS, Telnet, SSH and SNMP. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
http	Only displays the TCP port for the HTTP service.
https	Only displays the TCP port for the HTTPS service.
telnet	Only displays the settings of the Telnet service.
ssh	Only displays the settings of the SSH service.
snmp	Only displays the SNMP settings.
modbus	Only displays the settings of the Modbus/TCP service.
zeroconfig	Only displays the settings of the zero configuration advertising.

PDU Configuration

This command shows the PDU configuration, such as the device name, firmware version and model type.

```
#          show pdu
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show pdu details
```

Outlet Information

This command syntax shows the outlet information.

```
#          show outlets <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show outlets <n> details
```

Variables:

- <n> is one of the options: *all*, or a number.

Option	Description
all	Displays the information for all outlets. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
A specific outlet number	Displays the information for the specified outlet only.

Displayed information:

- Without the parameter "details," only the outlet name is displayed.
- With the parameter "details," more outlet information is displayed in addition to the outlet name, such as the outlet rating.

Inlet Information

This command syntax shows the inlet information.

```
#          show inlets <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show inlets <n> details
```

Variables:

- <n> is one of the options: *all*, or a number.

Option	Description
all	Displays the information for all inlets.
	<i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
A specific inlet number	Displays the information for the specified inlet only. An inlet number needs to be specified only when there are more than 1 inlet on your PDU.

Displayed information:

- Without the parameter "details," only the inlet's name and RMS current are displayed.
- With the parameter "details," more inlet information is displayed in addition to the inlet name and RMS current, such as the inlet's RMS voltage, active power and active energy.

Overcurrent Protector Information

This command is only available for PDUs with overcurrent protectors for protecting outlets.

This command syntax shows the overcurrent protector information, such as a circuit breaker or a fuse.

```
#          show ocp <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show ocp <n> details
```

Variables:

- <n> is one of the options: *all*, or a number.

Option	Description
all	Displays the information for all overcurrent protectors. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
A specific overcurrent protector number	Displays the information for the specified overcurrent protector only.

Displayed information:

- Without the parameter "details," only the circuit breaker name is displayed.
- With the parameter "details," more circuit breaker information is displayed in addition to the name, such as the rating and circuit breaker type.

Date and Time Settings

This command shows the current date and time settings on the PXE device.

```
# show time
```

To show detailed information, add the parameter "details" to the end of the command.

```
# show time details
```

Default Measurement Units

This command shows the default measurement units applied to the PXE web and CLI interfaces across all users, especially those users authenticated through remote authentication servers.

```
# show user defaultPreferences
```

*Note: If a user has set his/her own preferred measurement units or the administrator has changed any user's preferred units, the web and CLI interfaces show the preferred measurement units for that user instead of the default ones after that user logs in to the PXE. See **Existing User Profiles** (on page 212) for the preferred measurement units for a specific user.*

Environmental Sensor Information

This command syntax shows the environmental sensor's information.

```
# show externalsensors <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
# show externalsensors <n> details
```

```
External sensor 3 ('Temperature 1')
```

```
Sensor type: Temperature
```

```
Reading:      31.8 deg C (normal)
```

```
Serial number:      AEI0950133
```

```
Description:        Not configured
```

```
Location:           X Not configured
```

```
                    Y Not configured
```

```
                    Z Not configured
```

```
Position:           Port 1
```

```
Using default thresholds: yes
```

Variables:

- <n> is one of the options: *all*, or a number.

Option	Description
all	Displays the information of all environmental sensors. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
A specific environmental sensor number*	Displays the information for the specified environmental sensor only.

* The environmental sensor number is the ID number assigned to the sensor, which can be found on the Peripheral Devices page of the PXE web interface.

Displayed information:

- Without the parameter "details," only the sensor ID, sensor type and reading are displayed.

Note: A discrete (on/off) sensor displays the sensor state instead of the numeric reading.

- With the parameter "details," more information is displayed in addition to the ID number and sensor reading, such as the serial number, sensor position, and X, Y, and Z coordinates.

Note: DPX sensor packages do not provide chain position information..

Actuator Information

This command syntax shows an actuator's information.

```
#          show actuators <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show actuators <n> details
```

Variables:

- <n> is one of the options: *all*, or a number.

Option	Description
all	Displays the information for all actuators. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
A specific actuator number*	Displays the information for the specified actuator only.

* The actuator number is the ID number assigned to the actuator, which can be found on the Peripheral Devices page of the PXE web interface.

Displayed information:

- Without the parameter "details," only the actuator ID, type and state are displayed.
- With the parameter "details," more information is displayed in addition to the ID number and actuator state, such as the serial number and X, Y, and Z coordinates.

Environmental Sensor Package Information

Different from the "show externalsensors" commands, which show the reading, status and configuration of an individual environmental sensor, the following command syntax shows the information of all connected environmental sensor packages, each of which may contain more than one sensor or actuator.

```
# show peripheralDevicePackages
```

Information similar to the following is displayed. An environmental sensor module is a peripheral device package.

```
Peripheral Device Package 1
Serial Number:    AEI7A00022
Package Type:     DPX-T1H1
Position:         Port 1
Package State:    operational
Firmware Version: Not available
```

```
Peripheral Device Package 2
Serial Number:    AEI7A00021
Package Type:     DPX-T3H1
Position:         Port 1
Package State:    operational
Firmware Version: Not available
```

Inlet Sensor Threshold Information

This command syntax shows the specified inlet sensor's threshold-related information.

```
#          show sensor inlet <n> <sensor type>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show sensor inlet <n> <sensor type> details
```

Variables:

- <n> is the number of the inlet whose sensors you want to query. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Displayed information:

- Without the parameter "details," only the reading, state, threshold, deassertion hysteresis and assertion timeout settings of the specified inlet sensor are displayed.
- With the parameter "details," more sensor information is displayed, including resolution and range.
- If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

Inlet Pole Sensor Threshold Information

This command is only available for a three-phase PDU.

This command syntax shows the specified inlet pole sensor's threshold-related information.

```
#          show sensor inletpole <n> <p> <sensor type>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show sensor inletpole <n> <p> <sensor type> details
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to query. For a single-inlet PDU, <n> is always the number 1.
- <p> is the label of the inlet pole whose sensors you want to query.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor

Displayed information:

- Without the parameter "details," only the reading, state, threshold, deassertion hysteresis and assertion timeout settings of the specified inlet pole sensor are displayed.
- With the parameter "details," more sensor information is displayed, including resolution and range.
- If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

Environmental Sensor Threshold Information

This command syntax shows the specified environmental sensor's threshold-related information.

```
#          show sensor externalsensor <n>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show sensor externalsensor <n> details
```

External sensor 3 (Temperature):

Reading: 31.8 deg C

State: normal

Active Thresholds: Sensor specific thresholds

Default Thresholds for Temperature sensors:

Lower critical threshold: 10.0 deg C

Lower warning threshold: 15.0 deg C

Upper warning threshold: 30.0 deg C

Upper critical threshold: 35.0 deg C

Deassertion hysteresis: 1.0 deg C

Assertion timeout: 0 samples

Sensor Specific Thresholds:

Lower critical threshold: 8.0 deg C

Lower warning threshold: 13.0 deg C

Upper warning threshold: 28.0 deg C

Upper critical threshold: 33.0 deg C

Deassertion hysteresis: 1.0 deg C

Assertion timeout: 0 samples

Variables:

- <n> is the environmental sensor number. The environmental sensor number is the ID number assigned to the sensor, which can be found on the Peripheral Devices page of the PXE web interface.

Displayed information:

- Without the parameter "details," only the reading, threshold, deassertion hysteresis and assertion timeout settings of the specified environmental sensor are displayed.
- With the parameter "details," more sensor information is displayed, including resolution and range.

Note: For a discrete (on/off) sensor, the threshold-related and accuracy-related data is NOT available.

Environmental Sensor Default Thresholds

This command syntax shows a certain sensor type's default thresholds, which are the initial thresholds applying to the specified type of sensor.

```
#          show defaultThresholds <sensor type>
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show defaultThresholds <sensor type> details
```

Variables:

- <sensor type> is one of the following numeric sensor types:

Sensor types	Description
humidity	Humidity sensors
temperature	Temperature sensors
airPressure	Air pressure sensors
airFlow	Air flow sensors
all	All of the above numeric sensors
<i>Tip: You can also type the command without adding this option "all" to get the same data.</i>	

Displayed information:

- Without the parameter "details," only the default upper and lower thresholds, deassertion hysteresis and assertion timeout settings of the specified sensor type are displayed.
- With the parameter "details," the threshold range is displayed in addition to default thresholds settings.

Security Settings

This command shows the security settings of the PXE.

```
#          show security
```

To show detailed information, add the parameter "details" to the end of the command.

```
#          show security details
```

Displayed information:

- Without the parameter "details," the information including IP access control, role-based access control, password policy, and HTTPS encryption is displayed.
- With the parameter "details," more security information is displayed, such as user blocking time, user idle timeout and front panel permissions (if supported by your model).

Existing User Profiles

This command shows the data of one or all existing user profiles.

```
# show user <user_name>
```

To show detailed information, add the parameter "details" to the end of the command.

```
# show user <user_name> details
```

Variables:

- <user_name> is the name of the user whose profile you want to query. The variable can be one of the options: *all* or a user's name.

Option	Description
all	This option shows all existing user profiles. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
a specific user's name	This option shows the profile of the specified user only.

Displayed information:

- Without the parameter "details," only four pieces of user information are displayed: user name, user "Enabled" status, SNMP v3 access privilege, and role(s).
- With the parameter "details," more user information is displayed, such as the telephone number, e-mail address, preferred measurement units and so on.

Existing Roles

This command shows the data of one or all existing roles.

```
#          show roles <role_name>
```

Variables:

- <role_name> is the name of the role whose permissions you want to query. The variable can be one of the following options:

Option	Description
all	This option shows all existing roles. <i>Tip: You can also type the command without adding this option "all" to get the same data.</i>
a specific role's name	This option shows the data of the specified role only.

Displayed information:

- Role settings are displayed, including the role description and privileges.

EnergyWise Settings

This command shows the PXE device's current configuration for Cisco® EnergyWise.

```
#          show energywise
```

Event Log

The command used to show the event log begins with `show eventlog`. You can add either the *limit* or *class* parameters or both to show specific events.

► **Show the last 30 entries:**

```
# show eventlog
```

► **Show a specific number of last entries in the event log:**

```
# show eventlog limit <n>
```

► **Show a specific type of events only:**

```
# show eventlog class <event_type>
```

► **Show a specific number of last entries associated with a specific type of events only:**

```
# show eventlog limit <n> class <event_type>
```

Variables:

- `<n>` is one of the options: *all* or a number.

Option	Description
all	Displays all entries in the event log.
An integer number	Displays the specified number of last entries in the event log. The number ranges between 1 to 10,000.

- `<event_type>` is one of the following event types.

Event type	Description
all	All events.
device	Device-related events, such as system starting or firmware upgrade event.
userAdministration	User management events, such as a new user profile or a new role.
userActivity	User activities, such as login or logout.
pdu	Displays PDU-related events, such as entry or exit of the load shedding mode.

Event type	Description
sensor	Internal or external sensor events, such as state changes of any sensors.
serverMonitor	Server-monitoring records, such as a server being declared reachable or unreachable.
energywise	Cisco EnergyWise-related events, such as enabling the support of the EnergyWise function.
timerEvent	Scheduled action events.

Note: You can ignore the following event types in the CLI because the PXE does not support them: `assetManagement`, `cardReader`, `lhx`, `modem`, `transferSwitch` and `webcam`.

Reliability Data

This command shows the reliability data.

```
#          show reliability data
```

Reliability Error Log

This command shows the reliability error log.

```
#          show reliability errorlog <n>
```

Variables:

- <n> is one of the options: 0 (zero) or any other integer number.

Option	Description
0	Displays all entries in the reliability error log. <i>Tip: You can also type the command without adding this option "0" to get all data.</i>
A specific integer number	Displays the specified number of last entries in the reliability error log.

Command History

This command syntax shows the command history for current connection session.

```
# show history
```

Displayed information:

- A list of commands that were previously entered in the current session is displayed.

History Buffer Length

This command syntax shows the length of the history buffer for storing history commands.

```
# show history bufferlength
```

Displayed information:

- The current history buffer length is displayed.

Examples

This section provides examples of the show command.

Example 1 - Basic Security Information

The diagram shows the output of the *show security* command.

```
# show security
IPv4 access control: Disabled
IPv6 access control: Disabled
Role based access control for IPv4: Disabled
Role based access control for IPv6: Disabled
Password aging: Disabled
Prevent concurrent user login: No
Strong passwords: Disabled
Enforce HTTPS for web access: Yes
Restricted Service Agreement: disabled
```

Example 2 - In-Depth Security Information

More information is displayed when typing the *show security details* command.

```
# show security details
IPv4 access control: Disabled

IPv6 access control: Disabled

Role based access control for IPv4: Disabled
Role based access control for IPv6: Disabled

Password aging: Disabled

Prevent concurrent user login: No
Maximum number of failed logins: 3
User block time: 10 minutes

User idle timeout: 1440 minutes

Strong passwords: Disabled

Enforce HTTPS for web access: Yes

Restricted Service Agreement: disabled
Restricted Service Agreement Banner Content:
Unauthorized access prohibited; all access and activities not explicitly authori
zed by management are unauthorized. All activities are monitored and logged. The
re is no privacy on this system. Unauthorized access and activities or any crimi
nal activity will be reported to appropriate authorities.
```

Example 3 - Basic PDU Information

The diagram shows the output of the *show pdu* command.

```
# show pdu
PDU 'my PX'
Model: PXE-1847
Firmware version: 2.2.10.5-30940
#
```


Example 4 - In-Depth PDU Information

More information is displayed when typing the *show pdu details* command.

```
# show pdu
PDU 'my PX'
Model: PXE-1847
Firmware version: 2.2.10.5-30940
# show pdu details
PDU 'my PX'
Model: PXE-1847
Firmware version: 2.2.10.5-30940
Serial number: PA61234567

Voltage rating: 200-240V
Current rating: 32A
Frequency rating: 50/60Hz
Power rating: 6.4-7.7kVA

Sensor data retrieval: Enabled
Measurements per log entry: 60

External sensor Z coordinate format: Rack units
Device altitude: 3000 m
#
```

Clearing Information

You can use the clear commands to remove unnecessary data from the PXE.

After typing a "clear" command, press Enter to execute it.

*Note: Depending on your login name, the # prompt may be replaced by the > prompt. See **Different CLI Modes and Prompts** (on page 194).*

Clearing Event Log

This command removes all data from the event log.

```
# clear eventlog

-- OR --

# clear eventlog /y
```

If you entered the command without "/y," a message appears, prompting you to confirm the operation. Type *y* to clear the event log or *n* to abort the operation.

If you type *y*, a message "Event log was cleared successfully" is displayed after all data in the event log is deleted.

Configuring the PXE Device and Network

To configure the PXE device or network settings through the CLI, it is highly recommended to log in as the administrator so that you have full permissions.

To configure any settings, enter the configuration mode. Configuration commands are case sensitive so ensure you capitalize them correctly.

Entering Configuration Mode

Configuration commands function in configuration mode only.

► **To enter configuration mode:**

1. Ensure you have entered administrator mode and the # prompt is displayed.

*Note: If you enter configuration mode from user mode, you may have limited permissions to make configuration changes. See **Different CLI Modes and Prompts** (on page 194).*

2. Type `config` and press Enter.
3. The `config:#` prompt appears, indicating that you have entered configuration mode.

`config:# _`

4. Now you can type any configuration command and press Enter to change the settings.

Important: To apply new configuration settings, you must issue the "apply" command before closing the terminal emulation program. Closing the program does not save any configuration changes. See *Quitting Configuration Mode* (on page 219).

Quitting Configuration Mode

Both of "apply" and "cancel" commands let you quit the configuration mode. The difference is that "apply" saves all changes you made in the configuration mode while "cancel" aborts all changes.

► **To quit the configuration mode, use either command:**

```
config:#      apply
-- OR --
```

```
config:#      cancel
```

The # or > prompt appears after pressing Enter, indicating that you have entered the administrator or user mode. See ***Different CLI Modes and Prompts*** (on page 194).

PDU Configuration Commands

A PDU configuration command begins with *pdu*. You can use the PDU configuration commands to change the settings that apply to the whole PXE device.

Changing the PDU Name

This command syntax changes the PXE device's name.

```
config:#      pdu name "<name>"
```

Variables:

- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Enabling or Disabling Data Logging

This command syntax enables or disables the data logging feature.

```
config:#      pdu dataRetrieval <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the data logging feature.
disable	Disables the data logging feature.

For more information, see ***Setting Data Logging*** (on page 74).

Setting Data Logging Measurements Per Entry

This command syntax defines the number of measurements accumulated per log entry.

```
config:# pdu measurementsPerLogEntry <number>
```

Variables:

- <number> is an integer between 1 and 600. The default is 60 samples per log entry.

For more information, see **Setting Data Logging** (on page 74).

Specifying the Device Altitude

This command syntax specifies your PXE device's altitude above sea level (in meters). You must specify the PXE device's altitude above sea level if a Raritan differential air pressure sensor is attached. This is because the device's altitude is associated with the altitude correction factor. See **Altitude Correction Factors** (on page 347).

```
config:# pdu deviceAltitude <altitude>
```

Variables:

- <altitude> is an integer between 1 and 3000 meters.

Setting the Z Coordinate Format for Environmental Sensors

This command syntax enables or disables the use of rack units for specifying the height (Z coordinate) of environmental sensors.

```
config:# pdu externalSensorsZCoordinateFormat <option>
```

Variables:

- <option> is one of the options: *rackUnits* or *freeForm*.

Option	Description
rackUnits	The height of the Z coordinate is measured in standard rack units. When this is selected, you can type a numeric value in the rack unit to describe the Z coordinate of any environmental sensors or actuators.

Option	Description
freeForm	Any alphanumeric string can be used for specifying the Z coordinate.

*Note: After determining the format for the Z coordinate, you can set a value for it. See **Setting the Z Coordinate** (on page 286).*

Enabling or Disabling Peripheral Device Auto Management

This command syntax enables or disables the Peripheral Device Auto Management feature.

```
config:# pdu peripheralDeviceAutoManagement <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the automatic management feature for environmental sensors.
disable	Disables the automatic management feature for environmental sensors.

For more information, see **Disabling the Automatic Management Function** (on page 172).

Examples

This section illustrates several PDU configuration examples.

Example 1 - PDU Naming

The following command assigns the name "my px12" to the PDU.

```
config:# pdu name "my px12"
```

Example 2 - Data Logging Enabled

The following command enables the data logging feature.

```
config:# pdu dataRetrieval enable
```

Network Configuration Commands

A network configuration command begins with *network*. A number of network settings can be changed through the CLI, such as the IP address, transmission speed, duplex mode, and so on.

Setting the Networking Mode

If your PXE device is implemented with both wired and wireless networking mechanisms, you must determine which mechanism is enabled for network connectivity before further configuring networking parameters.

This command syntax enables the wired or wireless networking mode.

```
config:# network mode <mode>
```

Variables:

- <mode> is one of the modes: *wired* or *wireless*.

Mode	Description
wired	Enables the wired networking mode.
wireless	Enables the wireless networking mode.

Note: If you enable the wireless networking mode, and the PXE does not detect any wireless USB LAN adapter or the connected wireless USB LAN adapter is not supported, the message "Supported Wireless device not found" is displayed.

Configuring IP Protocol Settings

By default, only the IPv4 protocol is enabled. You can enable both the IPv4 and IPv6 protocols, or only the IPv6 protocol for your PXE device.

An IP protocol configuration command begins with *network ip*.

Enabling IPv4 or IPv6

This command syntax determines which IP protocol is enabled on the PXE.

```
config:# network ip proto <protocol>
```

Variables:

- <protocol> is one of the options: *v4Only*, *v6Only* or *both*.

Mode	Description
v4Only	Enables IPv4 only on all interfaces. This is the default.
v6Only	Enables IPv6 only on all interfaces.
both	Enables both IPv4 and IPv6 on all interfaces.

Selecting IPv4 or IPv6 Addresses

This command syntax determines which IP address is used when the DNS server returns both of IPv4 and IPv6 addresses. You need to configure this setting only after both of IPv4 and IPv6 protocols are enabled on the PXE.

```
config:# network ip dnsResolverPreference <resolver>
```

Variables:

- <resolver> is one of the options: *preferV4* or *preferV6*.

Option	Description
preferV4	Use the IPv4 addresses returned by the DNS server.
preferV6	Use the IPv6 addresses returned by the DNS server.

Configuring IPv4 Parameters

An IPv4 configuration command begins with *network ipv4*.

Configuration commands are case sensitive so ensure you capitalize them correctly.

Setting the IPv4 Configuration Mode

This command syntax determines the IP configuration mode.

```
config:# network ipv4 ipConfigurationMode <mode>
```

Variables:

- <mode> is one of the modes: *dhcp* or *static*.

Mode	Description
dhcp	The IPv4 configuration mode is set to DHCP.
static	The IPv4 configuration mode is set to static IP address.

Setting the IPv4 Preferred Host Name

After selecting DHCP as the IPv4 configuration mode, you can specify the preferred host name, which is optional. The following is the command syntax:

```
config:# network ipv4 preferredHostName <name>
```

Variables:

- <name> is a host name which:
 - Consists of alphanumeric characters and/or hyphens
 - Cannot begin or end with a hyphen
 - Cannot contain more than 63 characters
 - Cannot contain punctuation marks, spaces, and other symbols

Setting the IPv4 Address

After selecting the static IP configuration mode, you can use this command syntax to assign a permanent IP address to the PXE device.

```
config:# network ipv4 ipAddress <ip address>
```

Variables:

- <ip address> is the IP address being assigned to your PXE device. The value ranges from 0.0.0.0 to 255.255.255.255.

Setting the IPv4 Subnet Mask

After selecting the static IP configuration mode, you can use this command syntax to define the subnet mask.

```
config:#    network ipv4 subnetMask <netmask>
```

Variables:

- <netmask> is the subnet mask address. The value ranges from 0.0.0.0 to 255.255.255.255.

Setting the IPv4 Gateway

After selecting the static IP configuration mode, you can use this command syntax to specify the gateway.

```
config:#    network ipv4 gateway <ip address>
```

Variables:

- <ip address> is the IP address of the gateway. The value ranges from 0.0.0.0 to 255.255.255.255.

Setting the IPv4 Primary DNS Server

After selecting the static IP configuration mode, use this command syntax to specify the primary DNS server. If you have selected the DHCP configuration mode, you still can manually specify DNS servers with this command and then override the DHCP-assigned DNS servers. See **Overriding the IPv4 DHCP-Assigned DNS Server** (on page 227).

```
config:#    network ipv4 primaryDNSServer <ip address>
```

Variables:

- <ip address> is the IP address of the primary DNS server. The value ranges from 0.0.0.0 to 255.255.255.255.

Setting the IPv4 Secondary DNS Server

After selecting the static IP configuration mode, you can use this command syntax to specify the secondary DNS server. If you have selected the DHCP configuration mode, you still can manually specify DNS servers with this command and then override the DHCP-assigned DNS servers. See **Overriding the IPv4 DHCP-Assigned DNS Server** (on page 227).

```
config:# network ipv4 secondaryDNSServer <ip address>
```

Variables:

- <ip address> is the IP address of the secondary DNS server. The value ranges from 0.0.0.0 to 255.255.255.255.

Note: The PXE supports a maximum of 3 DNS servers. If two IPv4 DNS servers and two IPv6 DNS servers are available, the PXE only uses the primary IPv4 and IPv6 DNS servers.

Overriding the IPv4 DHCP-Assigned DNS Server

After specifying the primary/secondary DNS server, you can use this command to override the DHCP-assigned DNS server with the one you specified.

```
config:# network ipv4 overrideDNS <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	This option overrides the DHCP-assigned DNS server with the primary/secondary DNS server you assign.
disable	This option resumes using the DHCP-assigned DNS server.

Setting IPv4 Static Routes

If the IPv4 network mode is set to static IP and your local network contains two subnets, you can configure static routes to enable or disable communications between the PXE and devices in the other subnet.

These commands are prefixed with *network ipv4 staticRoutes*.

► **Add a static route:**

```
config:#    network ipv4 staticRoutes add <dest-1> <hop>
```

► **Delete an existing static route:**

```
config:#    network ipv4 staticRoutes delete <route_ID>
```

► **Modify an existing static route:**

```
config:#    network ipv4 staticRoutes modify <route_ID> <dest-2> <hop>
```

Variables:

- <dest-1> is a combination of the IP address and subnet mask of the other subnet. The format is *IP address/subnet mask*.
- <hop> is the IP address of the next hop router.
- <route_ID> is the ID number of the route setting which you want to delete or modify.
- <dest-2> is a modified route setting that will replace the original route setting. Its format is *IP address/subnet mask*. You can modify either the IP address or the subnet mask or both.

Configuring IPv6 Parameters

An IPv6 configuration command begins with *network ipv6*.

Configuration commands are case sensitive so ensure you capitalize them correctly.

Setting the IPv6 Configuration Mode

This command syntax determines the IP configuration mode.

```
config:#    network ipv6 ipConfigurationMode <mode>
```

Variables:

- <mode> is one of the modes: *automatic* or *static*.

Mode	Description
automatic	The IPv6 configuration mode is set to automatic.
static	The IPv6 configuration mode is set to static IP address.

Setting the IPv6 Preferred Host Name

After selecting DHCP as the IPv6 configuration mode, you can specify the preferred host name, which is optional. The following is the command syntax:

```
config:#    network ipv6 preferredHostName <name>
```

Variables:

- <name> is a host name which:
 - Consists of alphanumeric characters and/or hyphens
 - Cannot begin or end with a hyphen
 - Cannot contain more than 63 characters
 - Cannot contain punctuation marks, spaces, and other symbols

Setting the IPv6 Address

After selecting the static IP configuration mode, you can use this command syntax to assign a permanent IP address to the PXE device.

```
config:# network ipv6 ipAddress <ip address>
```

Variables:

- <ip address> is the IP address being assigned to your PXE device. This value uses the IPv6 address format. Note that you must add /xx, which indicates a prefix length of bits such as /64, to the end of this IPv6 address.

Setting the IPv6 Gateway

After selecting the static IP configuration mode, you can use this command syntax to specify the gateway.

```
config:# network ipv6 gateway <ip address>
```

Variables:

- <ip address> is the IP address of the gateway. This value uses the IPv6 address format.

Setting the IPv6 Primary DNS Server

After selecting the static IP configuration mode, use this command syntax to specify the primary DNS server. If you have selected the automatic configuration mode, you still can manually specify DNS servers with this command and then override the DHCP-assigned DNS servers. See **Overriding the IPv6 DHCP-Assigned DNS Server** (on page 231).

```
config:# network ipv6 primaryDNSServer <ip address>
```

Variables:

- <ip address> is the IP address of the primary DNS server. This value uses the IPv6 address format.

Setting the IPv6 Secondary DNS Server

After selecting the static IP configuration mode, you can use this command syntax to specify the secondary DNS server. If you have selected the automatic configuration mode, you still can manually specify DNS servers with this command and then override the DHCP-assigned DNS servers. See **Overriding the IPv6 DHCP-Assigned DNS Server** (on page 231).

```
config:#    network ipv6 secondaryDNSServer <ip address>
```

Variables:

- <ip address> is the IP address of the secondary DNS server. This value uses the IPv6 address format.

Note: The PXE supports a maximum of 3 DNS servers. If two IPv4 DNS servers and two IPv6 DNS servers are available, the PXE only uses the primary IPv4 and IPv6 DNS servers.

Overriding the IPv6 DHCP-Assigned DNS Server

After specifying the primary/secondary DNS server, you can use this command to override the DHCP-assigned DNS server with the one you specified.

```
config:#    network ipv6 overrideDNS <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	This option overrides the DHCP-assigned DNS server with the primary/secondary DNS server you assign.
disable	This option resumes using the DHCP-assigned DNS server.

Setting IPv6 Static Routes

If the IPv6 network mode is set to static IP and your local network contains two subnets, you can configure static routes to enable or disable communications between the PXE and devices in the other subnet.

These commands are prefixed with *network ipv6 staticRoutes*.

► **Add a static route:**

```
config:#    network ipv6 staticRoutes add <dest-1> <hop>
```

► **Delete a static route**

```
config:#    network ipv6 staticRoutes delete <route_ID>
```

► **Modify an existing static route:**

```
config:#    network ipv6 staticRoutes modify <route_ID> <dest-2> <hop>
```

Variables:

- <dest-1> is the IP address and prefix length of the subnet where the PXE belongs. The format is *IP address/prefix length*.
- <hop> is the IP address of the next hop router.
- <route_ID> is the ID number of the route setting which you want to delete or modify.
- <dest-2> is a modified route setting that will replace the original route setting. Its format is *IP address/prefix length*. You can modify either the IP address or the prefix length or both.

Setting LAN Interface Parameters

A LAN interface configuration command begins with *network interface*.

Changing the LAN Interface Speed

This command syntax determines the LAN interface speed.

```
config:# network interface LANInterfaceSpeed <option>
```

Variables:

- <option> is one of the options: *auto*, *10Mbps*, and *100Mbps*.

Option	Description
auto	System determines the optimum LAN speed through auto-negotiation.
10Mbps	The LAN speed is always 10 Mbps.
100Mbps	The LAN speed is always 100 Mbps.

Changing the LAN Duplex Mode

This command syntax determines the LAN interface duplex mode.

```
config:# network interface LANInterfaceDuplexMode <mode>
```

Variables:

- <mode> is one of the modes: *auto*, *half* or *full*.

Option	Description
auto	The PXE selects the optimum transmission mode through auto-negotiation.
half	Half duplex: Data is transmitted in one direction (to or from the PXE device) at a time.
full	Full duplex: Data is transmitted in both directions simultaneously.

Setting Network Service Parameters

A network service command begins with *network services*.

Setting the HTTP Port

The commands used to configure the HTTP port settings begin with *network services http*.

► Change the HTTP port:

```
config:#    network services http port <n>
```

► Enable or disable the HTTP port:

```
config:#    network services http enabled <option>
```

Variables:

- <n> is a TCP port number between 1 and 65535. The default HTTP port is 80.
- <option> is one of the options: *true* or *false*.

Option	Description
true	The HTTP port is enabled.
false	The HTTP port is disabled.

Setting the HTTPS Port

The commands used to configure the HTTPS port settings begin with *network services https*.

► **Change the HTTPS port:**

```
config:# network services https port <n>
```

► **Enable or disable the HTTPS access:**

```
config:# network services https enabled <option>
```

Variables:

- <n> is a TCP port number between 1 and 65535. The default HTTPS port is 443.
- <option> is one of the options: *true* or *false*.

Option	Description
true	Forces any access to the PXE via HTTP to be redirected to HTTPS.
false	No HTTP access is redirected to HTTPS.

Changing the Telnet Configuration

You can enable or disable the Telnet service, or change its TCP port using the CLI commands.

A Telnet command begins with *network services telnet*.

Enabling or Disabling Telnet

This command syntax enables or disables the Telnet service.

```
config:# network services telnet enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The Telnet service is enabled.

Option	Description
false	The Telnet service is disabled.

Changing the Telnet Port

This command syntax changes the Telnet port.

```
config:# network services telnet port <n>
```

Variables:

- <n> is a TCP port number between 1 and 65535. The default Telnet port is 23.

Changing the SSH Configuration

You can enable or disable the SSH service, or change its TCP port using the CLI commands.

An SSH command begins with *network services ssh*.

Enabling or Disabling SSH

This command syntax enables or disables the SSH service.

```
config:# network services ssh enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The SSH service is enabled.
false	The SSH service is disabled.

Changing the SSH Port

This command syntax changes the SSH port.

```
config:# network services ssh port <n>
```

Variables:

- <n> is a TCP port number between 1 and 65535. The default SSH port is 22.

Setting the SNMP Configuration

You can enable or disable the SNMP v1/v2c or v3 agent, configure the read and write community strings, or set the MIB-II parameters, such as sysContact, using the CLI commands.

An SNMP command begins with *network services snmp*.

Enabling or Disabling SNMP v1/v2c

This command syntax enables or disables the SNMP v1/v2c protocol.

```
config:# network services snmp v1/v2c <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	The SNMP v1/v2c protocol is enabled.
disable	The SNMP v1/v2c protocol is disabled.

Enabling or Disabling SNMP v3

This command syntax enables or disables the SNMP v3 protocol.

```
config:# network services snmp v3 <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	The SNMP v3 protocol is enabled.
disable	The SNMP v3 protocol is disabled.

Setting the SNMP Read Community

This command syntax sets the SNMP read-only community string.

```
config:# network services snmp readCommunity <string>
```

Variables:

- <string> is a string comprising 4 to 64 ASCII printable characters.
- The string CANNOT include spaces.

Setting the SNMP Write Community

This command syntax sets the SNMP read/write community string.

```
config:# network services snmp writeCommunity <string>
```

Variables:

- <string> is a string comprising 4 to 64 ASCII printable characters.
- The string CANNOT include spaces.

Setting the sysContact Value

This command syntax sets the SNMP MIB-II sysContact value.

```
config:# network services snmp sysContact <value>
```

Variables:

- <value> is a string comprising 0 to 255 alphanumeric characters.

Setting the sysName Value

This command syntax sets the SNMP MIB-II sysName value.

```
config:# network services snmp sysName <value>
```

Variables:

- <value> is a string comprising 0 to 255 alphanumeric characters.

Setting the sysLocation Value

This command syntax sets the SNMP MIB-II sysLocation value.

```
config:# network services snmp sysLocation <value>
```

Variables:

- <value> is a string comprising 0 to 255 alphanumeric characters.

Changing the Modbus Configuration

You can enable or disable the Modbus agent, configure its read-only capability, or change its TCP port.

A Modbus command begins with *network services modbus*.

Enabling or Disabling Modbus

This command syntax enables or disables the Modbus protocol.

```
config:# network services modbus enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The Modbus agent is enabled.
false	The Modbus agent is disabled.

Enabling or Disabling the Read-Only Mode

This command syntax enables or disables the read-only mode for the Modbus agent.

```
config:# network services modbus readonly <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The read-only mode is enabled.
false	The read-only mode is disabled.

Changing the Modbus Port

This command syntax changes the Modbus port.

```
config:# network services modbus port <n>
```

Variables:

- <n> is a TCP port number between 1 and 65535. The default Modbus port is 502.

Enabling or Disabling the Service Advertisement

This command syntax enables or disables the zero configuration protocol, which enables advertising or auto discovery of network services. See **Enabling Service Advertisement** (on page 68) for details.

```
config:# network services zeroconfig enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The zero configuration protocol is enabled.
false	The zero configuration protocol is disabled.

Examples

This section illustrates several network configuration examples.

Example 1 - Networking Mode

The following command enables the wired networking mode.

```
config:# network mode wired
```

Example 2 - Enabling Both IP Protocols

The following command determines that both IPv4 and IPv6 protocols are enabled.

```
config:# network ip proto both
```

Example 3 - Static IPv4 Configuration

The following command enables the Static IP configuration mode.

```
config:# network ipv4 ipConfigurationMode static
```

Time Configuration Commands

A time configuration command begins with *time*.

Determining the Time Setup Method

This command syntax determines the method to configure the system date and time.

```
config:# time method <method>
```

Variables:

- <method> is one of the time setup options: *manual* or *ntp*.

Mode	Description
manual	The date and time settings are customized.
ntp	The date and time settings synchronize with a specified NTP server.

Setting NTP Parameters

A time configuration command that is used to set the NTP parameters begins with *time ntp*.

Specifying the Primary NTP Server

This command syntax specifies the primary time server if synchronization with the NTP server is enabled.

```
config:#    time ntp firstServer <first_server>
```

Variables:

- The <first_server> is the IP address or host name of the primary NTP server.

Specifying the Secondary NTP Server

This command syntax specifies the primary time server if synchronization with the NTP server is enabled.

```
config:#    time ntp secondServer <second_server>
```

Variables:

- The <second_server> is the IP address or host name of the secondary NTP server.

Overriding DHCP-Assigned NTP Servers

This command syntax determines whether the customized NTP server settings override the DHCP-specified NTP servers.

```
config:#    time ntp overrideDHCPProvidedServer <option>
```

Variables:

- <option> is one of these options: *true* or *false*.

Mode	Description
true	Customized NTP server settings override the DHCP-specified NTP servers.
false	Customized NTP server settings do NOT override the DHCP-specified NTP servers.

Setting the Time Zone

In addition to the web interface, the CLI also provides a list of time zones for you to configure the date and time for your PXE device.

```
config:# time zone
```

After a list of time zones is displayed, you can either type the index number of the desired time zone or simply press Enter to cancel this setting.

Example

► To set the time zone:

1. Type the time zone command as shown below and press Enter.

```
config:# time zone
```
2. The system shows a list of time zones. Type the index number of the desired time zone and press Enter.
3. Type `apply` for the selected time zone to take effect.

Setting the Automatic Daylight Savings Time

This command syntax determines whether the daylight savings time is applied to the time settings.

```
config:# time autoDST <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Mode	Description
enable	Daylight savings time is enabled.
disable	Daylight savings time is disabled.

Examples

This section illustrates several time configuration examples.

Example 1 - Time Setup Method

The following command sets the date and time settings by using the NTP servers.

```
config:#    time method ntp
```

Example 2 - Primary NTP Server

The following command sets the primary time server to 192.168.80.66.

```
config:#    time ntp firstServer 192.168.80.66
```

Security Configuration Commands

A security configuration command begins with *security*.

Firewall Control

You can manage firewall control features through the CLI. The firewall control lets you set up rules that permit or disallow access to the PXE device from a specific or a range of IP addresses.

- An IPv4 firewall configuration command begins with *security ipAccessControl ipv4*.
- An IPv6 firewall configuration command begins with *security ipAccessControl ipv6*.

Modifying Firewall Control Parameters

There are different commands for modifying firewall control parameters.

- **IPv4 commands**

- ▶ **Enable or disable the IPv4 firewall control feature:**

```
config:# security ipAccessControl ipv4 enabled <option>
```

- ▶ **Determine the default IPv4 firewall control policy for inbound traffic:**

```
config:# security ipAccessControl ipv4 defaultPolicyIn <policy>
```

- ▶ **Determine the default IPv4 firewall control policy for outbound traffic:**

```
config:# security ipAccessControl ipv4 defaultPolicyOut <policy>
```

- **IPv6 commands**

- ▶ **Enable or disable the IPv6 firewall control feature:**

```
config:# security ipAccessControl ipv6 enabled <option>
```

- ▶ **Determine the default IPv6 firewall control policy for inbound traffic:**

```
config:# security ipAccessControl ipv6 defaultPolicyIn <policy>
```

- ▶ **Determine the default IPv6 firewall control policy for outbound traffic:**

```
config:# security ipAccessControl ipv6 defaultPolicyOut <policy>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	Enables the IP access control feature.

Option	Description
false	Disables the IP access control feature.

- <policy> is one of the options: *accept*, *drop* or *reject*.

Option	Description
accept	Accepts traffic from all IP addresses.
drop	Discards traffic from all IP addresses, without sending any failure notification to the source host.
reject	Discards traffic from all IP addresses, and an ICMP message is sent to the source host for failure notification.

*Tip: You can combine both commands to modify all firewall control parameters at a time. See **Multi-Command Syntax** (on page 311).*

Managing Firewall Rules

You can add, delete or modify firewall rules using the CLI commands.

- An IPv4 firewall control rule command begins with *security ipAccessControl ipv4 rule*.
- An IPv6 firewall control rule command begins with *security ipAccessControl ipv6 rule*.

Adding a Firewall Rule

Depending on where you want to add a new firewall rule in the list, the command syntax for adding a rule varies.

- **IPv4 commands**

► Add a new rule to the bottom of the IPv4 rules list:

```
config:# security ipAccessControl ipv4 rule add <direction> <ip_mask> <policy>
```

► Add a new IPv4 rule by inserting it above or below a specific rule:

```
config:# security ipAccessControl ipv4 rule add <direction> <ip_mask> <policy> <insert>
<rule_number>
```

-- OR --

```
config:# security ipAccessControl ipv4 rule add <direction> <insert> <rule_number>
<ip_mask> <policy>
```

- **IPv6 commands**

- ▶ **Add a new rule to the bottom of the IPv6 rules list:**

```
config:# security ipAccessControl ipv6 rule add <direction> <ip_mask> <policy>
```

- ▶ **Add a new IPv6 rule by inserting it above or below a specific rule:**

```
config:# security ipAccessControl ipv6 rule add <direction> <ip_mask> <policy> <insert>
<rule_number>
```

-- OR --

```
config:# security ipAccessControl ipv6 rule add <direction> <insert> <rule_number>
<ip_mask> <policy>
```

Variables:

- <direction> is one of the options: *in* or *out*.

Direction	Description
in	Inbound traffic.
out	Outbound traffic.

- <ip_mask> is the combination of the IP address and subnet mask values (or prefix length), which are separated with a slash. For example, an IPv4 combination looks like this: *192.168.94.222/24*.
- <policy> is one of the options: *accept*, *drop* or *reject*.

Policy	Description
accept	Accepts traffic from/to the specified IP address(es).
drop	Discards traffic from/to the specified IP address(es), without sending any failure notification to the source or destination host.
reject	Discards traffic from/to the specified IP address(es), and an ICMP message is sent to the source or destination host for failure notification.

- <insert> is one of the options: *insertAbove* or *insertBelow*.

Option	Description
insertAbove	Inserts the new rule above the specified rule number. Then: new rule's number = the specified rule number
insertBelow	Inserts the new rule below the specified rule number. Then: new rule's number = the specified rule number + 1

- <rule_number> is the number of the existing rule which you want to insert the new rule above or below.

Modifying a Firewall Rule

Depending on what to modify in an existing rule, the command syntax varies.

- **IPv4 commands**

► Modify an IPv4 rule's IP address and/or subnet mask:

```
config:# security ipAccessControl ipv4 rule modify <direction> <rule_number> ipMask <ip_mask>
```

► Modify an IPv4 rule's policy:

```
config:# security ipAccessControl ipv4 rule modify <direction> <rule_number> policy <policy>
```

► Modify all contents of an existing IPv4 rule:

```
config:# security ipAccessControl ipv4 rule modify <direction> <rule_number> ipMask <ip_mask> policy <policy>
```

- **IPv6 commands**

► Modify an IPv6 rule's IP address and/or prefix length:

```
config:# security ipAccessControl ipv6 rule modify <direction> <rule_number> ipMask <ip_mask>
```

► **Modify an IPv6 rule's policy:**

```
config:# security ipAccessControl ipv6 rule modify <direction> <rule_number> policy <policy>
```

► **Modify all contents of an IPv6 existing rule:**

```
config:# security ipAccessControl ipv6 rule modify <direction> <rule_number> ipMask <ip_mask> policy <policy>
```

Variables:

- <direction> is one of the options: *in* or *out*.

Direction	Description
in	Inbound traffic.
out	Outbound traffic.

- <rule_number> is the number of the existing rule that you want to modify.
- <ip_mask> is the combination of the IP address and subnet mask values (or prefix length), which are separated with a slash. For example, an IPv4 combination looks like this: *192.168.94.222/24*.
- <policy> is one of the options: *accept*, *drop* or *reject*.

Option	Description
accept	Accepts traffic from/to the specified IP address(es).
drop	Discards traffic from/to the specified IP address(es), without sending any failure notification to the source or destination host.
reject	Discards traffic from/to the specified IP address(es), and an ICMP message is sent to the source or destination host for failure notification.

Deleting a Firewall Rule

The following commands remove a specific IPv4 or IPv6 rule from the list.

- **IPv4 commands**

```
config:# security ipAccessControl ipv4 rule delete <direction> <rule_number>
```

- **IPv6 commands**

```
config:# security ipAccessControl ipv6 rule delete <direction> <rule_number>
```

Variables:

- <direction> is one of the options: *in* or *out*.

Direction	Description
in	Inbound traffic.
out	Outbound traffic.

- <rule_number> is the number of the existing rule that you want to remove.

Restricted Service Agreement

The CLI command used to set the Restricted Service Agreement feature begins with `security restrictedServiceAgreement`,

Enabling or Disabling the Restricted Service Agreement

This command syntax activates or deactivates the Restricted Service Agreement.

```
config:# security restrictedServiceAgreement enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	Enables the Restricted Service Agreement feature.
false	Disables the Restricted Service Agreement feature.

If the Restricted Service Agreement feature is enabled, the Restricted Service Agreement is displayed when any user logs in to the PXE. Do either of the following, or you cannot successfully log in to the PXE:

- In the web interface, select the checkbox labeled "I understand and accept the Restricted Service Agreement."

Tip: To select the agreement checkbox using the keyboard, press the Space bar.

- In the CLI, type `y` when the confirmation message "I understand and accept the Restricted Service Agreement" is displayed.

Specifying the Agreement Contents

This command syntax allows you to create or modify contents of the Restricted Service Agreement.

```
config:# security restrictedServiceAgreement bannerContent
```

After performing the above command, do the following:

1. Type the text comprising up to 10,000 ASCII characters when the CLI prompts you to enter the content.
2. To end the content:
 - a. Press Enter.
 - b. Type `--END--` to indicate the end of the content.
 - c. Press Enter again.

If the content is successfully entered, the CLI displays this message "Successfully entered Restricted Service Agreement" followed by the total number of entered characters in parentheses.

*Note: The new content of Restricted Service Agreement is saved only after typing the `apply` command. See **Quitting Configuration Mode** (on page 219).*

Example

The following example illustrates how to specify the content of the Restricted Service Agreement.

1. Type the following command and press Enter to start entering the content.

```
config:# security restrictedServiceAgreement bannerContent
```

2. Type the following content when the CLI prompts you to enter the content.

IMPORTANT!! You are accessing a PDU. If you are not the system administrator, do NOT power off or power cycle any outlet without the permission of the system administrator.

3. Press Enter.
4. Type the following:
--END--
5. Press Enter again.
6. Verify that the message "Successfully entered Restricted Service Agreement" is displayed, indicating that the content input is successful.

Login Limitation

The login limitation feature controls login-related limitations, such as password aging, simultaneous logins using the same user name, and the idle time permitted before forcing a user to log out.

A login limitation command begins with *security loginLimits*.

You can combine multiple commands to modify various login limitation parameters at a time. See **Multi-Command Syntax** (on page 311).

Single Login Limitation

This command syntax enables or disables the single login feature, which controls whether multiple logins using the same login name simultaneously is permitted.

```
config:# security loginLimits singleLogin <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the single login feature.
disable	Disables the single login feature.

Password Aging

This command syntax enables or disables the password aging feature, which controls whether the password should be changed at a regular interval:

```
config:# security loginLimits passwordAging <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the password aging feature.
disable	Disables the password aging feature.

Password Aging Interval

This command syntax determines how often the password should be changed.

```
config:# security loginLimits passwordAgingInterval <value>
```

Variables:

- <value> is a numeric value in days set for the password aging interval. The interval ranges from 7 to 365 days.

Idle Timeout

This command syntax determines how long a user can remain idle before that user is forced to log out of the PXE web interface or CLI.

```
config:# security loginLimits idleTimeout <value>
```

Variables:

- <value> is a numeric value in minutes set for the idle timeout. The timeout ranges from 1 to 1440 minutes (24 hours).

User Blocking

There are different commands for changing different user blocking parameters. These commands begin with `security userBlocking`.

You can combine multiple commands to modify the user blocking parameters at a time. See **Multi-Command Syntax** (on page 311).

► **Determine the maximum number of failed logins before blocking a user:**

```
config:# security userBlocking maximumNumberOfFailedLogins <value1>
```

► **Determine how long a user's login is blocked:**

```
config:# security userBlocking blockTime <value2>
```

Variables:

- <value1> is an integer between 3 and 10, or *unlimited*, which sets no limit on the maximum number of failed logins and thus disables the user blocking function.
- <value2> is a numeric value ranging from 1 to 1440 minutes (one day), or *infinite*, which blocks the user all the time until the user is unblocked manually.

Strong Passwords

The strong password commands determine whether a strong password is required for login, and what a strong password should contain at least.

A strong password command begins with `security strongPasswords`.

You can combine multiple strong password commands to modify different parameters at a time. See **Multi-Command Syntax** (on page 311).

Enabling or Disabling Strong Passwords

This command syntax enables or disables the strong password feature.

```
config:# security strongPasswords enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	Enables the strong password feature.
false	Disables the strong password feature.

Minimum Password Length

This command syntax determines the minimum length of the password.

```
config:# security strongPasswords minLength <value>
```

Variables:

- <value> is an integer between 8 and 32.

Maximum Password Length

This command syntax determines the maximum length of the password.

```
config:# security strongPasswords maxLength <value>
```

Variables:

- <value> is an integer between 16 and 64.

Lowercase Character Requirement

This command syntax determines whether a strong password includes at least a lowercase character.

```
config:# security strongPasswords enforceAtLeastOneLowerCaseCharacter <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	At least one lowercase character is required.
disable	No lowercase character is required.

Uppercase Character Requirement

This command syntax determines whether a strong password includes at least a uppercase character.

```
config:# security strongPasswords enforceAtLeastOneUpperCaseCharacter <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	At least one uppercase character is required.
disable	No uppercase character is required.

Numeric Character Requirement

This command syntax determines whether a strong password includes at least a numeric character.

```
config:# security strongPasswords enforceAtLeastOneNumericCharacter <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	At least one numeric character is required.
disable	No numeric character is required.

Special Character Requirement

This command syntax determines whether a strong password includes at least a special character.

```
config:# security strongPasswords enforceAtLeastOneSpecialCharacter <option>
```

Variables:

- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	At least one special character is required.
disable	No special character is required.

Maximum Password History

This command syntax determines the number of previous passwords that CANNOT be repeated when changing the password.

```
config:# security strongPasswords passwordHistoryDepth <value>
```

Variables:

- <value> is an integer between 1 and 12.

Role-Based Access Control

In addition to firewall access control based on IP addresses, you can configure other access control rules that are based on both IP addresses and users' roles.

- An IPv4 role-based access control command begins with *security roleBasedAccessControl ipv4*.
- An IPv6 role-based access control command begins with *security roleBasedAccessControl ipv6*.

Modifying Role-Based Access Control Parameters

There are different commands for modifying role-based access control parameters.

- **IPv4 commands**

► **Enable or disable the IPv4 role-based access control feature:**


```
config:# security roleBasedAccessControl ipv4 enabled <option>
```

► **Determine the IPv4 role-based access control policy:**

```
config:# security roleBasedAccessControl ipv4 defaultPolicy <policy>
```

- **IPv6 commands**

► **Enable or disable the IPv6 role-based access control feature:**

```
config:# security roleBasedAccessControl ipv6 enabled <option>
```

► **Determine the IPv6 role-based access control policy:**

```
config:# security roleBasedAccessControl ipv6 defaultPolicy <policy>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	Enables the role-based access control feature.
false	Disables the role-based access control feature.

- <policy> is one of the options: *allow* or *deny*.

Policy	Description
allow	Accepts traffic from all IP addresses regardless of the user's role.
deny	Drops traffic from all IP addresses regardless of the user's role.

*Tip: You can combine both commands to modify all role-based access control parameters at a time. See **Multi-Command Syntax** (on page 311).*

Managing Role-Based Access Control Rules

You can add, delete or modify role-based access control rules.

- An IPv4 role-based access control command for managing rules begins with *security roleBasedAccessControl ipv4 rule*.
- An IPv6 role-based access control command for managing rules begins with *security roleBasedAccessControl ipv6 rule*.

Adding a Role-Based Access Control Rule

Depending on where you want to add a new rule in the list, the command syntax for adding a rule varies.

- **IPv4 commands**

► **Add a new rule to the bottom of the IPv4 rules list:**

```
config:# security roleBasedAccessControl ipv4 rule add <start_ip> <end_ip> <role> <policy>
```

► **Add a new IPv4 rule by inserting it above or below a specific rule:**

```
config:# security roleBasedAccessControl ipv4 rule add <start_ip> <end_ip> <role> <policy>
<insert> <rule_number>
```

- **IPv6 commands**

► **Add a new rule to the bottom of the IPv6 rules list:**

```
config:# security roleBasedAccessControl ipv6 rule add <start_ip> <end_ip> <role> <policy>
```

► **Add a new IPv6 rule by inserting it above or below a specific rule:**

```
config:# security roleBasedAccessControl ipv6 rule add <start_ip> <end_ip> <role> <policy>
<insert> <rule_number>
```

Variables:

- <start_ip> is the starting IP address.
- <end_ip> is the ending IP address.
- <role> is the role for which you want to create an access control rule.
- <policy> is one of the options: *allow* or *deny*.

Policy	Description
allow	Accepts traffic from the specified IP address range when the user is a member of the specified role
deny	Drops traffic from the specified IP address range when the user is a member of the specified role

- <insert> is one of the options: *insertAbove* or *insertBelow*.

Option	Description
insertAbove	Inserts the new rule above the specified rule number. Then: new rule's number = the specified rule number
insertBelow	Inserts the new rule below the specified rule number. Then: new rule's number = the specified rule number + 1

- <rule_number> is the number of the existing rule which you want to insert the new rule above or below.

Modifying a Role-Based Access Control Rule

Depending on what to modify in an existing rule, the command syntax varies.

- **IPv4 commands**

► Modify a rule's IPv4 address range:

```
config:# security roleBasedAccessControl ipv4 rule modify <rule_number>
startIpAddress <start_ip> endIpAddress <end_ip>
```

► Modify an IPv4 rule's role:

```
config:# security roleBasedAccessControl ipv4 rule modify <rule_number> role <role>
```

► **Modify an IPv4 rule's policy:**

```
config:# security roleBasedAccessControl ipv4 rule modify <rule_number> policy  
<policy>
```

► **Modify all contents of an existing IPv4 rule:**

```
config:# security roleBasedAccessControl ipv4 rule modify <rule_number>  
startIpAddress <start_ip> endIpAddress <end_ip> role <role> policy <policy>
```

- **IPv6 commands**

► **Modify a rule's IPv6 address range:**

```
config:# security roleBasedAccessControl ipv6 rule modify <rule_number>  
startIpAddress <start_ip> endIpAddress <end_ip>
```

► **Modify an IPv6 rule's role:**

```
config:# security roleBasedAccessControl ipv6 rule modify <rule_number> role <role>
```

► **Modify an IPv6 rule's policy:**

```
config:# security roleBasedAccessControl ipv6 rule modify <rule_number> policy  
<policy>
```

► **Modify all contents of an existing IPv6 rule:**

```
config:# security roleBasedAccessControl ipv6 rule modify <rule_number>
startIpAddress <start_ip> endIpAddress <end_ip> role <role> policy <policy>
```

Variables:

- <rule_number> is the number of the existing rule that you want to modify.
- <start_ip> is the starting IP address.
- <end_ip> is the ending IP address.
- <role> is one of the existing roles.
- <policy> is one of the options: *allow* or *deny*.

Policy	Description
allow	Accepts traffic from the specified IP address range when the user is a member of the specified role
deny	Drops traffic from the specified IP address range when the user is a member of the specified role

Deleting a Role-Based Access Control Rule

These commands remove a specific rule from the list.

- **IPv4 commands**

```
config:# security roleBasedAccessControl ipv4 rule delete <rule_number>
```

- **IPv6 commands**

```
config:# security roleBasedAccessControl ipv6 rule delete <rule_number>
```

Variables:

- <rule_number> is the number of the existing rule that you want to remove.

Examples

This section illustrates several security configuration examples.

Example 1 - IPv4 Firewall Control Configuration

The following command sets up two parameters of the IPv4 access control feature.

```
config:# security ipAccessControl ipv4 enabled true defaultPolicyIn accept  
defaultPolicyOut accept
```

Results:

- The IPv4 access control feature is enabled.
- The default policy for inbound traffic is set to "accept."
- The default policy for outbound traffic is set to "accept."

Example 2 - Adding an IPv4 Firewall Rule

The following command adds a new IPv4 access control rule and specifies its location in the list.

```
config:# security ipAccessControl ipv4 rule add 192.168.84.123/24 accept  
insertAbove 5
```

Results:

- A new IPv4 firewall control rule is added to accept all packets sent from the IPv4 address 192.168.84.123.
- The newly-added rule is inserted above the 5th rule. That is, the new rule becomes the 5th rule, and the original 5th rule becomes the 6th rule.

Example 3 - User Blocking

The following command sets up two user blocking parameters.

```
config:# security userBlocking maximumNumberOfFailedLogins 5 blockTime 30
```

Results:

- The maximum number of failed logins is set to 5.
- The user blocking time is set to 30 minutes.

Example 4 - Adding an IPv4 Role-based Access Control Rule

The following command creates a new IPv4 role-based access control rule and specifies its location in the list.

```
config:# securityroleBasedAccessControl ipv4 rule add 192.168.78.50 192.168.90.100 admin deny insertAbove 3
```

Results:

- A new IPv4 role-based access control rule is added, dropping all packets from any IPv4 address between 192.168.78.50 and 192.168.90.100 when the user is a member of the role "admin."
- The newly-added IPv4 rule is inserted above the 3rd rule. That is, the new rule becomes the 3rd rule, and the original 3rd rule becomes the 4th rule.

Outlet Configuration Commands

An outlet configuration command begins with *outlet*. Such a command allows you to configure an individual outlet.

Changing the Outlet Name

This command syntax names an outlet.

```
config:# outlet <n> name "<name>"
```

Variables:

- <n> is the number of the outlet that you want to configure.
- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Example - Outlet Naming

The following command assigns the name "Win XP" to outlet 8.

```
config:# outlet 8 name "Win XP"
```

Inlet Configuration Commands

An inlet configuration command begins with *inlet*. You can configure an inlet by using the inlet configuration command.

Changing the Inlet Name

This command syntax names an inlet.

```
config:#    inlet <n> name "<name>"
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1. The value is an integer between 1 and 50.
- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Enabling or Disabling an Inlet (for Multi-Inlet PDUs)

Enabling or disabling an inlet takes effect on a multi-inlet PDU only.

This command syntax enables or disables an inlet.

```
config:#    inlet <n> enabled <option>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1. The value is an integer between 1 and 50.
- <option> is one of the options: *true* or *false*.

Option	Description
true	The specified inlet is enabled.
false	The specified inlet is disabled.

Note: If performing this command causes all inlets to be disabled, a warning message appears, prompting you to confirm. When this occurs, press y to confirm or n to cancel the operation.

Example - Inlet Naming

The following command assigns the name "AC source" to the inlet 1. If your PXE device contains multiple inlets, this command names the 1st inlet.

```
config:#    inlet 1 name "AC source"
```

Overcurrent Protector Configuration Commands

An overcurrent protector configuration command begins with *ocp*. The command configures an individual circuit breaker or fuse which protects outlets.

Changing the Overcurrent Protector Name

This command syntax names a circuit breaker or a fuse on your PXE.

```
config:#    ocp <n> name "<name>"
```

Variables:

- <n> is the number of the overcurrent protector that you want to configure. The value is an integer between 1 and 50.
- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Example - OCP Naming

The command assigns the name "Email servers CB" to the overcurrent protector labeled 2.

```
config:#    ocp 2 name "Email servers CB"
```

User Configuration Commands

Most user configuration commands begin with *user* except for the password change command.

Creating a User Profile

This command syntax creates a new user profile.

```
config:# user create <name> <option> <roles>
```

After performing the user creation command, the PXE prompts you to assign a password to the newly-created user. Then:

1. Type the password and press Enter.
2. Re-type the same password for confirmation and press Enter.

Variables:

- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable CANNOT contain spaces.
- <option> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the newly-created user profile.
disable	Disables the newly-created user profile.

- <roles> is a role or a list of comma-separated roles assigned to the specified user profile.

Modifying a User Profile

A user profile contains various parameters that you can modify.

*Tip: You can combine all commands to modify the parameters of a specific user profile at a time. See **Multi-Command Syntax** (on page 311).*

Changing a User's Password

This command syntax allows you to change an existing user's password if you have the Administrator Privileges.

```
config:# user modify <name> password
```

After performing the above command, PXE prompts you to enter a new password. Then:

1. Type a new password and press Enter.

2. Re-type the new password for confirmation and press Enter.

Variables:

- <name> is the name of the user whose settings you want to change.

Example

The following procedure illustrates how to change the password of the user "May."

1. Verify that you have entered the configuration mode. See **Entering Configuration Mode** (on page 219).
2. Type the following command to change the password for the user profile "May."

```
config:# user modify May password
```
3. Type a new password when prompted, and press Enter.
4. Type the same new password and press Enter.
5. If the password change is completed successfully, the config:# prompt appears.

Modifying a User's Personal Data

You can change a user's personal data, including the user's full name, telephone number, and email address.

Various commands can be combined to modify the parameters of a specific user profile at a time. See **Multi-Command Syntax** (on page 311).

► Change a user's full name:

```
config:#    user modify <name> fullName "<full_name>"
```

► Change a user's telephone number:

```
config:#    user modify <name> telephoneNumber "<phone_number>"
```

► Change a user's email address:

```
config:#    user modify <name> emailAddress <email_address>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <full_name> is a string comprising up to 32 ASCII printable characters. The <full_name> variable must be enclosed in quotes when it contains spaces.
- <phone_number> is the phone number that can reach the specified user. The <phone_number> variable must be enclosed in quotes when it contains spaces.
- <email_address> is the email address of the specified user.

Enabling or Disabling a User Profile

This command syntax enables or disables a user profile. A user can log in to the PXE device only after that user's user profile is enabled.

```
config:# user modify <name> enabled <option>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option> is one of the options: *true* or *false*.

Option	Description
true	Enables the specified user profile.
false	Disables the specified user profile.

Forcing a Password Change

This command syntax determines whether the password change is forced when a user logs in to the specified user profile next time.

```
config:# user modify <name> forcePasswordChangeOnNextLogin <option>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option> is one of the options: *true* or *false*.

Option	Description
true	A password change is forced on the user's next login.
false	No password change is forced on the user's next login.

Modifying SNMPv3 Settings

There are different commands to modify the SNMPv3 parameters of a specific user profile. You can combine all of the following commands to modify the SNMPv3 parameters at a time. See **Multi-Command Syntax** (on page 311).

► **Enable or disable the SNMP v3 access to PXE for the specified user:**

```
config:# user modify <name> snmpV3Access <option1>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option1> is one of the options: *enable* or *disable*.

Option	Description
enable	Enables the SNMP v3 access permission for the specified user.
disable	Disables the SNMP v3 access permission for the specified user.

► **Determine the security level:**

```
config:# user modify <name> securityLevel <option2>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option2> is one of the options: *noAuthNoPriv*, *authNoPriv* or *authPriv*.

Option	Description
noAuthNoPriv	No authentication and no privacy.
authNoPriv	Authentication and no privacy.
authPriv	Authentication and privacy.

► **Determine whether the authentication passphrase is identical to the password:**

```
config:# user modify <name> userPasswordAsAuthenticationPassphrase <option3>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option3> is one of the options: *true* or *false*.

Option	Description
true	Authentication passphrase is identical to the password.
false	Authentication passphrase is different from the password.

► **Determine the authentication passphrase:**

```
config:# user modify <name> authenticationPassPhrase <authentication_passphrase>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <authentication_passphrase> is a string used as an authentication passphrase, comprising 8 to 32 ASCII printable characters.

► **Determine whether the privacy passphrase is identical to the authentication passphrase:**

```
config:# user modify <name> useAuthenticationPassPhraseAsPrivacyPassPhrase <option4>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option4> is one of the options: *true* or *false*.

Option	Description
true	Privacy passphrase is identical to the authentication passphrase.
false	Privacy passphrase is different from the authentication passphrase.

► **Determine the privacy passphrase:**

```
config:# user modify <name> privacyPassPhrase <privacy_passphrase>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <privacy_passphrase> is a string used as a privacy passphrase, comprising 8 to 32 ASCII printable characters.

► **Determine the authentication protocol:**

```
config:# user modify <name> authenticationProtocol <option5>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option5> is one of the options: *MD5* or *SHA-1*.

Option	Description
MD5	MD5 authentication protocol is applied.
SHA-1	SHA-1 authentication protocol is applied.

► **Determine the privacy protocol:**

```
config:# user modify <name> privacyProtocol <option6>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option6> is one of the options: *DES* or *AES-128*.

Option	Description
DES	DES privacy protocol is applied.
AES-128	AES-128 privacy protocol is applied.

Changing the Role(s)

This command syntax changes the role(s) of a specific user.

```
config:# user modify <name> roles <roles>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <roles> is a role or a list of comma-separated roles assigned to the specified user profile.

Changing Measurement Units

You can change the measurement units displayed for temperatures, length, and pressure for a specific user profile. Different measurement unit commands can be combined so that you can set all measurement units at a time. To combine all commands, see **Multi-Command Syntax** (on page 311).

Note: The measurement unit change only applies to the web interface and command line interface.

*Tip: To set the default measurement units applied to the PXE user interfaces for all users via CLI, see **Setting Up User Preferences (Units of Measure)** (see "Setting Default Measurement Units" on page 277).*

► **Set the preferred temperature unit:**

```
config:# user modify <name> preferredTemperatureUnit <option1>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option1> is one of the options: C or F.

Option	Description
C	This option displays the temperature in Celsius.
F	This option displays the temperature in Fahrenheit.

► **Set the preferred length unit:**

```
config:# user modify <name> preferredLengthUnit <option2>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option2> is one of the options: *meter* or *feet*.

Option	Description
meter	This option displays the length or height in meters.
feet	This option displays the length or height in feet.

► **Set the preferred pressure unit:**

```
config:# user modify <name> preferredPressureUnit <option3>
```

Variables:

- <name> is the name of the user whose settings you want to change.
- <option3> is one of the options: *pascal* or *psi*.

Option	Description
pascal	This option displays the pressure value in Pascals (Pa).
psi	This option displays the pressure value in psi.

Changing the SSH Public Key

This command syntax changes the role(s) of a specific user.

```
config:# user modify <name> sshPublicKey
```

After performing the above command, you are prompted to enter the SSH public key. You can either enter the new SSH public key or simply press Enter without entering any SSH public key to remove the existing SSH public key.

Example

The following procedure illustrates how to change the SSH public key for the user "assistant."

1. Verify that you have entered the configuration mode. See **Entering Configuration Mode** (on page 219).
2. Type the following command and press Enter.

```
config:# user modify assistant sshPublicKey
```
3. You are prompted to enter a new SSH public key.
4. Type the new key and press Enter.

Deleting a User Profile

This command syntax deletes an existing user profile.

```
config:# user delete <name>
```

Changing Your Own Password

Every user can change their own password via this command syntax if they have the Change Own Password privilege. Note that this command does not begin with *user*.

```
config:# password
```

After performing this command, the PXE prompts you to enter both current and new passwords respectively.

Important: After the password is changed successfully, the new password is effective immediately no matter you type the command "apply" or not to save the changes.

Example

This procedure changes your own password:

1. Verify that you have entered the configuration mode. See **Entering Configuration Mode** (on page 219).
2. Type the following command and press Enter.

```
config:# password
```
3. Type the existing password and press Enter when the following prompt appears.

```
Current password:
```

4. Type the new password and press Enter when the following prompt appears.

Enter new password:

5. Re-type the new password for confirmation and press Enter when the following prompt appears.

Re-type new password:

Setting Default Measurement Units

Default measurement units, including temperature, length, and pressure units, apply to the PXE user interfaces across all users except for those whose preferred measurement units are set differently by themselves or the administrator. Diverse measurement unit commands can be combined so that you can set all default measurement units at a time. To combine all commands, see **Multi-Command Syntax** (on page 311).

Note: The measurement unit change only applies to the web interface and command line interface.

*Tip: To change the preferred measurement units displayed in the PXE user interfaces for a specific user via CLI, see **Changing Measurement Units** (on page 274).*

► Set the default temperature unit:

```
config:# user defaultpreferences preferredTemperatureUnit <option1>
```

Variables:

- <option1> is one of the options: *C* or *F*.

Option	Description
C	This option displays the temperature in Celsius.
F	This option displays the temperature in Fahrenheit.

► Set the default length unit:

```
config:# user defaultpreferences preferredLengthUnit <option2>
```

Variables:

- <option2> is one of the options: *meter* or *feet*.

Option	Description
meter	This option displays the length or height in meters.
feet	This option displays the length or height in feet.

► **Set the default pressure unit:**

```
config:# user defaultpreferences preferredPressureUnit <option3>
```

Variables:

- <option3> is one of the options: *pascal* or *psi*.

Option	Description
pascal	This option displays the pressure value in Pascals (Pa).
psi	This option displays the pressure value in psi.

Examples

This section illustrates several user configuration examples.

Example 1 - Creating a User Profile

The following command creates a new user profile and sets two parameters for the new user.

```
config:# user create May enable admin
```

Results:

- A new user profile "May" is created.
- The new user profile is enabled.
- The **admin** role is assigned to the new user profile.

Example 2 - Modifying a User's Roles

The following command assigns two roles to the user "May."

```
config:# user modify May roles admin,tester
```

Results:

- The user May has the union of all privileges of "admin" and "tester."

Example 3 - Default Measurement Units

The following command sets all default measurement units at a time.

```
config:# user defaultpreferences preferredTemperatureUnit F preferredLengthUnit feet
preferredPressureUnit psi
```

Results:

- The default temperature unit is set to Fahrenheit.
- The default length unit is set to feet.
- The default pressure unit is set to psi.

Role Configuration Commands

A role configuration command begins with *role*.

Creating a Role

This command syntax creates a new role, with a list of semicolon-separated privileges assigned to the role.

```
config:# role create <name> <privilege1>;<privilege2>;<privilege3>...
```

If a specific privilege contains any arguments, that privilege should be followed by a colon and the argument(s).

```
config:#  role create <name> <privilege1>:<argument1>,<argument2>...;
          <privilege2>:<argument1>,<argument2>...;
          <privilege3>:<argument1>,<argument2>...;
          ...
```

Variables:

- <name> is a string comprising up to 32 ASCII printable characters.
- <privilege1>, <privilege2>, <privilege3> and the like are names of the privileges assigned to the role. Separate each privilege with a semi-colon. See **All Privileges** (on page 280).
- <argument1>, <argument2> and the like are arguments set for a particular privilege. Separate a privilege and its argument(s) with a colon, and separate arguments with a comma if there are more than one argument for a privilege.

All Privileges

This table lists all privileges. Note that available privileges vary according to the model you purchased.

Privilege	Description
acknowledgeAlarms	Acknowledge Alarms
adminPrivilege	Administrator Privileges
changeAssetStripConfiguration	Change Asset Strip Configuration
changeAuthSettings	Change Authentication Settings
changeDataRetrieval	Change Data Logging Settings
changeDateTimeSettings	Change Date/Time Settings
changeExternalSensorsConfiguration	Change Peripheral Device Configuration
changeModemConfiguration	Change Modem Configuration
changeNetworkSettings	Change Network Settings
changePassword	Change Own Password
changePduConfiguration	Change Pdu, Inlet, Outlet & Overcurrent Protector Configuration
changeSecuritySettings	Change Security Settings
changeSnmpSettings	Change SNMP Settings

Privilege	Description
changeUserSettings	Change Local User Management
clearLog	Clear Local Event Log
firmwareUpdate	Firmware Update
performReset	Reset (Warm Start)
viewDataRetrieval	View Data Logging Settings
viewEventSetup	View Event Settings
viewLog	View Local Event Log
viewSecuritySettings	View Security Settings
viewSnmpSettings	View SNMP Settings
viewUserSettings	View Local User Management

Modifying a Role

You can modify diverse parameters of an existing role, including its privileges.

► Modify a role's description:

```
config:#    role modify <name> description "<description>"
```

Variables:

- <name> is a string comprising up to 32 ASCII printable characters.
- <description> is a description comprising alphanumeric characters. The <description> variable must be enclosed in quotes when it contains spaces.

► Add more privileges to a specific role:

```
config:#    role modify <name> addPrivileges
            <privilege1>;<privilege2>;<privilege3>...
```

If a specific privilege contains any arguments, add a colon and the argument(s) after that privilege.


```
config:#    role modify <name> addPrivileges
           <privilege1>:<argument1>,<argument2>...;
           <privilege2>:<argument1>,<argument2>...;
           <privilege3>:<argument1>,<argument2>...;
           ...
```

Variables:

- <name> is a string comprising up to 32 ASCII printable characters.
- <privilege1>, <privilege2>, <privilege3> and the like are names of the privileges assigned to the role. Separate each privilege with a semi-colon. See **All Privileges** (on page 280).
- <argument1>, <argument2> and the like are arguments set for a particular privilege. Separate a privilege and its argument(s) with a colon, and separate arguments with a comma if there are more than one argument for a privilege.

► **Remove specific privileges from a role:**

```
config:#    role modify <name> removePrivileges
           <privilege1>;<privilege2>;<privilege3>...
```

If a specific privilege contains any arguments, add a colon and the argument(s) after that privilege.

```
config:#    role modify <name> removePrivileges
            <privilege1>:<argument1>,<argument2>...;
            <privilege2>:<argument1>,<argument2>...;
            <privilege3>:<argument1>,<argument2>...;
            ...
```

Note: When removing privileges from a role, make sure the specified privileges and arguments (if any) exactly match those assigned to the role. Otherwise, the command fails to remove specified privileges that are not available.

Variables:

- <name> is a string comprising up to 32 ASCII printable characters.
- <privilege1>, <privilege2>, <privilege3> and the like are names of the privileges assigned to the role. Separate each privilege with a semi-colon. See **All Privileges** (on page 280).
- <argument1>, <argument2> and the like are arguments set for a particular privilege. Separate a privilege and its argument(s) with a colon, and separate arguments with a comma if there are more than one argument for a privilege.

Deleting a Role

This command syntax deletes an existing role.

```
config:#    role delete <name>
```

Example - Creating a Role

The following command creates a new role and assigns privileges to the role.

```
config:#    role create tester firmwareUpdate;viewEventSetup
```

Results:

- A new role "tester" is created.
- Two privileges are assigned to the role: firmwareUpdate (Firmware Update) and viewEventSetup (View Event Settings).

Environmental Sensor Configuration Commands

An environmental sensor configuration command begins with *externalsensor*. You can configure the name and location parameters of an individual environmental sensor.

Changing the Sensor Name

This command syntax names an environmental sensor.

```
config:#    externalsensor <n> name "<name>"
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Specifying the Sensor Type

Raritan's contact closure sensor (DPX-CC2-TR) supports the connection of diverse third-party or Raritan's detectors/switches. You must specify the type of connected detector/switch for proper operation. Use this command syntax when you need to specify the sensor type.

```
config:#    externalsensor <n> sensorSubType <sensor_type>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor_type> is one of these types: *contact*, *smokeDetection*, *waterDetection* or *vibration*.

Type	Description
contact	The connected detector/switch is for detection of door lock or door closed/open status.

Type	Description
smokeDetection	The connected detector/switch is for detection of the smoke presence.
waterDetection	The connected detector/switch is for detection of the water presence.
vibration	The connected detector/switch is for detection of the vibration.

Setting the X Coordinate

This command syntax specifies the X coordinate of an environmental sensor.

```
config:#    externalsensor <n> xlabel "<coordinate>"
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.

Setting the Y Coordinate

This command syntax specifies the Y coordinate of an environmental sensor.

```
config:#    externalsensor <n> ylabel "<coordinate>"
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.

Setting the Z Coordinate

This command syntax specifies the Z coordinate of an environmental sensor.

```
config:#    externalsensor <n> zlabel "<coordinate>"
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- Depending on the Z coordinate format you set, there are two types of values for the <coordinate> variable:

Type	Description
Free form	<coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.
Rack units	<coordinate> is an integer number in rack units.

*Note: To specify the Z coordinate using the rack units. See **Setting the Z Coordinate Format for Environmental Sensors** (on page 221).*

Changing the Sensor Description

This command syntax provides a description for a specific environmental sensor.

```
config:#    externalsensor <n> description "<description>"
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <description> is a string comprising up to 64 ASCII printable characters, and it must be enclosed in quotes.

Using Default Thresholds

This command syntax determines whether default thresholds, including the deassertion hysteresis and assertion timeout, are applied to a specific environmental sensor.

```
config:#    externalsensor <n> useDefaultThresholds <option>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <option> is one of the options: *true* or *false*.

Option	Description
true	Default thresholds are selected as the threshold option for the specified sensor.
false	Sensor-specific thresholds are selected as the threshold option for the specified sensor.

Setting the Alarmed to Normal Delay for DX-PIR

This command syntax determines the value of the Alarmed to Normal Delay setting for a DX-PIR presence detector.

```
config:#    externalsensor <n> alarmedToNormalDelay <time>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <time> is an integer number in seconds, ranging between 0 and 300.

Examples

This section illustrates several environmental sensor configuration examples.

Example 1 - Environmental Sensor Naming

The following command assigns the name "Cabinet humidity" to the environmental sensor with the ID number 4.

```
config:#    externalsensor 4 name "Cabinet humidity"
```

Example 2 - Sensor Threshold Selection

The following command sets the environmental sensor #1 to use the default thresholds, including the deassertion hysteresis and assertion timeout, as its threshold settings.

```
config:#    externalsensor 1 useDefaultThresholds true
```

Sensor Threshold Configuration Commands

A sensor configuration command begins with *sensor*. You can use the commands to configure the threshold, hysteresis and assertion timeout values for any sensor associated with the following items:

- Inlets
- Inlet poles (for three-phase PDUs only)
- Overcurrent protectors
- Environmental sensors

It is permitted to assign a new value to the threshold at any time regardless of whether the threshold has been enabled.

Commands for Inlet Sensors

A sensor configuration command for inlets begins with *sensor inlet*.

Setting the Inlet's Upper Critical Threshold

This command syntax configures the Upper Critical threshold of an inlet.

```
config:#    sensor inlet <n> <sensor type> upperCritical <option>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper critical threshold for the specified inlet sensor.
disable	Disables the upper critical threshold for the specified inlet sensor.
A numeric value	Sets a value for the upper critical threshold of the specified inlet sensor and enables this threshold at the same time.

Setting the Inlet's Upper Warning Threshold

This command syntax configures the Upper Warning threshold of an inlet.

```
config:#    sensor inlet <n> <sensor type> upperWarning <option>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper warning threshold for the specified inlet sensor.
disable	Disables the upper warning threshold for the specified inlet sensor.
A numeric value	Sets a value for the upper warning threshold of the specified inlet sensor and enables this threshold at the same time.

Setting the Inlet's Lower Critical Threshold

This command syntax configures the Lower Critical threshold of an inlet.

```
config:#    sensor inlet <n> <sensor type> lowerCritical <option>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower critical threshold for the specified inlet sensor.
disable	Disables the lower critical threshold for the specified inlet sensor.
A numeric value	Sets a value for the lower critical threshold of the specified inlet sensor and enables this threshold at the same time.

Setting the Inlet's Lower Warning Threshold

This command syntax configures the Lower Warning threshold of an inlet.

```
config:#    sensor inlet <n> <sensor type> lowerWarning <option>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower warning threshold for the specified inlet sensor.
disable	Disables the lower warning threshold for the specified inlet sensor.
A numeric value	Sets a value for the lower warning threshold of the specified inlet sensor and enables this threshold at the same time.

Setting the Inlet's Deassertion Hysteresis

This command syntax configures the deassertion hysteresis value of an inlet.

```
config:#    sensor inlet <n> <sensor type> hysteresis <value>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <value> is a numeric value that is assigned to the hysteresis for the specified inlet sensor. See **"To De-assert" and Deassertion Hysteresis** (on page 354).

Setting the Inlet's Assertion Timeout

This command syntax configures the assertion timeout value of an inlet.

```
config:#    sensor inlet <n> <sensor type> assertionTimeout <value>
```

Variables:

- <n> is the number of the inlet that you want to configure. For a single-inlet PDU, <n> is always the number 1.
- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
peakCurrent	Peak current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor
lineFrequency	Line frequency sensor
residualCurrent	Residual current sensor
phaseAngle	Inlet phase angle sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <value> is a number in samples that is assigned to the assertion timeout for the specified inlet sensor. It ranges between 1 and 100. See **"To Assert" and Assertion Timeout** (on page 352).

Commands for Inlet Pole Sensors

A sensor configuration command for inlet poles begins with *sensor inletpole*. This type of command is available on a three-phase PDU only.

Setting the Upper Critical Threshold for an Inlet Pole

This command syntax configures the Upper Critical threshold of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> upperCritical <option>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper critical threshold for the specified inlet pole sensor.
disable	Disables the upper critical threshold for the specified inlet pole sensor.
A numeric value	Sets a value for the upper critical threshold of the specified inlet pole sensor and enables this threshold at the same time.

Setting the Upper Warning Threshold for an Inlet Pole

This command syntax configures the Upper Warning threshold of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> upperWarning <option>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper warning threshold for the specified inlet pole sensor.
disable	Disables the upper warning threshold for the specified inlet pole sensor.

Option	Description
A numeric value	Sets a value for the upper warning threshold of the specified inlet pole sensor and enables this threshold at the same time.

Setting the Lower Critical Threshold for an Inlet Pole

This command syntax configures the Lower Critical threshold of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> lowerCritical <option>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower critical threshold for the specified inlet pole sensor.
disable	Disables the lower critical threshold for the specified inlet pole sensor.
A numeric value	Sets a value for the lower critical threshold of the specified inlet pole sensor and enables this threshold at the same time.

Setting the Lower Warning Threshold for an Inlet Pole

This command syntax configures the Lower Warning threshold of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> lowerWarning <option>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower warning threshold for the specified inlet pole sensor.
disable	Disables the lower warning threshold for the specified inlet pole sensor.
A numeric value	Sets a value for the lower warning threshold of the specified inlet pole sensor and enables this threshold at the same time.

Setting the Inlet Pole's Deassertion Hysteresis

This command syntax configures the deassertion hysteresis value of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> hysteresis <value>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor

Sensor type	Description
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <value> is a numeric value that is assigned to the hysteresis for the specified inlet pole sensor. See **"To De-assert" and Deassertion Hysteresis** (on page 354).

Setting the Inlet Pole's Assertion Timeout

This command syntax configures the assertion timeout value of an inlet pole.

```
config:# sensor inletpole <n> <p> <sensor type> assertionTimeout <value>
```

Variables:

- <n> is the number of the inlet whose pole sensors you want to configure.
- <p> is the label of the inlet pole that you want to configure.

Pole	Label <p>	Current sensor	Voltage sensor
1	L1	L1	L1 - L2
2	L2	L2	L2 - L3
3	L3	L3	L3 - L1

- <sensor type> is one of the following sensor types:

Sensor type	Description
current	Current sensor
voltage	Voltage sensor
activePower	Active power sensor
apparentPower	Apparent power sensor
powerFactor	Power factor sensor
activeEnergy	Active energy sensor
unbalancedCurrent	Unbalanced load sensor

Note: If the requested sensor type is not supported, the "Sensor is not available" message is displayed.

- <value> is a number in samples that is assigned to the assertion timeout for the specified inlet pole sensor. See **"To Assert" and Assertion Timeout** (on page 352).

Commands for Environmental Sensors

A sensor threshold configuration command for environmental sensors begins with *sensor externalsensor*.

Setting the Sensor's Upper Critical Threshold

This command syntax configures the Upper Critical threshold of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> upperCritical <option>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears: "Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper critical threshold for the specified environmental sensor.
disable	Disables the upper critical threshold for the specified environmental sensor.
A numeric value	Sets a value for the upper critical threshold of the specified environmental sensor and enables this threshold at the same time.

Setting the Sensor's Upper Warning Threshold

This command syntax configures the Upper Warning threshold of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> upperWarning <option>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears: "Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the upper warning threshold for the specified environmental sensor.
disable	Disables the upper warning threshold for the specified environmental sensor.
A numeric value	Sets a value for the upper warning threshold of the specified environmental sensor and enables this threshold at the same time.

Setting the Sensor's Lower Critical Threshold

This command syntax configures the Lower Critical threshold of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> lowerCritical <option>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears: "Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower critical threshold for the specified environmental sensor.
disable	Disables the lower critical threshold for the specified environmental sensor.
A numeric value	Sets a value for the lower critical threshold of the specified environmental sensor and enables this threshold at the same time.

Setting the Sensor's Lower Warning Threshold

This command syntax configures the Lower Warning threshold of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> lowerWarning <option>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

*Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears:
"Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.*

- <option> is one of the options: *enable*, *disable* or a numeric value.

Option	Description
enable	Enables the lower warning threshold for the specified environmental sensor.
disable	Disables the lower warning threshold for the specified environmental sensor.
A numeric value	Sets a value for the lower warning threshold of the specified environmental sensor and enables this threshold at the same time.

Setting the Sensor's Deassertion Hysteresis

This command syntax configures the deassertion hysteresis value of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> hysteresis <value>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears: "Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.

- <value> is a numeric value that is assigned to the hysteresis for the specified environmental sensor. See **"To De-assert" and Deassertion Hysteresis** (on page 354).

Setting the Sensor's Assertion Timeout

This command syntax configures the assertion timeout value of a numeric environmental sensor.

```
config:# sensor externalsensor <n> <sensor type> assertionTimeout <value>
```

Variables:

- <n> is the ID number of the environmental sensor that you want to configure. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.
- <sensor type> is one of these sensor types: *temperature*, *humidity*, *airPressure* or *air Flow*.

Note: If the specified sensor type does not match the type of the specified environmental sensor, this error message appears: "Specified sensor type 'XXX' does not match the sensor's type (<sensortype>)," where XXX is the specified sensor type, and <sensortype> is the correct sensor type.

- <value> is a number in samples that is assigned to the assertion timeout for the specified environmental sensor. It ranges between 1 and 100. See **"To Assert" and Assertion Timeout** (on page 352).

Examples

This section illustrates several environmental sensor threshold configuration examples.

Example 1 - Warning Thresholds for Inlet Sensors

The following command sets both the Upper Warning and Lower Warning thresholds for the inlet 1 RMS current.

```
config:#    sensor inlet 1 current upperWarning 20 lowerWarning 12
```

Results:

- The Upper Warning threshold for the inlet 1 RMS current is set to 20A. It also enables the upper warning threshold if this threshold has not been enabled yet.
- The Lower Warning threshold for the inlet 1 RMS current is set to 12A. It also enables the lower warning threshold if this threshold has not been enabled yet.

Example 2 - Upper Critical Threshold for a Temperature Sensor

The following command sets the Upper Critical threshold of the environmental "temperature" sensor with the ID number 2 to 40 degrees Celsius. It also enables the upper critical threshold if this threshold has not been enabled yet.

```
config:#    sensor externalsensor 2 temperature upperCritical 40
```

Actuator Configuration Commands

An actuator configuration command begins with *actuator*. You can configure the name and location parameters of an individual actuator.

Changing the Actuator Name

This command syntax names an actuator.

```
config:#    actuator <n> name "<name>"
```

Variables:

- <n> is the ID number of the actuator that you want to configure. The ID number is assigned and shown in the PXE web interface. It is an integer starting at 1.
- <name> is a string comprising up to 32 ASCII printable characters. The <name> variable must be enclosed in quotes when it contains spaces.

Setting the X Coordinate

This command syntax specifies the X coordinate of an actuator.

```
config:#    actuator <n> xlabel "<coordinate>"
```

Variables:

- <n> is the ID number of the actuator that you want to configure. The ID number is assigned and shown in the PXE web interface. It is an integer starting at 1.
- <coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.

Setting the Y Coordinate

This command syntax specifies the Y coordinate of an actuator.

```
config:#    actuator <n> ylabel "<coordinate>"
```

Variables:

- <n> is the ID number of the actuator that you want to configure. The ID number is assigned and shown in the PXE web interface. It is an integer starting at 1.
- <coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.

Setting the Z Coordinate

This command syntax specifies the Z coordinate of an actuator.

```
config:#    actuator <n> zlabel "<coordinate>"
```

Variables:

- <n> is the ID number of the actuator that you want to configure. The ID number is assigned and shown in the PXE web interface. It is an integer starting at 1.
- Depending on the Z coordinate format you set, there are two types of values for the <coordinate> variable:

Type	Description
Free form	<coordinate> is a string comprising up to 24 ASCII printable characters, and it must be enclosed in quotes.
Rack units	<coordinate> is an integer number in rack units.

Note: To specify the Z coordinate using the rack units. See **Setting the Z Coordinate Format for Environmental Sensors** (on page 221).

Changing the Actuator Description

This command syntax provides a description for a specific actuator.

```
config:#    actuator <n> description "<description>"
```

Variables:

- <n> is the ID number of the actuator that you want to configure. The ID number is assigned and shown in the PXE web interface. It is an integer starting at 1.
- <description> is a string comprising up to 64 ASCII printable characters, and it must be enclosed in quotes.

Example - Actuator Naming

The following command assigns the name "Door lock" to the actuator whose ID number is 9.

```
config:# actuator 9 name "Door lock"
```

EnergyWise Configuration Commands

An EnergyWise configuration command begins with *energywise*.

Enabling or Disabling EnergyWise

This command syntax determines whether the Cisco® EnergyWise endpoint implemented on the PXE device is enabled.

```
config:# energywise enabled <option>
```

Variables:

- <option> is one of the options: *true* or *false*.

Option	Description
true	The Cisco EnergyWise feature is enabled.
false	The Cisco EnergyWise feature is disabled.

Specifying the EnergyWise Domain

This command syntax specifies to which Cisco® EnergyWise domain the PXE device belongs.

```
config:# energywise domain <name>
```

Variables:

- <name> is a string comprising up to 127 ASCII printable characters. Spaces and asterisks are NOT acceptable.

Specifying the EnergyWise Secret

This command syntax specifies the password (secret) to enter the Cisco® EnergyWise domain.

```
config:# energywise secret <password>
```

Variables:

- <password> is a string comprising up to 127 ASCII printable characters. Spaces and asterisks are NOT acceptable.

Changing the UDP Port

This command syntax specifies the UDP port for communications in the Cisco® EnergyWise domain.

```
config:# energywise port <port>
```

Variables:

- <port> is the UDP port number ranging between 1 and 65535.

Setting the Polling Interval

This command syntax determines the polling interval at which the Cisco® EnergyWise domain queries the PXE device.

```
config:# energywise polling <timing>
```

Variables:

- <timing> is an integer number in seconds. It ranges between 30 and 600 seconds.

Example - Setting Up EnergyWise

The following command sets up two Cisco® EnergyWise-related features.

```
config:# energywise enabled true port 10288
```

Results:

- The EnergyWise feature implemented on the PXE is enabled.
- The UDP port is set to 10288.

Setting the History Buffer Length

This command syntax sets the history buffer length, which determines the amount of history commands that can be retained in the buffer. The default length is 25.

```
config:# history length <n>
```

Variables:

- <n> is an integer number between 1 and 250.

Multi-Command Syntax

To shorten the configuration time, you can combine various configuration commands in one command to perform all of them at a time. All combined commands must belong to the same configuration type, such as commands prefixed with *network*, *user modify*, *sensor externalsensor* and so on.

A multi-command syntax looks like this:

```
<configuration type> <setting 1> <value 1> <setting 2>  
<value 2> <setting 3> <value 3> ...
```

Example 1 - Combination of IP, Subnet Mask and Gateway Parameters

The following multi-command syntax configures IPv4 address, subnet mask and gateway for the network connectivity simultaneously.

```
config:# network ipv4 ipAddress 192.168.84.225 subnetMask 255.255.255.0
gateway 192.168.84.0
```

Results:

- The IP address is set to 192.168.84.225.
- The subnet mask is set to 255.255.255.0.
- The gateway is set to 192.168.84.0.

Example 2 - Combination of Upper Critical and Upper Warning Settings

The following multi-command syntax simultaneously configures Upper Critical and Upper Warning thresholds for the RMS current of the inlet.

```
config:# sensor inlet 1 current upperCritical disable upperWarning 20
```

Results:

- The Upper Critical threshold of the inlet's RMS current is disabled.
- The Upper Warning threshold of the inlet's RMS current is set to 20A and enabled at the same time.

Actuator Control Operations

An actuator, which is connected to a dry contact signal channel of a DX sensor, can control a mechanism or system. You can switch on or off that mechanism or system through the actuator control command in the CLI.

Perform these commands in the administrator or user mode. See ***Different CLI Modes and Prompts*** (on page 194).

Switching On the Actuator(s)

This command syntax turns on one or all actuators.

```
#          control actuator <n> on
```

To quicken the operation, you can add the parameter `/y` to the end of the command, which confirms the operation.

```
#          control actuator <n> on /y
```

Variables:

- `<n>` is one of the options: *all* or an actuator number.

Option	Description
all	Switches ON all actuators.
A specific actuator's ID number	Switches ON the specified actuator. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.

If you entered the command without `/y`, a message appears, prompting you to confirm the operation. Then:

- Type `y` to confirm the operation, OR
- Type `n` to abort the operation

Switching Off the Actuator(s)

This command syntax turns off one or all actuators.

```
#          control actuator <n> off
```

To quicken the operation, you can add the parameter `/y` to the end of the command, which confirms the operation.

```
#          control actuator <n> off /y
```

Variables:

- `<n>` is one of the options: *all* or an actuator number.

Option	Description
all	Switches OFF all actuators.
A specific actuator's ID number	Switches OFF the specified actuator. The ID number is available in the PXE web interface or using the show command in the CLI. It is an integer between 1 and 32.

If you entered the command without `/y`, a message appears, prompting you to confirm the operation. Then:

- Type `y` to confirm the operation, OR
- Type `n` to abort the operation

Example - Turning On a Specific Actuator

The following command turns on the actuator whose ID number is 8.

```
#          control actuator 8 on
```

Unlocking a User

If any user is blocked from accessing the PXE, you can unblock them at the local console.

► To unblock a user:

1. Log in to the CLI interface using any terminal program via a local connection. See ***With HyperTerminal*** (on page 192).
2. When the Username prompt appears, type `unlock` and press Enter.

Username: `unlock`

3. When the "Username to unlock" prompt appears, type the name of the blocked user and press Enter.

Username to unlock:

4. A message appears, indicating that the specified user was unblocked successfully.

Resetting the PXE

You can reset the PXE device to factory defaults or simply restart it using the CLI commands.

Restarting the PDU

This command restarts the PXE device. It is not a factory default reset.

► To restart the PXE device:

1. Ensure you have entered administrator mode and the `#` prompt is displayed.
2. Type either of the following commands to restart the PXE device.

```
#      reset unit
```

-- OR --

```
#      reset unit /y
```

3. If you entered the command without `/y` in Step 2, a message appears prompting you to confirm the operation. Type `y` to confirm the reset.
4. Wait until the Username prompt appears, indicating the reset is complete.

Note: If you are performing this command over a USB connection, re-connect the USB cable after the reset is completed, or the CLI communications are lost.

Resetting Active Energy Readings

You can reset either one active energy sensor or all active energy sensors at a time to restart the energy accumulation process. Only users with the 'Admin' role assigned can reset active energy readings.

► **To reset all active energy readings of the PXE:**

```
#      reset activeEnergy pdu
      -- OR --
#      reset activeEnergy pdu /y
```

► **To reset one inlet's active energy readings:**

```
#      reset activeEnergy inlet <n>
      -- OR --
#      reset activeEnergy inlet <n> /y
```

If you entered the command without "/y", a message appears prompting you to confirm the operation. Type y to confirm the reset or n to abort it.

Variables:

- <n> is the inlet number. For a single-inlet PDU, the number is always 1.

Resetting to Factory Defaults

The following commands restore all settings of the PXE device to factory defaults.

► **To reset PXE settings after login, use either command:**

```
#      reset factorydefaults
      -- OR --
#      reset factorydefaults /y
```

► **To reset PXE settings before login:**

```
Username:  factorydefaults
```

See **Using the CLI Command** (on page 328) for details.

Network Troubleshooting

The PXE provides 4 diagnostic commands for troubleshooting network problems: *nslookup*, *netstat*, *ping*, and *tracert*. The diagnostic commands function as corresponding Linux commands and can get corresponding Linux outputs.

Entering Diagnostic Mode

Diagnostic commands function in the diagnostic mode only.

► **To enter the diagnostic mode:**

1. Enter either of the following modes:
 - Administrator mode: The # prompt is displayed.
 - User mode: The > prompt is displayed.
2. Type `diag` and press Enter. The `diag#` or `diag>` prompt appears, indicating that you have entered the diagnostic mode.
3. Now you can type any diagnostic commands for troubleshooting.

Quitting Diagnostic Mode

► **To quit the diagnostic mode, use this command:**

```
diag>          exit
```

The # or > prompt appears after pressing Enter, indicating that you have entered the administrator or user mode. See ***Different CLI Modes and Prompts*** (on page 194).

Diagnostic Commands

The diagnostic command syntax varies from command to command.

Querying DNS Servers

This command syntax queries Internet domain name server (DNS) information of a network host.

```
diag>          nslookup <host>
```

Variables:

- <host> is the name or IP address of the host whose DNS information you want to query.

Showing Network Connections

This command syntax displays network connections and/or status of ports.

```
diag>          netstat <option>
```

Variables:

- <option> is one of the options: *ports* or *connections*.

Option	Description
ports	Shows TCP/UDP ports.
connections	Shows network connections.

Testing the Network Connectivity

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 this syntax when it includes all options:

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

Tracing the Route

This command syntax traces the network route between your PXE device and a network host.

```
diag>          traceroute <host>
```

Variables:

- <host> is the name or IP address of the host you want to trace.

Example - Ping Command

The following command checks the network connectivity of the host 192.168.84.222 by sending the ICMP ECHO_REQUEST message to the host for 5 times.

```
diag>          ping 192.168.84.222 count 5
```

Retrieving Previous Commands

If you would like to retrieve any command that was previously typed in the same connection session, press the Up arrow (↑) on the keyboard until the desired command is displayed.

Automatically Completing a Command

A CLI command always consists of several words. You can easily enter a command by typing first word(s) or letter(s) and then pressing Tab or Ctrl+i instead of typing the whole command word by word.

► To have a command completed automatically:

1. Type initial letters or words of the desired command. Make sure the letters or words you typed are unique so that the CLI can identify the command you want.
2. Press Tab or Ctrl+i until the complete command appears.

Example 1:

Type the first word and the first letter of the second word of the "reset factorydefaults" command, that is, `reset f`. Then press Tab or Ctrl+i to complete the second word.

Example 2:

Type the first word and initial letters of the second word of the "security enforceHttpsForWebAccess" command, that is, `security enf`. Then press Tab or Ctrl+i to complete the second word.

Appendix A Specifications

In This Chapter

Maximum Ambient Operating Temperature	322
Sensor RJ-12 Port Pinouts	322
RS-485 Port Pinouts	322

Maximum Ambient Operating Temperature

The maximum ambient operating temperature (TMA) for the PXE is the same for all models.

Specification	Measure
Max Ambient Temperature	45 degrees Celsius

Sensor RJ-12 Port Pinouts

RJ-12 Pin/signal definition			
Pin No.	Signal	Direction	Description
1	+12V	—	Power (500mA, fuse protected)
2	GND	—	Signal Ground
3	—	—	—
4	—	—	—
5	GND	—	Signal Ground
6	1-wire		Used for Feature Port

RS-485 Port Pinouts

RS-485 Pin/signal definition			
Pin No.	Signal	Direction	Description
1	—	—	—
2	—	—	—
3	D+	bi-direction	Data +

RS-485 Pin/signal definition			
		al	
4	—	—	—
5	—	—	—
6	D-	bi-directional	Data -
7	—	—	—
8	—	—	—

Appendix B Equipment Setup Worksheet

PXE Series Model _____

PXE Series Serial Number _____

OUTLET 1	OUTLET 2	OUTLET 3
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE
OUTLET 4	OUTLET 5	OUTLET 6
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE

OUTLET 7	OUTLET 8	OUTLET 9
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE
OUTLET 10	OUTLET 11	OUTLET 12
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE
OUTLET 13	OUTLET 14	OUTLET 15
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE

Appendix B: Equipment Setup Worksheet

OUTLET 16	OUTLET 17	OUTLET 18
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE
OUTLET 19	OUTLET 20	OUTLET 21
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE

OUTLET 22	OUTLET 23	OUTLET 24
MODEL	MODEL	MODEL
SERIAL NUMBER	SERIAL NUMBER	SERIAL NUMBER
USE	USE	USE

Types of adapters

Types of cables

Name of software program

Appendix C Resetting to Factory Defaults

For security reasons, the PXE device can be reset to factory defaults only at the local console.

Important: Exercise caution before resetting the PXE to its factory defaults. This erases existing information and customized settings, such as user profiles, threshold values, and so on. Only active energy data and firmware upgrade history are retained forever.

In This Chapter

Using the CLI Command328

Using the CLI Command

The Command Line Interface (CLI) provides a reset command for restoring the PXE to factory defaults. For information on CLI, see **Using the Command Line Interface** (on page 191).

► **To reset to factory defaults after logging in to the CLI:**

1. Connect to the PXE device. See **Logging in to CLI** (on page 192) or **Connecting the PXE to a Computer** (on page 11).
2. Launch a terminal emulation program such as HyperTerminal, Kermit, or PuTTY, and open a window on the PXE. For information on the serial port configuration, see Step 2 of **Initial Network Configuration via CLI** (on page 12).
3. Log in to the CLI by typing the user name "admin" and its password.
4. After the # system prompt appears, type either of the following commands and press Enter.

```
#      reset factorydefaults
```

```
-- OR --
```

```
#      reset factorydefaults /y
```

5. If you entered the command without "/y" in Step 4, a message appears prompting you to confirm the operation. Type y to confirm the reset.
6. Wait until the Username prompt appears, indicating the reset is complete.

► **To reset to factory defaults without logging in to the CLI:**

The PXE provides an easier way to reset the product to factory defaults in the CLI prior to login.

1. Connect to the PXE and launch a terminal emulation program as described in the above procedure.
2. At the Username prompt in the CLI, type "factorydefaults" and press Enter.

```
Username: factorydefaults
```

3. Type `y` on a confirmation message to perform the reset.

Appendix D LDAP Configuration Illustration

This section provides an LDAP example for illustrating the configuration procedure using Microsoft Active Directory® (AD). To configure LDAP authentication, four main steps are required:

- a. Determine user accounts and groups intended for the PXE
- b. Create user groups for the PXE on the AD server
- c. Configure LDAP authentication on the PXE device
- d. Configure roles on the PXE device

In This Chapter

Step A. Determine User Accounts and Groups	330
Step B. Configure User Groups on the AD Server	331
Step C. Configure LDAP Authentication on the PXE Device.....	332
Step D. Configure User Groups on the PXE Device.....	334

Step A. Determine User Accounts and Groups

Determine the user accounts and groups that are authenticated for accessing the PXE. In this example, we will create two user groups with different permissions. Each group will consist of two user accounts available on the AD server.

User groups	User accounts (members)
PX_User	usera
	pxuser2
PX_Admin	userb
	pxuser

Group permissions:

- The PX_User group will have neither system permissions nor outlet permissions.
- The PX_Admin group will have full system and outlet permissions.

Step B. Configure User Groups on the AD Server

You must create the groups for the PXE on the AD server, and then make appropriate users members of these groups.

In this illustration, we assume:

- The groups for the PXE are named *PX_Admin* and *PX_User*.
- User accounts *pxuser*, *pxuser2*, *usera* and *userb* already exist on the AD server.

► To configure the user groups on the AD server:

1. On the AD server, create new groups -- *PX_Admin* and *PX_User*.

Note: See the documentation or online help accompanying Microsoft AD for detailed instructions.

2. Add the *pxuser2* and *usera* accounts to the *PX_User* group.
3. Add the *pxuser* and *userb* accounts to the *PX_Admin* group.
4. Verify whether each group comprises correct users.



Step C. Configure LDAP Authentication on the PXE Device

You must enable and set up LDAP authentication properly on the PXE device to use external authentication.

In the illustration, we assume:

- The DNS server settings have been configured properly. See **Modifying Network Settings** (on page 56) and **Role of a DNS Server** (on page 63).
- The AD server's domain name is *techadssl.com*, and its IP address is *192.168.56.3*.
- The AD protocol is NOT encrypted over SSL.
- The AD server uses the default TCP port 389.
- Anonymous bind is used.

► **To configure LDAP authentication:**

1. Choose Device Settings > Security > Authentication. The Authentication Settings dialog appears.
2. Select the LDAP radio button to activate the LDAP/LDAPS authentication.
3. Click New to add an LDAP/LDAPS authentication server. The "Create new LDAP Server Configuration" dialog appears.
4. Provide the PXE with the information about the AD server.
 - IP Address / Hostname - Type the domain name *techadssl.com* or IP address *192.168.56.3*.

Important: Without the SSL encryption enabled, you can type either the domain name or IP address in this field, but you must type the fully qualified domain name if the SSL encryption is enabled.

- Use settings from LDAP server - Leave the checkbox deselected.
- Type of LDAP Server - Select "Microsoft Active Directory" from the drop-down list.
- LDAP over SSL - Have the checkbox deselected since the SSL encryption is not applied in this example.
- Port - Ensure the field is set to 389.
- SSL Port and Server Certificate - Skip the two fields since the SSL encryption is not enabled.
- Use Bind Credentials - Do NOT select this checkbox because anonymous bind is used.
- Bind DN, Bind Password and Confirm Bind Password -- Skip the three fields because anonymous bind is used.

- Base DN for Search - Type `dc=techadssl,dc=com` as the starting point where your search begins on the AD server.
- Login Name Attribute - Ensure the field is set to `sAMAccountName` because the LDAP server is Microsoft Active Directory.
- User Entry Object Class - Ensure the field is set to `user` because the LDAP server is Microsoft Active Directory.
- User Search Subfilter - The field is optional. The subfilter information is also useful for filtering out additional objects in a large directory structure. In this example, we leave it blank.
- Active Directory Domain - Type `techadssl.com`.

Create new LDAP Server Configuration

IP Address / Hostname: ⓘ

☐ Use settings from LDAP Server

Select LDAP Server: ▼

Type of LDAP Server: ▼

☐ LDAP over SSL

Port:

SSL Port:

☐ Use only trusted LDAP Server Certificates

Server Certificate: not set

☐ Anonymous Bind

☐ Use Bind Credentials

Bind DN:

Bind Password:

Confirm Bind Password:

Base DN for Search:

Login Name Attribute:

User Entry Object Class:

User Search Subfilter:

Active Directory Domain:

5. Click OK. The LDAP server is saved.

6. Click OK. The LDAP authentication is activated.

Note: If the PXE clock and the LDAP server clock are out of sync, the certificates are considered expired and users are unable to authenticate using LDAP. To ensure proper synchronization, administrators should configure the PXE and the LDAP server to use the same NTP server.

Step D. Configure User Groups on the PXE Device

A role on the PXE device determines the system and outlet permissions. You must create the roles whose names are identical to the user groups created for the PXE on the AD server or authorization will fail. Therefore, we will create the roles named *PX_User* and *PX_Admin* on the PDU.

In this illustration, we assume:

- Users assigned to the *PX_User* role can neither configure PXE nor access the outlets.
- Users assigned to the *PX_Admin* role have the Administrator permissions so they can both configure PXE and access the outlets.

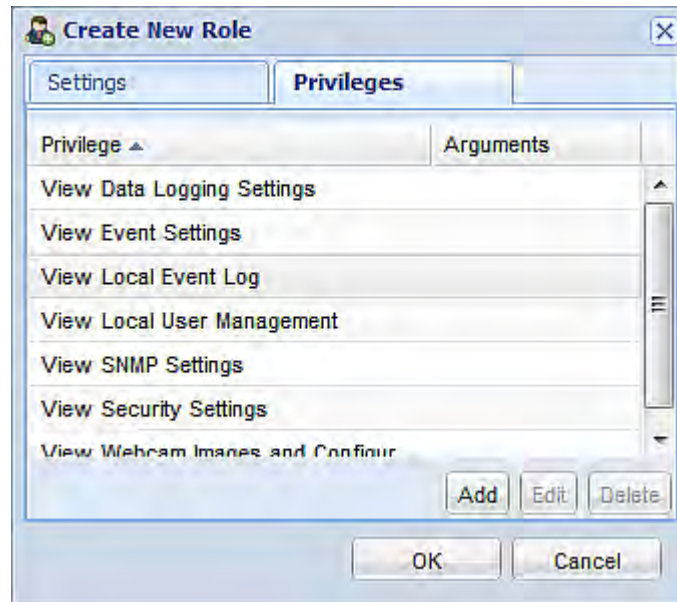
► **To create the *PX_User* role with appropriate permissions assigned:**

1. Choose User Management > Roles. The Manage Roles dialog appears.

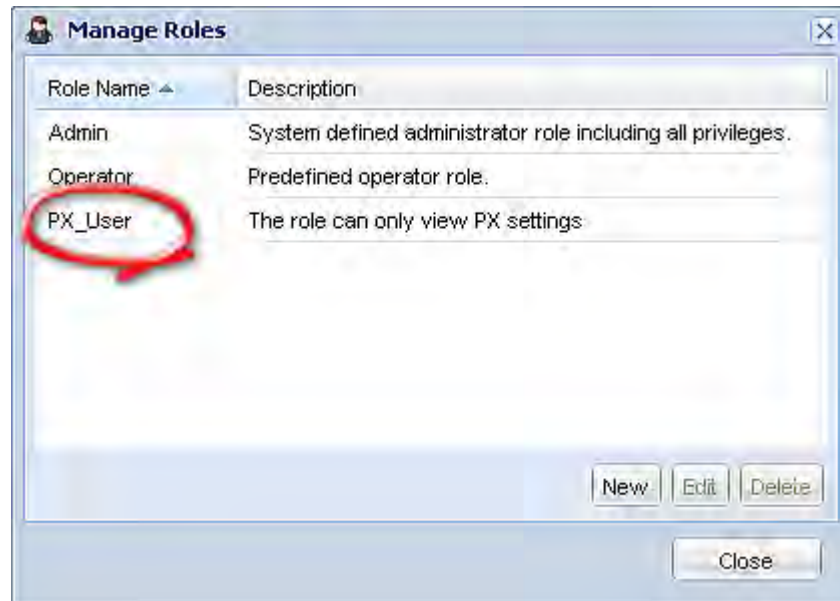
Tip: You can also access the Manage Roles dialog by clicking the Manage Roles button in the Edit User 'XXX' dialog.

2. Click New. The Create New Role dialog appears.
3. Type *PX_User* in the Role Name field.
4. Type a description for the *PX_User* role in the Description field. In this example, we type "The role can only view PX settings" to describe the role.
5. Click the Privileges tab to select all View XXX permissions (where XXX is the name of the setting). A View XXX permission lets users view the XXX settings without the capability to configure or change them.
 - a. Click Add. The "Add Privileges to new Role" dialog appears.
 - b. Select a permission beginning with the word "View" from the Privileges list, such as View Event Settings.
 - c. Click Add.

- d. Repeat Steps a to c to add all permissions beginning with "View."



6. Click OK. The PX_User role is created.

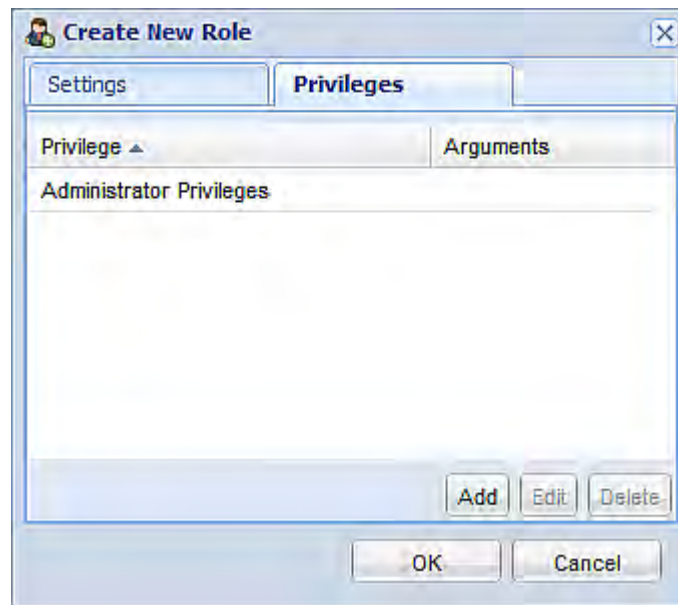


7. Keep the Manage Roles dialog opened to create the PX_Admin role.

► **To create the PX_Admin role with full permissions assigned:**

1. Click New. The Create New Role dialog appears.
2. Type PX_Admin in the Role Name field.

3. Type a description for the PX_Admin role in the Description field. In this example, we type "The role includes all privileges" to describe the role.
4. Click the Privileges tab to select the Administrator permission. The Administrator permission allows users to configure or change all PXE settings.
 - a. Click Add. The "Add Privileges to new Role" dialog appears.
 - b. Select the permission named Administrator Privileges from the Privileges list.
 - c. Click Add.



5. Click OK. The PX_Admin role is created.



6. Click Close to quit the dialog.

Appendix E Integration

The PXE device can work with certain Raritan or non-Raritan products to provide diverse power solutions.

In This Chapter

Power IQ Configuration	338
dcTrack.....	340

Power IQ Configuration

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:

- Power IQ User Guide: Available on the Raritan website's **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/>).

Adding PDUs to Power IQ Management

Once Power IQ is configured, add Raritan PX or other PDUs to its management. Power IQ can then gather data from these PDUs. If you're adding a PDU that uses a custom dynamic plugin, see Adding PDUs with Custom Dynamic Plugins.

You can also add PDUs to Power IQ by uploading a CSV file containing the information. See Adding PDUs in Bulk with CSV Files in the Power IQ User Guide.

► To add PDUs to Power IQ management:

1. In the PDUs tab, click Add.
2. Enter the IP address of the PDU.
3. If the PDU is in a daisy-chained configuration or console server configuration, enter the PDU's position number in the chain or serial port number in the Proxy Index field. You can also specify branch circuit monitors using the Proxy Index field. See Adding Veris Branch Circuit Monitors with Acquisuite.

Note: If the PDU is not in this type of configuration, leave the Proxy Index field blank.

4. Enter an asset tag number or other asset management code in the External Key field. **Optional.**
5. Enter data in Custom Field 1 and Custom Field 2. **Optional.** The labels may have been changed in Power IQ to identify these fields.
6. If the PDU is a Raritan PX, enter a valid Username and Password for the PDU in the PDU Administrative Credentials section. Re-enter the password in the Password Confirm field.
7. Select the SNMP Version.
 - For SNMP version 1/2c PDUs, enter an SNMP Community String that has at least READ permissions to this PDU. This enables polling the PDU for data. Enter an SNMP community string that has both READ and WRITE permissions to the PDU to enable power control, outlet naming, sensor naming, and buffered data retrieval.
 - For SNMP version 3 PDUs, enter the Username and select an Authorization Level. The authorization levels are:
 - noAuthNoPriv - No Authentication Passkey, No Encoding Passkey
 - authNoPriv - Authentication Passkey, No Encoding Passkey
 - authPriv - Authentication Passkey, Encoding Passkey
 - a. Depending on the Authorization Level selected, you must enter additional credentials for Authorization and Privacy.
 - b. Authorization Protocol: Select MD5 or SHA.
 - c. Enter the PDU's Authorization Passkey, then re-enter the passkey in the Authorization Passkey Confirm field.
 - d. Privacy Protocol: Select DES or AES.
 - e. Enter the PDU's Privacy Passkey, then re-enter the passkey in the Privacy Passkey Confirm field.

Note: You must enable the SNMP agent on all PDUs added to Power IQ.

8. Select "Validate and wait for discovery to complete before proceeding" to check credentials and view the discovery process status as you add this PDU. **Optional.** See Validating PDU Credentials in the Power IQ User Guide.
9. Click Add.

Note: PDU discovery is complete once the PDU model type is determined. SNMP fields such as contact or location values are not determined until this device is polled for the first time.

Once added, the PDU appears in the PDU list. Power IQ begins polling the PDU for sensor data. You can configure how often Power IQ polls PDU. See Configuring Polling Intervals in the Power IQ User Guide.

dcTrack

dcTrack® is a Raritan product that allows you to manage the data center. You can use dcTrack to:

- Record and manage the data center infrastructure and assets
- Monitor the electrical consumption of the data center
- Track environmental factors in the data center, such as temperature and humidity
- Optimize the data center growth

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

dcTrack Overview

dcTrack® is a powerful and intelligent data center management and automation application.

dcTrack has been designed by data center and IT professionals to provide broad and deep visibility into the data center. It empowers data center managers to plan for growth and change by optimizing their current operations, assets, and infrastructure.

With dcTrack, you can view everything in the data center from servers, blades, virtual servers and applications to data networks, IP addressing space and cabling. dcTrack also allows you to track real-time power consumption and manage raised floor space and rack elevations.

Use dcTrack to build your floor map data center map directly in the application, or import an existing floor map into the dcTrack. Further, dcTrack allows you to import AutoCAD® 2012 (and earlier) objects to build a data center map.

If you currently maintain data center information in spreadsheet format, that data can be imported into dcTrack using the Import wizard.

Isolate potential problems with end-to-end power and data circuits by visually tracing them. This allows you to identify all intermediate circuit points and locate problems.

By using dcTrack's workflow and change management feature, data center managers are better able to enforce best practices across the enterprise and meet ITIL framework guidelines. You can also opt to skip the Change Control process and work in Request Bypass so requests are processed immediately.

dcTrack® can be used as a standalone product or integrated with

Raritan's Power IQ

<http://www.raritan.com/products/dcim-software/power-iq>® for power and environmental monitoring.

Adding the PX to dcTrack Management

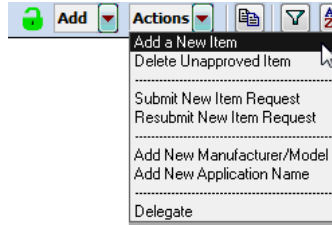
The PX is categorized as a rack PDU in dcTrack. This section describes the procedure to add the PX to dcTrack for management. For more information, see the dcTrack User Guide that accompanies the dcTrack.

► To add a rack PDU:

1. From the Explorer Menu, select Power Items > Rack PDU.
2. Select Add from the Page Mode drop-down in the toolbar.



3. Select Add a New Item from the Actions drop-down in the toolbar.



4. At a minimum, complete all of the required fields on the Detail 1 page. Complete additional fields as needed.
5. Enter the rack PDU ID.
6. Select the make and model.
7. Assign the rack PDU to cabinet and rail position.

Note: Once a status of Installed is applied to a item, placement fields cannot be edited in Edit mode. This means that rail positions cannot be changed once the item is installed. As a workaround, administrators can edit items from the Items & Ports page in Classic View.

8. Select the cabinet side if the rack PDU is vertically mounted.

Note: Twelve vertically mounted rack PDUs are supported per cabinet. Horizontally mounted/rack mounted rack PDUs do not apply to this step since there is no side to select.

9. If you are adding a Raritan PX2 device for asset sensor management purposes, see Adding a PX2 to dcTrack for information on adding this item as a rack PDU.
10. Create ports as needed. See Creating Ports.
11. Complete all relevant Detail 2 information (if needed):
 - a. Enter notes (if applicable).
 - b. Enter maintenance and support information (if applicable).
 - c. Complete custom user fields (if applicable).
12. Click Save. The saved item is given a status of Planned. Since the item has a status of new, it appears in red on the cabinet elevation.
13. To submit a request for approval, select Install Item Request from the Actions drop-down. After the Gatekeeper has reviewed and approved the request, a work order to physically add the item in the data center is generated by the Gatekeeper.

Appendix F Additional PXE Information

In This Chapter

MAC Address	343
Locking Outlets and Cords	343
Unbalanced Current Calculation	346
Altitude Correction Factors	347
Raritan Training Website	348
Truncated Data in the Web Interface	348
Reserving IP Addresses in Windows DHCP Servers.....	349
Sensor Threshold Settings	349

MAC Address

A label is affixed to the PXE, 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.

Locking Outlets and Cords

In addition to the cable retention clips, Raritan also provides other approaches to secure the connection of the power cords from your IT equipment to the Raritan PDUs, including:

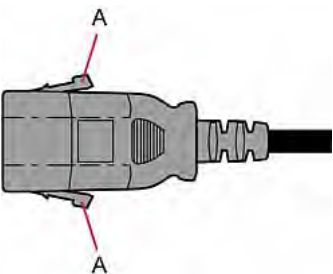
- SecureLock™ outlets and cords
- Button-type locking outlets

Note that NOT all Raritan PDUs are implemented with any of the above locking outlets.

SecureLock™ Outlets and Cords

SecureLock™ is an innovative mechanism designed by Raritan, which securely holds C14 or C20 plugs that are plugged into Raritan PDUs in place. This method requires the following two components:

- Raritan PDU with SecureLock™ outlets, which have a latch slot inside either side of the outlet.
- SecureLock™ cords, which is a power cord with a locking latch on each side of its plug. The following diagram illustrates such a plug.



Item	Description
A	Latches on the SecureLock™ cord's plug

Only specific PDUs are implemented with the SecureLock™ mechanism. If your PDU does not have this design, do NOT use the SecureLock™ cords with it.

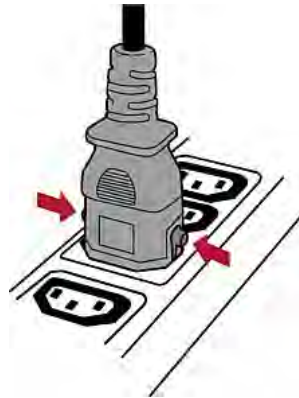
Tip: The SecureLock™ outlets can accept regular power cords for power distribution but the SecureLock™ mechanism does not take effect.

► **To lock a power cord using the SecureLock™ mechanism:**

1. Verify that the SecureLock™ cord you purchased meets your needs.
 - The cords' female socket matches the power socket type (C14 or C20) on your IT equipment.
 - The cord's male plug matches the outlet type (C13 or C19) on your PDU.
2. Connect the SecureLock™ cord between the IT equipment and your PDU.
 - Plug the female socket end of the cord into the power socket of the desired IT equipment.
 - Plug the male plug end of the cord into the appropriate SecureLock™ outlet on the PDU. Push the plug toward the outlet until you hear the click, which indicates the plug's latches are snapped into the latch slots of the outlet.

► **To remove a SecureLock™ power cord from the PDU:**

1. Press and hold down the two latches on the cord's plug as illustrated in the diagram below.



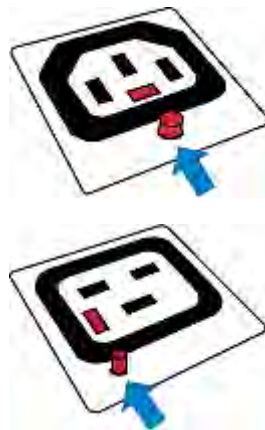
2. Unplug the cord now.

Button-Type Locking Outlets

A button-type locking outlet has a button on it. Such outlets do not require any special power cords to achieve the locking purpose. All you need to do is simply plug a regular power cord into the locking outlet and the outlet automatically locks the cord.

► **To remove a power cord from the locking outlet:**

1. Press and hold down the tiny button on the outlet. Depending on the outlet type, the button location differs.



2. Unplug the power cord now.

Unbalanced Current Calculation

Unbalanced current information is available on 3-phase models only. This section explains how the PXE calculates the unbalanced current percentage.

► **Calculation:**

1. Calculate the average current of all 3 lines.

$$\text{Average current} = (L1 + L2 + L3) / 3$$

2. Calculate each line's current unbalance by having each line current subtracted and divided with the average current.

$$L1 \text{ current unbalance} = (L1 - \text{average current}) / \text{average current}$$

$$L2 \text{ current unbalance} = (L2 - \text{average current}) / \text{average current}$$

$$L3 \text{ current unbalance} = (L3 - \text{average current}) / \text{average current}$$

3. Determine the maximum absolute value among three lines' current unbalance values.

$$\text{Maximum} (|L1 \text{ current unbalance}| , |L2 \text{ current unbalance}| , |L3 \text{ current unbalance}|)$$

4. Convert the maximum value to a percentage.

$$\text{Unbalanced load percent} = 100 * \text{maximum current unbalance}$$

► **Example:**

- Each line's current:

$$L1 = 5.5 \text{ amps}$$

$$L2 = 5.2 \text{ amps}$$

$$L3 = 4.0 \text{ amps}$$

- Average current: $(5.5+5.2+4.0) / 3 = 4.9$ amps
- L1 current unbalance: $(5.5 - 4.9) / 4.9 = 0.1224$
- L2 current unbalance: $(5.2 - 4.9) / 4.9 = 0.0612$
- L3 current unbalance: $(4.0 - 4.9) / 4.9 = -0.1837$
- Maximum current unbalance:
Maximum ($|0.1224|$, $|0.0612|$, $|-0.1837|$) = 0.1837
- Current unbalance converted to a percentage:
 $100 * (0.1837) = 18\%$

Altitude Correction Factors

If a Raritan differential air pressure sensor is attached to your device, the altitude you enter for the device can serve as an altitude correction factor. That is, the reading of the differential air pressure sensor will be multiplied by the correction factor to get a correct reading.

This table shows the relationship between different altitudes and correction factors.

Altitude (meters)	Altitude (feet)	Correction factor
0	0	0.95
250	820	0.98
425	1394	1.00
500	1640	1.01
740	2428	1.04
1500	4921	1.15
2250	7382	1.26
3000	9842	1.38

Raritan Training Website

Raritan offers free training materials for various Raritan products on the **Raritan training website** <http://www.raritantraining.com>. The Raritan products introduced on this website include the intelligent PDU, dcTrack™, Power IQ, KVM and CommandCenter Secure Gateway (CC-SG). Raritan would update the training materials irregularly according to the latest development of Raritan products.

To get access to these training materials or courses, you need to apply for a username and password through the Raritan training website. After you are verified, you can access the Raritan training website anytime.

Having access to the training website could be helpful for learning or getting some ideas regarding Raritan products and making correct decisions on purchasing them. For example, you can take the dcTrack video training before implementing or using it.

Truncated Data in the Web Interface

Some fields of the PXE web interface can accommodate data entry up to 256 characters. When the data entered is too long, it may be truncated due to some or all of the following factors:

- Screen resolution
- Font size
- Font type
- Size of different characters

Current web browser technology cannot break or wrap these fields with long inputs.

The solution for this issue includes:

- Increase of the screen resolution
- Application of smaller font size
- Use of other interfaces, such as the CLI or SNMP, to view the data in these fields

Reserving IP Addresses in Windows DHCP Servers

The PXE uses its serial number as the client identifier in the DHCP request. Therefore, to successfully reserve an IP address for the PXE in a Windows® DHCP server, use the PXE device's serial number as the unique ID instead of the MAC address.

Convert the serial number into ASCII codes for the IP address reservation entry. For example, if the PXE device's serial number is PEG1A00003, use the serial number's ASCII codes "50 45 47 31 41 30 30 30 30 33" as the unique ID.

Sensor Threshold Settings

This section explains the thresholds settings in a threshold setup dialog for a numeric internal or external sensor.



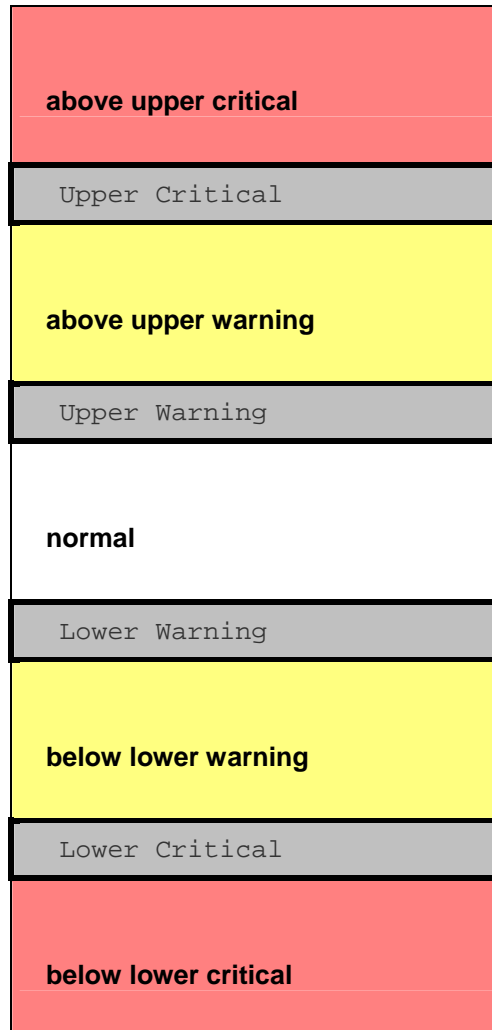
The image shows a Windows-style dialog box titled "Setup Sensor XXX". It contains several settings for sensor thresholds. Each setting has a checkbox and a text input field. The settings are: "Lower Critical:" (checked), "Lower Warning:" (checked), "Upper Warning:" (checked), "Upper Critical:" (checked), "Deassertion Hysteresis:" (unchecked), and "Assertion Timeout:" (unchecked). At the bottom right, there are "OK" and "Cancel" buttons.

Setting	Checked	Value
Lower Critical :	<input checked="" type="checkbox"/>	
Lower Warning :	<input checked="" type="checkbox"/>	
Upper Warning :	<input checked="" type="checkbox"/>	
Upper Critical :	<input checked="" type="checkbox"/>	
Deassertion Hysteresis :	<input type="checkbox"/>	
Assertion Timeout :	<input type="checkbox"/>	

Thresholds and Sensor States

A numeric sensor has four threshold settings: Lower Critical, Lower Warning, Upper Warning and Upper Critical.

The threshold settings determine how many sensor states are available for a certain sensor and the range of each sensor state. The diagram below shows how each threshold relates to each state.



► Available sensor states:

The more thresholds are enabled for a sensor, the more sensor states are available for it. The "normal" state is always available regardless of whether any threshold is enabled.

For example:

- When a sensor only has the Upper Critical threshold enabled, it has two sensor states: normal and above upper critical.
- When a sensor has both the Upper Critical and Upper Warning thresholds enabled, it has three sensor states: normal, above upper warning, and above upper critical.
- When a sensor has all thresholds enabled, 5 sensor states are available: normal, above upper warning, above upper critical, below lower warning, and below lower critical.

Both states of "above upper warning" and "below lower warning" are warning states to call for users' attention.

Both states of "above upper critical" and "below lower critical" are critical states that require users to immediately handle.

► **Range of each available sensor state:**

The value of each enabled threshold determines the reading range of each available sensor state. For details, see:

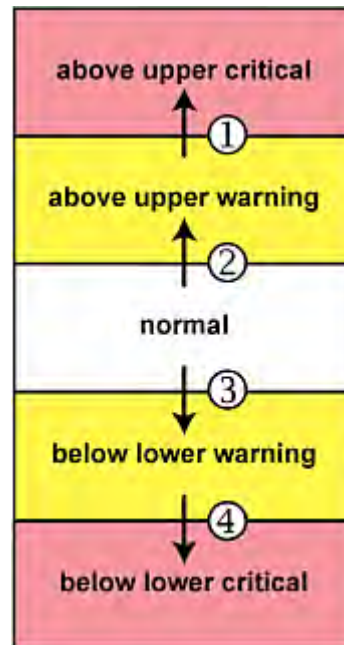
- **"above upper critical" State** (on page 171)
- **"above upper warning" State** (on page 170)
- **"below lower critical" State** (on page 170)
- **"below lower warning" State** (on page 170)

"To Assert" and Assertion Timeout

If multiple sensor states are available for a specific sensor, the PXE asserts a state for it whenever a bad state change occurs.

► Assert a state:

To assert a state is to announce a "worse" new state. Below are bad state changes that cause the PXE to assert.



1. above upper warning --> above upper critical
2. normal --> above upper warning
3. normal --> below lower warning
4. below lower warning --> below lower critical

► Assertion Timeout:

In the threshold setup dialog, the Assertion Timeout field impacts the "assert" action. It determines how long a sensor must be in the "worse" new state before the PXE turns on the "assert" action. If that sensor changes its state again within the specified wait time, the PXE does NOT assert that state.

To disable the assertion timeout, set it to 0 (zero).

Note: For most sensors, the measurement unit in the "Assertion Timeout" field is sample. Because the PXE measures each sensor per second, a sample is equal to a second.

► **When 'Assertion Timeout' is helpful:**

If you have created an event rule that instructs the PXE to send notifications for assertion events, setting the "Assertion Timeout" is helpful for eliminating a number of notifications that you may receive in case the sensor's reading fluctuates around a certain threshold.

Assertion Timeout Example for Temperature Sensors

Assumption:

Upper Warning threshold is enabled.
 Upper Warning = 25 (degrees Celsius)
 Assertion Timeout = 5 samples (that is, 5 seconds)

When a temperature sensor's reading exceeds 25 degrees Celsius, moving from the "normal" range to the "above upper warning" range, the PXE does NOT immediately announce this bad state. Instead it waits for 5 seconds, and then does either of the following:

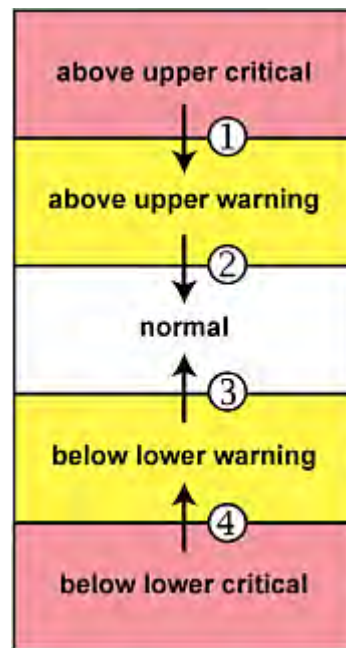
- If the temperature remains above 25 degrees Celsius in the "above upper warning" range for 5 seconds, the PXE turns on the "assert" action to announce the "above upper warning" state for it.
- If the temperature drops below 25 degrees Celsius within 5 seconds, the "assert" action is NOT turned on.

"To De-assert" and Deassertion Hysteresis

After the PXE asserts a state for a sensor, it may de-assert the same state later on.

► To de-assert a state:

To de-assert a state is to announce the end of the previously asserted, bad state. Below are good state changes that cause the PXE to de-assert.



1. above upper critical --> above upper warning
2. above upper warning --> normal
3. below lower warning --> normal
4. below lower critical --> below lower warning

► Deassertion Hysteresis:

In the threshold settings dialog, the Deassertion Hysteresis field determines a new level to turn on the "de-assert" action.

This function is similar to a thermostat, which instructs the air conditioner to turn on the cooling system when the temperature exceeds a pre-determined level. "Deassertion Hysteresis" instructs the PXE to de-assert a state for a sensor only when that sensor's reading hits the "deassertion" level.

For upper thresholds, this "deassertion" level is a decrease against each threshold. For lower thresholds, this level is an increase to each threshold.

For example:

If Deassertion Hysteresis = 2,

- Upper Critical = 33, so its "deassertion" level = $33 - 2 = 31$.
- Upper Warning = 25, so its "deassertion" level = $25 - 2 = 23$.
- Lower Critical = 10, so its "deassertion" level = $10 + 2 = 12$.
- Lower Warning = 18, so its "deassertion" level = $18 + 2 = 20$.

To use each threshold as the "deassertion" level instead of determining a new level, set the Deassertion Hysteresis to 0 (zero).

► When 'Deassertion Hysteresis' is helpful:

If you have created an event rule that instructs the PXE to send notifications for deassertion events, setting the "Deassertion Hysteresis" is helpful for eliminating a number of notifications that you may receive in case a sensor's reading fluctuates around a certain threshold.

Deassertion Hysteresis Example for Temperature Sensors

Assumption:

Upper Warning threshold is enabled.

Upper Warning = 20 (degrees Celsius)

Deassertion Hysteresis = 3 (degrees Celsius)

"Deassertion" level = $20 - 3 = 17$ (degrees Celsius)

When the PXE detects that a temperature sensor's reading drops below 20 degrees Celsius, moving from the "above upper warning" range to the "normal" range, either of the following may occur:

- If the temperature falls between 20 and 17 degrees Celsius, the "de-assert" action is NOT turned on.
- If the temperature drops to 17 degrees Celsius or lower, the PXE turns on the "de-assert" action to announce the end of the "above upper warning" state.

Index

1

1U Products • 1

A

A Note about Enabling Thresholds • 191
A Note about Firmware Upgrade Time • 181
A Note about Infinite Loop • xiv, 148
A Note about Untriggered Rules • 151
About the Interface • 192
Access Security Control • 86
Accessing the Help • 182
Action Group • 122, 124
Actuator Configuration Commands • 308
Actuator Control Operations • 314
Actuator Information • 205
Add Page Icon • 42, 45
Adding a Firewall Rule • 248
Adding a Role-Based Access Control Rule • 261
Adding Authentication Servers • 108
Adding IT Devices for Ping Monitoring • xiv, 154
Adding LDAP Server Settings • 108
Adding PDUs to Power IQ Management • 340
Adding RADIUS Server Settings • xiv, 111
Adding the PX to dcTrack Management • 343
Additional PXE Information • 345
Adjusting the Pane • 43
Alarm • 123, 125
Alarms List • xiii, 52, 122, 125
Alerted Sensors • xiii, 51
All Privileges • 282, 284, 285
Altitude Correction Factors • 73, 222, 349
Assertion Timeout Example for Temperature Sensors • 355
Automatic Mode • 30
Automatically Completing a Command • 322

B

Backup and Restore of PXE Device Settings • xv, 173, 176
Before You Begin • 8
Browser-Defined Shortcut Menu • 50
Browsing through the Online Help • 183
Bulk Configuration • 173, 176

Button-Type Locking Outlets • 347

C

Certificate Signing Request • 102
Changing a User's Password • 269
Changing Default Thresholds • xiv, 163, 165
Changing HTTP(S) Settings • xiii, 64, 86
Changing Measurement Units • 276, 279
Changing Modbus/TCP Settings • xiii, 67
Changing SSH Settings • 64, 80
Changing Telnet Settings • 65
Changing the Actuator Description • 310
Changing the Actuator Name • 309
Changing the Column • 48
Changing the Default Policy • xiv, 87, 88, 97, 98
Changing the Inlet Name • 267
Changing the LAN Duplex Mode • 235
Changing the LAN Interface Speed • 235
Changing the Modbus Configuration • 241
Changing the Modbus Port • 242
Changing the Outlet Name • 266
Changing the Overcurrent Protector Name • 268
Changing the PDU Name • 221
Changing the Role List View • 86
Changing the Role(s) • 276
Changing the Sensor Description • 288
Changing the Sensor Name • 286
Changing the Sorting • 49, 153
Changing the SSH Configuration • 238
Changing the SSH Port • 239
Changing the SSH Public Key • 277
Changing the Telnet Configuration • 237
Changing the Telnet Port • 238
Changing the UDP Port • 312
Changing the User List View • 82
Changing the View of a List • 48, 53, 82, 86, 156
Changing Your Own Password • 278
Changing Your Password • 38
Checking Outlet-Specific Data • xiv, 115
Checking Server Monitoring States • 156
Checking the Branch Circuit Rating • xiii, 9
Circuit Breaker Orientation Limitation • 2, 4, 6
Circuit Breakers • xiii, 32
Clearing Event Entries • 152
Clearing Event Log • 219

- Clearing Information • 219
- Closing a Local Connection • 195
- Collapsing the Tree • 43
- Command History • 217
- Commands for Environmental Sensors • 303
- Commands for Inlet Pole Sensors • 296
- Commands for Inlet Sensors • 290
- Components of an Event Rule • 121
- Configuring Environmental Sensors or Actuators • xiv, 47, 157, 162, 165, 166
- Configuring IP Protocol Settings • 225
- Configuring IPv4 Parameters • 226
- Configuring IPv6 Parameters • 230
- Configuring SMTP Settings • 75, 127
- Configuring SNMP Notifications • 147, 188
- Configuring SNMP Settings • 66, 79
- Configuring the Firewall • xiii, 87
- Configuring the PXE • xiii, 9, 56
- Configuring the PXE Device and Network • 220
- Configuring Users for Encrypted SNMP v3 • 66, 186, 187
- Connecting Environmental Sensor Packages (Optional) • xiii, 18, 156
- Connecting the PDU to a Power Source • 9
- Connecting the PXE to a Computer • 11, 330
- Connecting the PXE to Your Network • 12
- Connection Ports • 28
- Controlling Actuators • xv, 172
- Copying the PXE Configuration • xv, 175
- Creating a Certificate Signing Request • 102
- Creating a Role • 81, 84, 281
- Creating a Self-Signed Certificate • 104
- Creating a User Profile • 36, 65, 78, 82, 83, 84, 187, 269
- Creating Actions • xiv, 52, 122, 138, 149
- Creating an Event Rule • 122
- Creating Firewall Rules • xiv, 87, 89
- Creating Role-Based Access Control Rules • xiv, 97, 98
- Creating Rules • xiv, 133

D

- Data Pane • 45
- Date and Time Settings • 203
- dcTrack • xv, 342
- dcTrack Overview • 343
- Deassertion Hysteresis Example for Temperature Sensors • 357
- Default Log Messages • xiv, 96, 127, 139

- Default Measurement Units • 203
- Deleting a Firewall Rule • 252
- Deleting a Role • 86, 285
- Deleting a Role-Based Access Control Rule • 264
- Deleting a User Profile • 82, 278
- Deleting an Event Rule or Action • 150
- Deleting Authentication Server Settings • 113
- Deleting Firewall Rules • 92
- Deleting Ping Monitoring Settings • 155
- Deleting Role-Based Access Control Rules • 101
- Describing the Sensor or Actuator's Location • 162, 164
- Determining the Time Setup Method • 243
- Device Management • 53
- Diagnostic Commands • 319
- Different CLI Modes and Prompts • 194, 195, 197, 219, 220, 221, 314, 319
- Disabling an Inlet (for Multi-Inlet PDUs) • xiv, 118
- Disabling External Authentication • 113
- Disabling the Automatic Management Function • xv, 160, 172, 223
- Displaying PDU Information • 54, 115
- Downloading Diagnostic Information • 178
- Downloading Key and Certificate Files • 106
- Downloading SNMP MIB • 67, 187, 188, 189
- DPX Sensor Packages • xiii, 18
- DPX2 Sensor Packages • xiii, 18, 23
- DX Sensor Packages • xiii, 18, 25, 132

E

- Editing Authentication Server Settings • 112
- Editing Firewall Rules • 91
- Editing Ping Monitoring Settings • 155
- Editing Role-Based Access Control Rules • 100
- Email and SMS Message Placeholders • xiv, 127, 128, 132, 144
- Enabling and Editing the Security Banner • xiv, 96
- Enabling Data Logging • 74
- Enabling External and Local Authentication Services • 114
- Enabling IPv4 or IPv6 • 225
- Enabling Login Limitations • 94
- Enabling or Disabling a User Profile • 272
- Enabling or Disabling an Inlet (for Multi-Inlet PDUs) • 267

- Enabling or Disabling Data Logging • 221
 - Enabling or Disabling EnergyWise • 311
 - Enabling or Disabling Modbus • 241
 - Enabling or Disabling Peripheral Device Auto Management • 223
 - Enabling or Disabling SNMP v1/v2c • 239
 - Enabling or Disabling SNMP v3 • 239
 - Enabling or Disabling SSH • 238
 - Enabling or Disabling Strong Passwords • 257
 - Enabling or Disabling Telnet • 237
 - Enabling or Disabling the Read-Only Mode • 241
 - Enabling or Disabling the Restricted Service Agreement • 252
 - Enabling or Disabling the Service Advertisement • 242
 - Enabling Password Aging • 95
 - Enabling Service Advertisement • xiii, 68, 242
 - Enabling SNMP • 74, 186
 - Enabling Strong Passwords • 95
 - Enabling the Feature • xiv, 97
 - Enabling the Firewall • 87
 - Enabling User Blocking • 93
 - EnergyWise Configuration Commands • 311
 - EnergyWise Settings • 214
 - Entering Configuration Mode • 195, 220, 270, 278
 - Entering Diagnostic Mode • 195, 319
 - Environmental Sensor Configuration Commands • 286
 - Environmental Sensor Default Thresholds • 211
 - Environmental Sensor Information • 204
 - Environmental Sensor Package Information • 206
 - Environmental Sensor Threshold Information • 210
 - Environmental Sensors and Actuators • xiv, 156
 - Equipment Setup Worksheet • 9, 326
 - Event Log • 215
 - Event Rules and Actions • xiv, 66, 75, 119, 121, 154, 188
 - Example • 245, 253, 270, 278
 - Example - Actuator Naming • 311
 - Example - Creating a Role • 285
 - Example - Inlet Naming • 268
 - Example - OCP Naming • 268
 - Example - Outlet Naming • 266
 - Example - Ping Command • 322
 - Example - Setting Up EnergyWise • 313
 - Example - Turning On a Specific Actuator • 316
 - Example 1 • 148
 - Example 1 - Basic Security Information • 217
 - Example 1 - Combination of IP, Subnet Mask and Gateway Parameters • 313
 - Example 1 - Creating a User Profile • 280
 - Example 1 - Environmental Sensor Naming • 290
 - Example 1 - IPv4 Firewall Control Configuration • 264
 - Example 1 - Networking Mode • 242
 - Example 1 - PDU Naming • 224
 - Example 1 - Time Setup Method • 246
 - Example 1 - Warning Thresholds for Inlet Sensors • 308
 - Example 2 • 148
 - Example 2 - Adding an IPv4 Firewall Rule • 265
 - Example 2 - Combination of Upper Critical and Upper Warning Settings • 314
 - Example 2 - Data Logging Enabled • 224
 - Example 2 - Enabling Both IP Protocols • 243
 - Example 2 - In-Depth Security Information • 218
 - Example 2 - Modifying a User's Roles • 281
 - Example 2 - Primary NTP Server • 246
 - Example 2 - Sensor Threshold Selection • 290
 - Example 2 - Upper Critical Threshold for a Temperature Sensor • 308
 - Example 3 - Basic PDU Information • 218
 - Example 3 - Default Measurement Units • 281
 - Example 3 - Static IPv4 Configuration • 243
 - Example 3 - User Blocking • 265
 - Example 4 - Adding an IPv4 Role-based Access Control Rule • 266
 - Example 4 - In-Depth PDU Information • 219
 - Examples • 217, 224, 242, 245, 264, 280, 289, 308
 - Existing Roles • 214
 - Existing User Profiles • 203, 213
 - Expanding the Tree • 41, 42, 115, 117, 172
- ## F
- Filling Out the Equipment Setup Worksheet • 9
 - Firewall Control • 246
 - Firmware Update via SCP • xv, 179, 180
 - Firmware Update via Web Interface • 179, 180
 - Firmware Upgrade • 175, 178
 - Forcing a Password Change • 272
 - Forcing HTTPS Encryption • 86, 101

Full Disaster Recovery • 182

G

Gathering the External Authentication Information • 107
 Gathering the LDAP Information • 107
 Gathering the RADIUS Information • xiv, 108

H

Help Command • 196
 History Buffer Length • 217
 How to Use the Calendar • 70

I

Identifying Environmental Sensors and Actuators • xiv, 157, 160
 Identifying Sensor or Actuator Channels • xiv, 161
 Idle Timeout • 255
 Initial Network Configuration via CLI • 12, 44, 330
 Inlet and Overcurrent Protector Management • 115
 Inlet Configuration Commands • 267
 Inlet Information • 201
 Inlet Pole Sensor Threshold Information • 208
 Inlet Sensor Threshold Information • 207
 Installation and Configuration • 8
 Installing a CA-Signed Certificate • 103
 Installing Cable Retention Clips on Outlets (Optional) • 16
 Installing Existing Key and Certificate Files • 105
 Installing the USB-to-Serial Driver (Optional) • 10, 11
 Integration • 340
 Internal Beeper State • xiii, 78
 Introduction • 1
 Introduction to the Web Interface • 40
 IP Configuration • 198

L

LAN Interface Settings • 198
 Layout • 190
 LDAP Configuration Illustration • 110, 332
 LED Display • 29
 LEDs for Measurement Units • 30, 31
 Listing TCP Connections • 178

Locking Outlets and Cords • xv, 16, 345
 Log an Event Message • 123, 126
 Logging in to CLI • 193, 330
 Logging in to the Web Interface • 36
 Logging out of CLI • 195
 Login • xiii, 36
 Login Limitation • 254
 Logout • 39
 Logout Button • 45
 Lowercase Character Requirement • 257

M

MAC Address • 10, 345
 Managing Environmental Sensors or Actuators • xiv, 25, 157, 160
 Managing Event Logging • 151
 Managing Firewall Rules • 248
 Managing Role-Based Access Control Rules • 261
 Manual Mode • 31
 Matching the Position • xiv, 157, 159
 Matching the Serial Number • xiv, 157, 158
 Maximum Ambient Operating Temperature • 9, 324
 Maximum Password History • 259
 Maximum Password Length • 257
 Menus • 41
 Minimum Password Length • 257
 Modifying a Firewall Rule • 250
 Modifying a Role • 81, 82, 84, 283
 Modifying a Role-Based Access Control Rule • 262
 Modifying a User Profile • 38, 81, 84, 269
 Modifying a User's Personal Data • 271
 Modifying an Action • 67, 150
 Modifying an Event Rule • 149
 Modifying Firewall Control Parameters • 247
 Modifying IPv4 Settings • xiii, 57
 Modifying IPv6 Settings • xiii, 59
 Modifying Network Service Settings • 63, 192, 194
 Modifying Network Settings • 44, 56, 68, 334
 Modifying Role-Based Access Control Parameters • 259
 Modifying SNMPv3 Settings • 273
 Modifying the Network Configuration • 55
 Modifying the Network Interface Settings • 56
 Monitoring Server Accessibility • 153
 Monitoring the Inlet • 116
 More Information • 46

- More Information about AD Configuration • 110
- Mounting 1U Models Using L-Brackets and Buttons • 3
- Mounting Zero U Models Using L-Brackets and Buttons • 6
- Mounting Zero U Models Using Two Rear Buttons • 4
- Multi-Command Syntax • 248, 254, 256, 260, 269, 271, 273, 276, 279, 313

N

- Naming Outlets • 114
- Naming Overcurrent Protectors • 117
- Naming the Inlet • 116
- Naming the PDU • 41, 42, 43, 44, 55, 73, 77, 163, 172
- Network Configuration • 198
- Network Configuration Commands • 224
- Network Diagnostics • 177
- Network Service Settings • 199
- Network Troubleshooting • 177, 319
- Networking Mode • 199
- Numeric Character Requirement • 258

O

- Outlet Configuration Commands • 266
- Outlet Information • 200
- Outlet Management • 114
- Outlets • 27
- Overcurrent Protector Configuration Commands • 268
- Overcurrent Protector Information • 202
- Overriding DHCP-Assigned NTP Servers • 244
- Overriding the IPv4 DHCP-Assigned DNS Server • 228, 229
- Overriding the IPv6 DHCP-Assigned DNS Server • 232, 233

P

- Package Contents • 1, 8
- Panel Components • 27
- Password Aging • 255
- Password Aging Interval • 255
- PDU Configuration • 200
- PDU Configuration Commands • 221
- Pinging a Host • 177
- Power Cord • 27

- Power IQ Configuration • 340
- Preparing the Installation Site • 8
- Product Models • 1
- PX Explorer Pane • 41

Q

- Querying Available Parameters for a Command • 196, 197
- Querying DNS Servers • 320
- Quitting Configuration Mode • 220, 253
- Quitting Diagnostic Mode • 319

R

- Rackmount Safety Guidelines • 2
- Rack-Mounting the PDU • 2
- Raritan Training Website • xv, 350
- Rebooting the PXE Device • 77
- Reliability Data • 216
- Reliability Error Log • 216
- Remembering User Names and Passwords • xiii, 38
- Reserving IP Addresses in Windows DHCP Servers • xv, 351
- Reset Button • 32
- Resetting Active Energy Readings • 318
- Resetting All Active Energy Readings • xiii, 77, 118
- Resetting Inlet Active Energy Readings • xiv, 77, 117
- Resetting the Button-Type Circuit Breaker • 32
- Resetting the Handle-Type Circuit Breaker • 33
- Resetting the PXE • 317
- Resetting to Factory Defaults • 318, 330
- Resizing a Dialog • 49
- Restarting the PDU • 317
- Restricted Service Agreement • 252
- Retrieving Previous Commands • 322
- Retrieving Software Packages Information • 182
- Role Configuration Commands • 281
- Role of a DNS Server • 63, 334
- Role-Based Access Control • 259
- RS-485 Port Pinouts • 324

S

- Safety Guidelines • ii
- Safety Instructions • iii, 9
- Sample Event Rules • 147

- Sample Inlet-Level Event Rule • 147
- Sample PDU-Level Event Rule • 147
- Saving the PXE Configuration • 174
- Scheduling an Action • xiv, 137
- SecureLock™ Outlets and Cords • 346
- Security Configuration Commands • 246
- Security Settings • 212
- Selecting IPv4 or IPv6 Addresses • 226
- Selecting the Internet Protocol • 57, 59
- Send an SNMP Notification • 67, 123, 128
- Send EMail • 123, 127, 139
- Send Sensor Report • 123, 131
- Sensor RJ-12 Port Pinouts • 324
- Sensor Threshold Configuration Commands • 290
- Sensor Threshold Settings • xv, 119, 163, 351
- Setting Data Logging • 74, 221, 222
- Setting Data Logging Measurements Per Entry • 222
- Setting Default Measurement Units • xiii, 73, 83, 276, 279
- Setting Inlet Thresholds • 119
- Setting IPv4 Static Routes • 230
- Setting IPv6 Static Routes • 234
- Setting LAN Interface Parameters • 234
- Setting Network Service Parameters • 235
- Setting NTP Parameters • 243
- Setting Power Thresholds • 47, 119, 191
- Setting the Alarmed to Normal Delay for DX-PIR • 289
- Setting the Automatic Daylight Savings Time • 245
- Setting the Date and Time • 69
- Setting the EnergyWise Configuration • 76
- Setting the History Buffer Length • 313
- Setting the HTTP Port • 236
- Setting the HTTPS Port • 237
- Setting the Inlet Pole's Assertion Timeout • 302
- Setting the Inlet Pole's Deassertion Hysteresis • 301
- Setting the Inlet's Assertion Timeout • 296
- Setting the Inlet's Deassertion Hysteresis • 295
- Setting the Inlet's Lower Critical Threshold • 293
- Setting the Inlet's Lower Warning Threshold • 294
- Setting the Inlet's Upper Critical Threshold • 291
- Setting the Inlet's Upper Warning Threshold • 292
- Setting the IPv4 Address • 227
- Setting the IPv4 Configuration Mode • 226
- Setting the IPv4 Gateway • 228
- Setting the IPv4 Preferred Host Name • 227
- Setting the IPv4 Primary DNS Server • 228
- Setting the IPv4 Secondary DNS Server • 229
- Setting the IPv4 Subnet Mask • 227
- Setting the IPv6 Address • 232
- Setting the IPv6 Configuration Mode • 231
- Setting the IPv6 Gateway • 232
- Setting the IPv6 Preferred Host Name • 231
- Setting the IPv6 Primary DNS Server • 232
- Setting the IPv6 Secondary DNS Server • 233
- Setting the Lower Critical Threshold for an Inlet Pole • 299
- Setting the Lower Warning Threshold for an Inlet Pole • 300
- Setting the Networking Mode • 224
- Setting the Polling Interval • 312
- Setting the Sensor's Assertion Timeout • 307
- Setting the Sensor's Deassertion Hysteresis • 306
- Setting the Sensor's Lower Critical Threshold • 304
- Setting the Sensor's Lower Warning Threshold • 305
- Setting the Sensor's Upper Critical Threshold • 303
- Setting the Sensor's Upper Warning Threshold • 304
- Setting the SNMP Configuration • 239
- Setting the SNMP Read Community • 240
- Setting the SNMP Write Community • 240
- Setting the sysContact Value • 240
- Setting the sysLocation Value • 241
- Setting the sysName Value • 240
- Setting the Time Zone • 245
- Setting the Upper Critical Threshold for an Inlet Pole • 296
- Setting the Upper Warning Threshold for an Inlet Pole • 298
- Setting the X Coordinate • 287, 309
- Setting the Y Coordinate • 287, 309
- Setting the Z Coordinate • 223, 288, 310
- Setting the Z Coordinate Format • 163
- Setting the Z Coordinate Format for Environmental Sensors • 223, 288, 310
- Setting Thresholds for Multiple Sensors • xiv, 163, 166

- Setting Up an SSL Certificate • 86, 101
- Setting Up External Authentication • xiv, 63, 86, 106
- Setting Up Role-Based Access Control Rules • 97
- Setting Up Roles • 38, 74, 78, 81, 83
- Setting Up User Login Controls • 93
- Setting Up Your Preferred Measurement Units • xiii, 73, 81, 83
- Setup Button • 43
- Showing Information • 197
- Showing Network Connections • 320
- Single Login Limitation • 254
- SNMP Gets and Sets • 189
- SNMP Sets and Thresholds • 191
- Sorting Firewall Rules • 92
- Sorting Role-Based Access Control Rules • 100
- Sorting the Access Order • 112
- Special Character Requirement • 259
- Specifications • 2, 324
- Specifying the Agreement Contents • 253
- Specifying the Device Altitude • 73, 222
- Specifying the EnergyWise Domain • 311
- Specifying the EnergyWise Secret • 312
- Specifying the Primary NTP Server • 244
- Specifying the Secondary NTP Server • 244
- Specifying the Sensor Type • 286
- States of Managed Actuators • xiv, 171
- States of Managed Sensors • 168
- Static Route Examples • xiii, 58, 59, 61
- Status Bar • xiii, 43
- Step A. Determine User Accounts and Groups • 332
- Step B. Configure User Groups on the AD Server • 333
- Step C. Configure LDAP Authentication on the PXE Device • 334
- Step D. Configure User Groups on the PXE Device • 336
- Strong Passwords • 256
- Supported Maximum DPX Sensor Distances • 18, 22
- Supported Web Browsers • xiii, 35
- Switch Peripheral Actuator • 123, 132
- Switching Off the Actuator(s) • 316
- Switching On the Actuator(s) • 315
- Syslog Message • 123, 130

T

- Testing the Network Connectivity • 321

- Testing the Server Connection • 112
- The PXE MIB • 189
- The Yellow- or Red-Highlighted Sensors • 46, 51, 52, 116, 119, 167
- Three-Digit Row • 29
- Thresholds and Sensor States • 352
- Time Configuration Commands • 243
- Tracing the Network Route • 177
- Tracing the Route • 322
- Truncated Data in the Web Interface • xv, 350
- Two-Digit Row • 30

U

- Unbalanced Current Calculation • xv, 348
- Unblocking a User • 93, 317
- Unmanaging Environmental Sensors or Actuators • xv, 25, 161, 171
- Unpacking the Product and Components • 8
- Updating the PXE Firmware • xv, 179
- Uppercase Character Requirement • 258
- User Blocking • 256
- User Configuration Commands • 268
- User Management • 78
- Using a Raritan Y cable • 21
- Using an Optional Sensor Hub • 19
- Using Default Thresholds • 289
- Using SNMP • 180, 185
- Using the CLI Command • xv, 318, 330
- Using the Command Line Interface • xv, 63, 164, 192, 330
- Using the PDU • xiii, 27
- Using the Web Interface • 12, 35

V

- Viewing Connected Users • 152
- Viewing Firmware Update History • 181
- Viewing Sensor or Actuator Data • 167
- Viewing the Dashboard • 51
- Viewing the Local Event Log • 151

W

- Warning Icon • 46
- What's New in the PXE User Guide • xiii
- Windows NTP Server Synchronization Solution • xiii, 70, 72
- With HyperTerminal • 193, 317
- With SSH or Telnet • 194

[Index](#)

Z

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