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# Junos<sup>®</sup> OS for EX Series Ethernet Switches, Release 11.4: Power over Ethernet



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Published: 2011-11-16  
Revision 1

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Writing:  
Editing:  
Illustration:  
Cover Design:

Revision History  
November 2011—Revision 1

The information in this document is current as of the date listed in the revision history.

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## How to Use This Guide

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Complete documentation for the EX Series product family is provided on webpages at [http://www.juniper.net/techpubs/en\\_US/release-independent/information-products/pathway-pages/ex-series/product/index.html](http://www.juniper.net/techpubs/en_US/release-independent/information-products/pathway-pages/ex-series/product/index.html). We have selected content from these webpages and created a number of EX Series guides that collect related topics into a book-like format so that the information is easy to print and easy to download to your local computer.

Software features for EX Series switches are listed by platform and by Junos OS release in a standalone document. See [EX Series Switch Software Features Overview](#).

The release notes are at [http://www.juniper.net/techpubs/en\\_US/junos11.4/information-products/topic-collections/release-notes/11.4/junos-release-notes-11.4.pdf](http://www.juniper.net/techpubs/en_US/junos11.4/information-products/topic-collections/release-notes/11.4/junos-release-notes-11.4.pdf).

## List of EX Series Guides for Junos OS Release 11.4

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Title	Description
<i>Complete Hardware Guide for EX2200 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX2200 Ethernet switches
<i>Complete Hardware Guide for EX3200 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX3200 Ethernet switches
<i>Complete Hardware Guide for EX3300 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX3300 Ethernet switches

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Title	Description
<i>Complete Hardware Guide for EX4200 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX4200 Ethernet switches
<i>Complete Hardware Guide for EX4500 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX4500 Ethernet switches
<i>Complete Hardware Guide for EX6210 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX6210 Ethernet switches
<i>Complete Hardware Guide for EX8208 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8208 Ethernet switches
<i>Complete Hardware Guide for EX8216 Ethernet Switches</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for EX8216 Ethernet switches
<i>Complete Hardware Guide for the XRE200 External Routing Engine</i>	Component descriptions, site preparation, installation, replacement, and safety and compliance information for the XRE200 External Routing Engine
<i>Complete Software Guide for Junos® OS for EX Series Ethernet Switches, Release 11.4</i>	Software feature descriptions, configuration examples, and tasks for Junos OS for EX Series switches
<b>Software Topic Collections</b>	Software feature descriptions, configuration examples and tasks, and reference pages for configuration statements and operational commands (This information also appears in the <i>Complete Software Guide for Junos® OS for EX Series Ethernet Switches, Release 11.4.</i> )
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Access and User Management</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Access Control</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Configuration Management</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Class of Service</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Device Security</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Ethernet Switching</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: EX3300, EX4200, and EX4500 Virtual Chassis</i>	





Title	Description
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: EX8200 Virtual Chassis</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Fibre Channel over Ethernet</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: High Availability</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Interfaces</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Layer 3 Protocols</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: MPLS</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Multicast</i>	
<i>Junos® OS for EX Series Switches, Release 11.4: Network Management and Monitoring</i>	
<i>Junos® OS for EX Series Switches, Release 11.4: Port Security</i>	
<i>Junos® OS for EX Series Switches, Release 11.4: Power over Ethernet</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Routing Policy and Packet Filtering</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Software Installation</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: Spanning-Tree Protocols</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: System Monitoring</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: System Services</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: System Setup</i>	
<i>Junos® OS for EX Series Ethernet Switches, Release 11.4: User Interfaces</i>	

## Downloading Software

You can download Junos OS for EX Series switches from the Download Software area at <http://www.juniper.net/customers/support/> . To download the software, you must

have a Juniper Networks user account. For information about obtaining an account, see <http://www.juniper.net/entitlement/setupAccountInfo.do>.

## Documentation Symbols Key

Notice Icons		
Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
Text and Syntax Conventions		
Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b>  No alarms currently active
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces important new terms.</li> <li>Identifies book names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS System Basics Configuration Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
Plain text like this	Represents names of configuration statements, commands, files, and directories; IP addresses; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols <b>ospf area area-id</b>] hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>



Text and Syntax Conventions		
Convention	Description	Examples
< > (angle brackets)	Enclose optional keywords or variables.	<code>stub &lt;default-metric <i>metric</i>&gt;;</code>
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<code>broadcast   multicast</code> <code>(<i>string1</i>   <i>string2</i>   <i>string3</i>)</code>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<code>rsvp { # Required for dynamic MPLS only</code>
[ ] (square brackets)	Enclose a variable for which you can substitute one or more values.	<code>community name members [ <i>community-ids</i> ]</code>
Indentation and braces ( { } )	Identify a level in the configuration hierarchy.	<pre>[edit] routing-options {   static {     route default {       nexthop <i>address</i>;       retain;     }   } }</pre>
; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
J-Web GUI Conventions		
<b>Bold text like this</b>	Represents J-Web graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>
> (bold right angle bracket)	Separates levels in a hierarchy of J-Web selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. Send e-mail to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net) with the following:

- Document URL or title
- Page number if applicable
- Software version
- Your name and company

## Requesting Technical Support

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Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

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- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/> .
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications: <https://www.juniper.net/alerts/>
- Join and participate in the Juniper Networks Community Forum: <http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

## Opening a Case with JTAC

You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/> .
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html> .

## PART 1

# Power over Ethernet

- [Power over Ethernet \(PoE\)—Overview on page 3](#)
- [Examples: PoE Configuration on page 9](#)
- [Configuring PoE on page 25](#)
- [Administering PoE on page 33](#)
- [Troubleshooting PoE Configuration on page 43](#)
- [Configuration Statements for PoE on page 45](#)
- [Operational Commands for PoE on page 61](#)



# Power over Ethernet (PoE)—Overview

- [PoE and EX Series Switches Overview on page 3](#)

## PoE and EX Series Switches Overview

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Power over Ethernet (PoE) permits electric power, along with data, to be passed over a copper Ethernet LAN cable. Powered devices, such as voice over IP (VoIP) telephones, wireless access points, video cameras, and point-of-sale devices, that support PoE can receive power safely from the same access ports that are used to connect personal computers to the network.

This topic describes PoE on Juniper Networks EX Series Ethernet Switches.

It covers:

- [PoE, PoE+, and Enhanced PoE on page 3](#)
- [PoE Power Management on page 4](#)

## PoE, PoE+, and Enhanced PoE

PoE was first defined in the IEEE 802.3af standard. In this standard, the amount of power that can be supplied to a powered device is limited to 15.4 W. A later standard, IEEE 802.3at, defined PoE+, which increases the amount of power to 30 W. The PoE+ standard provides support for legacy PoE devices—an IEEE 802.3af powered device can operate normally when connected to IEEE 802.3at (PoE+) power sourcing equipment.

Beginning at Juniper Networks Junos operating system (Junos OS) Release 11.1, Juniper Networks provides enhanced PoE on EX3200 and EX4200 switches. Enhanced PoE is a Juniper Networks extension to the IEEE 802.3af standard that allows up to 18.6 W per PoE port.

[Table 1 on page 3](#) lists EX Series switches and line cards and the version of PoE they support.

Table 1: PoE Version Support

Switch or Line Card	PoE Version
EX2200 switch	PoE+ (IEEE 802.3at)

Table 1: PoE Version Support (*continued*)

Switch or Line Card	PoE Version
EX3200 switch	Enhanced PoE
EX3300 switch	PoE+ (IEEE 802.3at)
EX4200 switch—P and T models (EX4200-24P, EX4200-24T, EX4200-48P, EX4200-48T)	Enhanced PoE
EX4200 switch—PX models (EX4200-24PX and EX4200-48PX)	PoE+ (IEEE 802.3at)
EX6200-48P (48-port PoE+) line card	PoE+ (IEEE 802.3at)
EX8200-2XS-40P (40-port PoE+ with 4-port SFP and 2-port SFP+) line card	PoE+ (IEEE 802.3at)—Ports 0 through 11
EX8200-48PL (2-port SFP+ and 48-port PoE+ 20 Gbps) line card	PoE (IEEE 802.3af)—Remaining PoE ports



**NOTE:** This topic and its related topics use the term PoE as a generic term to refer to PoE, PoE+, and enhanced PoE.

## PoE Power Management

A switch or line card that supports PoE has a PoE controller that keeps track of the PoE power consumption on the switch and allocates power to the PoE ports. The following factors determine how the PoE controller allocates power to the PoE ports:

- [PoE Power Budget on page 4](#)
- [Power Management Mode on page 6](#)
- [PoE Interface Power Priority on page 7](#)

### PoE Power Budget

The PoE power budget is the total amount of power that the PoE controller has available to allocate to its PoE ports. The PoE controller cannot exceed its PoE power budget and does not allocate power to a PoE port if the allocation would exceed the PoE power budget.

How the PoE power budget is determined depends on the switch model:

- [PoE Power Budget on EX2200, EX3200, EX3300, and EX4200 Switches on page 5](#)
- [PoE Power Budget on EX6200 and EX8200 Switches on page 5](#)

**PoE Power Budget on EX2200, EX3200, EX3300, and EX4200 Switches**

The PoE power budget on EX2200, EX3200, EX3300, and EX4200 switches varies according to switch model and the capacities of power supplies installed. For example:

- A 24-port or 48-port EX2200 switch, with its fixed power supply of 550 W, has a set PoE budget of 405 W.
- A 12-port EX2200-C switch, with its fixed power supply of 180 W, has a set PoE budget of 100 W.
- An EX3200 switch with a 320 W power supply installed has a PoE power budget of 130 W, while an EX3200 switch with a 600 W power supply installed has a PoE power budget of 410 W.

Use the `show poe controller` command to display a switch's PoE power budget.

If your switch supports power supplies of different capacities, keep the following points in mind:

- If you change your existing power supply to a lower-capacity power supply, the PoE power budget might no longer be sufficient to power all the PoE ports on the switch.
- If your switch supports redundant power supplies and you have installed power supplies of different capacities, the PoE power budget is based on the wattage of the lower-capacity power supply.
- You cannot increase the number of PoE-capable ports on a switch by installing a larger power supply.

**PoE Power Budget on EX6200 and EX8200 Switches**

For EX6200 and EX8200 switches, each line card that supports PoE has its own PoE controller and PoE power budget. The PoE power budget is allocated to a line card by the switch power management. Because EX6200 and EX8200 switches can differ in the number and capacity of power supplies installed and in the number and types of line cards installed, the amount of power available for PoE power can vary for different switches of the same model.

Power management allocates PoE power to line cards that support PoE only after it has allocated base power to and powered on all line cards. It then allocates the remaining power to the PoE power budgets of PoE line cards in order of line card power priority. (In a default configuration, power priority is determined by line card slot number, with slot 0 having the highest priority.) If the remaining power is insufficient to provide PoE power to all PoE line cards, a low priority line card might receive no PoE power or partial PoE power.

By default, power management allocates enough PoE power to a line card to power all PoE ports at their maximum supported power. If the connected powered devices require less power than that, you can configure a smaller PoE power budget for the line card. For example, power management normally allocates 915 W of PoE power to a 48-port PoE+ 20 Gbps (EX8200-48PL) line card. If the connected powered devices consume no more than a total of 250 W, you can set the PoE power budget for the line card to 250

W. Doing so frees up 665 W, which then can be used to fulfill the PoE power needs of lower-priority line cards.

Power management adjusts PoE power allocations as power availability and demand in a switch changes. As a general rule, power management allocates power to powering line cards before it allocates PoE power. For example, if you add a line card and there is insufficient power available to power it on, power management reduces the PoE power it provides to line cards, starting with the lowest priority line card, until it frees up enough power to power on the new line card. When power management reduces the PoE power budget for a line card because of insufficient power, it logs a message in the system log.

Note that the actual power consumed by the powered devices does not affect power management's power allocation for a line card. If you have set the PoE budget for a line card to 500 W, power management allocates 500 W even if the powered devices are consuming less power than that. Similarly, the PoE power budget is not increased if you add additional powered devices: if the powered devices require more than the 500 W PoE budget you have configured, lower priority devices will not receive power.

You can display the switch power budget maintained by power management, including its PoE power allocations, by using the **show chassis power-budget-statistics** command. You can also display the PoE power budget for each line card in a switch by using the **show poe controller** command.

For more information on how power management allocates power, including PoE power, see Understanding Power Management on EX Series Switches.

### Power Management Mode

EX Series switches support two power management modes: class (the default) and static. The mode you configure for your switch determines how the maximum power for a PoE interface is derived and how power is allocated to the PoE interfaces:

- Class mode—In this mode, the maximum power for an interface is determined by the class of connected powered device. [Table 2 on page 6](#) lists the classes of powered devices and associated power levels.

**Table 2: Class of Powered Device and Power Levels**

Standard	Class	Maximum Power Delivered by PoE Port	Power Range of Powered Device
IEEE 802.3af (PoE) and IEEE 802.3at (PoE+)	0	15.4 W	0.44 through 12.95 W
	1	4.0 W	0.44 through 3.84 W
	2	7.0 W	3.84 through 6.49 W
	3	15.4 W	6.49 through 12.95 W
IEEE 802.3at (PoE+)	4	30.0 W	12.95 through 25.5 W



To account for line loss, the power range of the powered device is less than the maximum power delivered at the PoE port for each class. Line loss is influenced by cable length, quality, and other factors and is typically less than 16 percent.

The powered device communicates to the PoE controller which class it belongs to when it is connected. The PoE controller then allocates to the interface the maximum power required by the class (see [Table 2 on page 6](#)). It does not allocate power to an interface until a powered device is connected. Class 0 is the default class for powered devices that do not provide class information. Class 4 powered devices are supported only by PoE ports that support IEEE 802.3at (PoE+).

- **Static mode**—In this mode, you specify the maximum power for each PoE interface. The PoE controller then allocates this amount of power to the interface from its total budget. For example, if you specify a maximum value of 8.0 W for **ge-0/0/3**, the PoE controller allocates 8.0 W out of its total power budget for the interface. This amount is allocated to the interface whether or not a powered device is connected to the interface or whether the connected powered device uses less power than 8.0 W.

Because of line loss, the power received by the powered device can be less than the power available at the PoE port. [Table 3 on page 7](#) shows the maximum power available at a PoE port and the resulting power guaranteed to the powered device.

**Table 3: Maximum Power Per Port in Static Mode**

Switch or Line Card	Maximum Power Delivered by PoE Port	Guaranteed Power to Powered Devices
EX2200 switches, EX3300 switches, and EX4200 PX model switches	30 W	25.5 W
EX3200 switches and EX4200 P and T model switches running Junos OS Release 10.4 or earlier	15.4 W	12.95 W
EX3200 switches and EX4200 P and T model switches running Junos OS Release 11.1 or later	18.6 W <b>NOTE:</b> Switches that are upgraded to Junos OS Release 11.1 from a previous release require an upgrade of the PoE controller software to obtain 18.6 W.	15.64 W
EX6200-48P line cards	30 W	25.5 W
EX8200-2XS-40P line cards and EX8200-48PL line cards	30 W (ports 0 through 11)	25.5 W
	15.4 W (remaining PoE ports)	12.95 W

In both class and static mode, if the power consumption of a powered device exceeds the maximum power allocated to the interface, the switch turns off power to the interface.

### PoE Interface Power Priority

You can configure a PoE interface to have either a high or low power priority. The power priority determines which interfaces receive power if PoE power demands are greater than the PoE power budget. If the total power allocated for all interfaces exceeds the

switch budget, PoE power to lower-priority interfaces is turned off and the power allocated to those interfaces drops to 0. Thus you should set interfaces that connect to critical powered devices, such as security cameras and emergency phones, to high priority.

Among PoE interfaces that have the same assigned priority, power priority is determined by the port number, with lower-numbered ports having higher priority.

For EX6200 and EX8200 switches, interface power priority determines the relative priority of the interfaces on a line card, not on the switch as a whole. The relative priority of interfaces residing on different line cards is determined by line card priority. For example, if line card 1 has a higher power priority than line card 2 and a power shortage occurs, power is removed from the PoE interfaces in this order:

- Low priority interfaces on line card 2
- High priority interfaces on line card 2
- Low priority interfaces on line card 1
- High priority interfaces on line card 1

**Related  
Documentation**

- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16](#)
- [Upgrading the PoE Controller Software for Enhanced PoE Support on page 40](#)

## CHAPTER 2

# Examples: PoE Configuration

- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16](#)

### Example: Configuring PoE Interfaces on an EX Series Switch

Power over Ethernet (PoE) ports supply electric power over the same ports that are used to connect network devices and allow you to plug in devices that require both network connectivity and electric power, such as voice over IP (VoIP) phones, wireless access points, and some IP cameras.

You do not need to configure PoE unless you wish to modify the default values or disable PoE on a specific interface.

This example describes a default configuration of PoE interfaces on an EX Series switch:

- [Requirements on page 9](#)
- [Overview and Topology on page 10](#)
- [Configuration on page 10](#)
- [Verification on page 11](#)

### Requirements

This example uses the following software and hardware components:

- Junos OS Release 9.0 or later for EX Series switches
- One EX Series switch that supports PoE

Before you configure PoE, be sure you have:

- Performed the initial switch configuration. See [Connecting and Configuring an EX Series Switch \(CLI Procedure\)](#) or [Connecting and Configuring an EX Series Switch \(J-Web Procedure\)](#) for details.

## Overview and Topology

The topology used in this example consists of a switch that has 24 ports. Eight of the ports support PoE (IEEE 802.3af), which means they provide both network connectivity and electric power for powered devices such as VoIP telephones, wireless access points, and IP security cameras that require 12.95 W or less. The remaining 16 ports provide only network connectivity. You use the standard ports to connect devices that have their own power sources, such as desktop and laptop computers, printers, and servers. [Table 4 on page 10](#) details the topology used in this configuration example.

**Table 4: Components of the PoE Configuration Topology**

Property	Settings
Switch hardware	EX Series switch with 24 Gigabit Ethernet ports: 8 PoE interfaces ( <b>ge-0/0/0</b> through <b>ge-0/0/7</b> ) and 16 non-PoE interfaces ( <b>ge-0/0/8</b> through <b>ge-0/0/23</b> )
VLAN name	<b>default</b>
Connection to a wireless access point (requires PoE)	<b>ge-0/0/0</b>
Connections to Avaya IP telephones with integrated hubs that allow phone and desktop PC to connect to a single port (requires PoE)	<b>ge-0/0/1</b> through <b>ge-0/0/7</b>
Direct connections to desktop PCs, file servers, integrated printer/fax/copier machines (no PoE required)	<b>ge-0/0/8</b> through <b>ge-0/0/20</b>
Unused ports (for future expansion)	<b>ge-0/0/21</b> through <b>ge-0/0/23</b>

## Configuration

To enable the default PoE configuration on the switch:

### CLI Quick Configuration

To quickly enable the default configuration on the switch:

Simply connect the powered devices to the PoE ports.

### Step-by-Step Procedure

To use the PoE interfaces with default values:

1. Make sure the switch is powered on.
2. Connect the wireless access point to interface **ge-0/0/0**.
3. Connect the Avaya phones to interfaces **ge-0/0/1** through **ge-0/0/7**.

## Verification

To verify that PoE interfaces have been created and are operational, perform this task:

- [Verifying That the PoE Interfaces Have Been Created on page 11](#)

### Verifying That the PoE Interfaces Have Been Created

**Purpose** Verify that the PoE interfaces have been created on the switch.

**Action** List all the PoE interfaces configured on the switch:

```
user@switch> show poe interface
```

Interface	Admin status	Oper status	Max power	Priority	Power consumption	Class
ge-0/0/0	Enabled	ON	15.4W	Low	7.9W	0
ge-0/0/1	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/2	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/3	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/4	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/5	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/6	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/7	Enabled	ON	15.4W	Low	3.2W	2

**Meaning** The **show poe interface** command lists PoE interfaces configured on the switch, with their status, priority, power consumption, and class. This output shows that eight interfaces have been created with default values and are consuming power at the expected rates.

- Related Documentation**
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
  - [Configuring PoE \(CLI Procedure\) on page 25](#)
  - [Troubleshooting PoE Interfaces on page 43](#)

## Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch

Power over Ethernet (PoE) ports supply electric power over the same ports that are used to connect network devices. These ports allow you to plug in devices that need both network connectivity and electric power, such as voice over IP (VoIP) phones, wireless access points, and some IP cameras.

By default, PoE ports on EX Series switches are set to low power priority. You can configure a PoE port to have a high power priority setting. If a situation arises where there is not sufficient power for all the PoE ports, the available power is directed to the higher priority ports, while power to the lower priority ports is shut down as needed. Thus you should set ports that connect to security cameras, emergency phones, and other high priority powered devices to high priority.

This example describes how to configure a few high priority PoE interfaces.

- [Requirements on page 12](#)
- [Overview and Topology on page 12](#)
- [Configuration on page 13](#)
- [Verification on page 15](#)

## Requirements

This example uses the following software and hardware components:

- Junos OS Release 9.0 or later for EX Series switches
- One EX Series switch that supports PoE

Before you configure PoE, be sure you have:

- Performed the initial switch configuration. See [Connecting and Configuring an EX Series Switch \(CLI Procedure\)](#) or [Connecting and Configuring an EX Series Switch \(J-Web Procedure\)](#) for details.

## Overview and Topology

The topology used in this example consists of a switch that has 24 ports. Eight of the ports support PoE (IEEE 802.3af), which means they provide both network connectivity and electric power for powered devices such as VoIP telephones, wireless access points, and IP security cameras that require 12.95 W or less. The remaining 16 ports provide only network connectivity. You use the standard ports to connect devices that have their own power sources, such as desktop and laptop computers, printers, and servers. [Table 5 on page 12](#) details the topology used in this configuration example.

**Table 5: Components of the PoE Configuration Topology**

Property	Settings
Switch hardware	Switch with 24 Gigabit Ethernet ports: 8 PoE interfaces ( <b>ge-0/0/0</b> through <b>ge-0/0/7</b> ) and 16 non-PoE interfaces ( <b>ge-0/0/8</b> through <b>ge-0/0/23</b> )
VLAN name	<b>default</b>
Connection to a wireless access point (requires PoE)	<b>ge-0/0/0</b>
Security IP Cameras (require PoE)	<b>ge-0/0/1</b> and <b>ge-0/0/2 high</b>
Emergency VoIP phone (requires PoE)	<b>ge-0/0/3 high</b>
VoIP phone in Executive Office (requires PoE)	<b>ge-0/0/4 high</b>
Other VoIP phones (require PoE)	<b>ge-0/0/5</b> through <b>ge-0/0/7</b>
Direct connections to desktop PCs, file servers, integrated printer/fax/copier machines (no PoE required)	<b>ge-0/0/8</b> through <b>ge-0/0/20</b>

Table 5: Components of the PoE Configuration Topology (*continued*)

Property	Settings
Unused ports (for future expansion)	ge-0/0/21 through ge-0/0/23

## Configuration

To configure PoE interfaces:

### CLI Quick Configuration

By default, PoE interfaces are created for all PoE ports and PoE is enabled. The default priority for PoE interfaces is **low**.

To quickly set some interfaces to high priority and to include descriptions of the interfaces, copy the following commands and paste them into the switch terminal window:

```
[edit]
set poe interface ge-0/0/1 priority high telemetries
set poe interface ge-0/0/2 priority high telemetries
set poe interface ge-0/0/3 priority high telemetries
set poe interface ge-0/0/4 priority high telemetries
set interfaces ge-0/0/0 description "wireless access point"
set interfaces ge-0/0/1 description "security camera front door"
set interfaces ge-0/0/2 description "security camera back door"
set interfaces ge-0/0/3 description "emergency phone"
set interfaces ge-0/0/4 description "Executive Office VoIP phone"
set interfaces ge-0/0/5 description "staff VoIP phone"
set interfaces ge-0/0/6 description "staff VoIP phone"
set interfaces ge-0/0/7 description "staff VoIP phone"
```

### Step-by-Step Procedure

To configure PoE interfaces with different priorities:

1. Set the interfaces connected to high priority powered devices to high priority. Include the **telemetries** statement for the high priority interfaces, thus enabling the logging of power consumption on those interfaces:

```
[edit poe]
user@switch# set interface ge-0/0/1 priority high telemetries
user@switch# set interface ge-0/0/2 priority high telemetries
user@switch# set interface ge-0/0/3 priority high telemetries
user@switch# set interface ge-0/0/4 priority high telemetries
```

2. Provide descriptions for the PoE interfaces:

```
[edit interfaces]
user@switch# set ge-0/0/0 description "wireless access point"
user@switch# set ge-0/0/1 description "security camera front door"
user@switch# set ge-0/0/2 description "security camera back door"
user@switch# set ge-0/0/3 description "emergency phone"
user@switch# set ge-0/0/4 description "Executive Office VoIP phone"
user@switch# set ge-0/0/5 description "staff VoIP phone"
user@switch# set ge-0/0/6 description "staff VoIP phone"
user@switch# set ge-0/0/7 description "staff VoIP phone"
```

3. Connect the wireless access point to interface **ge-0/0/0**. This interface uses the default PoE settings.
4. Connect the two security cameras to interfaces **ge-0/0/1** and **ge-0/0/2**. These interfaces are set to high priority with telemetries enabled.

5. Connect the emergency VoIP phone to interface **ge-0/0/3**. This interface is set to high priority with telemetries enabled.
6. Connect the Executive Office VoIP phone to interface **ge-0/0/4**. This interface is set to high priority with telemetries enabled.
7. Connect the staff VoIP phones to **ge-0/0/5**, **ge-0/0/6**, and **ge-0/0/7**. These interfaces use the default PoE settings.

**Results** Check the results of the configuration:

```
[edit]
user@switch# show
interfaces {
  ge-0/0/0 {
    description "wireless access point";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/1 {
    description "security camera front door";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/2 {
    description "security camera back door";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/3 {
    description "emergency phone";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/4 {
    description "Executive Office VoIP phone";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/5 {
    description "staff VoIP phone";
    unit 0 {
      family ethernet-switching;
    }
  }
  ge-0/0/6 {
    description "staff VoIP phone";
    unit 0 {
      family ethernet-switching;
    }
  }
}
```



```

    }
  }
  ge-0/0/7 {
    description "staff VoIP phone";
    unit 0 {
      family ethernet-switching;
    }
  }
}
poe {
  interface all;
  interface ge-0/0/1 {
    priority high;
    telemetries;
  }
  interface ge-0/0/2 {
    priority high;
    telemetries;
  }
  interface ge-0/0/3 {
    priority high;
    telemetries;
  }
  interface ge-0/0/4 {
    priority high;
    telemetries;
  }
}
}

```

## Verification

To verify that PoE interfaces have been created and are operational, perform the following tasks:

- [Verifying That the PoE Interfaces Have Been Created with the Correct Priorities on page 15](#)

### Verifying That the PoE Interfaces Have Been Created with the Correct Priorities

**Purpose** Verify that the PoE interfaces on the switch are now set to the correct priority settings.

**Action** List all the PoE interfaces configured on the switch:

user@switch> **show poe interface**

Interface	Admin status	Oper status	Max power	Priority	Power consumption	Class
ge-0/0/0	Enabled	ON	15.4W	Low	7.9W	0
ge-0/0/1	Enabled	ON	15.4W	High	4.8W	0
ge-0/0/2	Enabled	ON	15.4W	High	4.8W	0
ge-0/0/3	Enabled	ON	15.4W	High	3.3W	2
ge-0/0/4	Enabled	ON	15.4W	High	4.7W	2
ge-0/0/5	Enabled	ON	15.4W	Low	3.2W	2
ge-0/0/6	Enabled	ON	15.4W	Low	3.3W	2
ge-0/0/7	Enabled	ON	15.4W	Low	3.3W	2

**Meaning** The **show poe interface** command lists PoE interfaces configured on the switch, with their status, priority, power consumption, and class. This output shows that eight PoE interfaces

are enabled. Interfaces **ge-0/0/1** through **ge-0/0/4** are configured as priority **high**. The remaining PoE interfaces are configured with the default priority value of **low**.

**Related Documentation**

- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Troubleshooting PoE Interfaces on page 43](#)

---

## Example: Configuring PoE on an EX6200 or EX8200 Switch

---

Power over Ethernet (PoE) ports supply electric power over the same ports that are used to connect network devices. These ports allow you to plug in devices that need both network connectivity and electric power, such as voice over IP (VoIP) phones, wireless access points, and IP cameras.

On EX6200 and EX8200 switches, the PoE power budget—that is, the total amount of PoE power that is available to the PoE ports on the switch—can vary according to the number and type of power supplies installed and the power requirements of other components, such as line cards. To make the most efficient use of the PoE power budget for the switch, you can configure the PoE power budget for each PoE line card so that the line card power budget is tailored to the power requirements of the connected powered devices.

This example shows how to configure PoE on an EX8200 switch. The principles illustrated by this example apply to EX6200 switches as well.

This example covers:

- [Requirements on page 16](#)
- [Overview and Topology on page 17](#)
- [Configuration on page 20](#)
- [Verification on page 21](#)

### Requirements

This example uses the following software and hardware components:

- Junos OS Release 11.2 or later for EX Series switches
- An EX8208 switch with the following components installed:
  - Six 2000 W AC power supplies using low-line power inputs
  - Two EX8200-48T (48-port RJ-45) line cards
  - Two EX8200-2XS-40P (40-port PoE+ with 4-port SFP and 2-port SFP+) line cards
  - Three EX8200-48PL (48-port PoE+ 20 Gbps) line cards

Before you configure PoE, be sure you have:

- Performed the initial switch configuration. See [Connecting and Configuring an EX Series Switch \(CLI Procedure\)](#) or [Connecting and Configuring an EX Series Switch \(J-Web Procedure\)](#) for details.

## Overview and Topology

For EX6200 and EX8200 switches, each line card that supports PoE has its own PoE controller and PoE power budget. The PoE power budget for a line card is allocated by the switch power management out of the total power available on the switch. By default, power management allocates to each PoE card the maximum power for that card—that is, the amount of power needed to supply all PoE ports on the cards with their maximum supported power.

Depending on the number and capacity of power supplies installed and the power requirements of the installed line cards in a switch, there might not be enough power available to provide the maximum power to all PoE line cards. Because power management by default allocates maximum power to each line card in priority order until available power runs out, lower-priority PoE line cards might receive partial or no PoE power, while higher-priority PoE line cards might receive more PoE power than the connected powered devices require.

To avoid this issue, you can configure smaller power budgets for line cards than the maximum. For example, power management allocates 915 W of PoE power to a EX8200-48PL line card by default. If the connected powered devices consume no more than a total of 250 W, you can set the PoE power budget for the line card to 250 W. Doing so frees up 665 W, which then can be used to fulfill the PoE power needs of lower-priority line cards.

The topology used in this example consists of a switch that has a mixture of line cards installed, some of which support PoE and some of which do not.

[Table 6 on page 17](#) details the topology used in this configuration example.

**Table 6: Components of the PoE Configuration Topology**

Component	Description	Comments
Power supplies	Six 2000 W power supplies with low-line power inputs	1200 W capacity each
Line card 0	EX8200-48T line card (no PoE ports)	Ports 0 through 47—Access ports for non-PoE devices, such as print and file servers or workstations not connected through VoIP phones
Line card 1	EX8200-48PL line card	Ports 0 through 47—Access ports for PoE class 2 VoIP phones
Line card 2	EX8200-48PL line card	Ports 0 through 47—Access ports for PoE class 2 VoIP phones

Table 6: Components of the PoE Configuration Topology (*continued*)

Component	Description	Comments
Line card 3	EX8200-2XS-40P line card	<p>Ports 0 through 11—Access ports for high-priority PoE+ class 4 devices, such as door access control devices, pan-tilt-zoom security cameras, and high-power wireless access points.</p> <p>Ports 12 through 22—Access ports for high-priority PoE class 3 devices, such as static security cameras, executive video VoIP phones, and wireless access points.</p> <p>Ports 22 through 40—Access ports for PoE class 2 devices, such as VoIP phones.</p> <p>SFP+ ports 44 and 45—Uplink ports to the distribution switch, link aggregated with the uplink ports on line card 4.</p>
Line card 4	EX8200-2XS-40P line card	<p>Ports 0 through 11—Access ports for high-priority PoE+ class 4 devices</p> <p>Ports 12 through 40—Access ports for PoE class 2 devices</p> <p>SFP+ ports 44 and 45—Uplinks ports to the distribution switch, link aggregated with the uplink ports on line card 3</p>
Line card 5	EX8200-48T line card (no PoE ports)	Ports 0 through 47—Access ports for non-PoE devices
Line card 6	EX8200-48PL line card	Ports 0 through 47—Access ports for PoE class 2 VoIP phones

The following output from the **show chassis power-budget-statistics** command shows how power is being allocated to the switch components before PoE is configured:

```

user@switch# show chassis power-budget-statistics
PSU 0      (EX8200-AC2K)      :    1200 W  Online
PSU 1      (EX8200-AC2K)      :    1200 W  Online
PSU 2      (EX8200-AC2K)      :    1200 W  Online
PSU 3      (EX8200-AC2K)      :    1200 W  Online
PSU 4      (EX8200-AC2K)      :    1200 W  Online
PSU 5      (EX8200-AC2K)      :    1200 W  Online
Total Power supplied by all Online PSUs :    7200 W
Power Redundancy Configuration          :    N+1
Power Reserved for the Chassis          :    1600 W
FPC Statistics                          Base power    PoE power    Priority

FPC 0      (EX8200-48T)      :    350 W      0 W      7
FPC 1      (EX8200-48PL)     :    267 W     915 W      7
FPC 2      (EX8200-48PL)     :    267 W     915 W      7
FPC 3      (EX8200-2XS-40P)   :    387 W     792 W      7
FPC 4      (EX8200-2XS-40P)   :    387 W     792 W      7
FPC 5      (EX8200-48T)      :    350 W      0 W      7
FPC 6      (EX8200-48PL)     :    267 W     96 W      7

Total (non-PoE) Power allocated         :    3875 W
Total Power allocated for PoE           :    3510 W

```

Power Available (Redundant case) : 2675 W  
 Total Power Available : 0 W

The **Total Power Available** field shows that all available power is being used. Because there is not enough power, the line card in slot 6 is allocated a PoE power budget of only 96 W, which is insufficient to meet the requirements of the connected VoIP phones.

In addition, the assigned power priorities of the line cards do not align with their actual power priority. Line cards 3 and 4 should have the highest power priorities because they provide PoE power to critical security devices and because they provide the connections to the distribution switch. Because the default configuration gives all line cards the same assigned priority (the lowest priority), the power priority for line cards is determined by their slot numbers. Under the default configuration, line card 0 has the highest power priority, not line card 3.

To solve these issues, this example configures the PoE power budgets and power priorities for the line cards as shown in [Table 7 on page 19](#).

**Table 7: Line Card PoE Power Budget and Power Priority**

FPC	Power Requirements of Powered Devices	PoE Power Budget for Line Card	Power Priority of Line Card
0	Not applicable	Not applicable	7
1	48 class 2 devices (maximum of 7 W each)	336 W	7
2	48 class 2 devices (maximum of 7 W each)	336 W	7
3	12 class 4 devices (maximum of 30 W each)  10 class 3 devices (maximum of 15.4 W each)  18 class 2 devices (maximum of 7 W each)	640 W	0
4	12 class 4 devices (maximum of 30 W each)  28 class 2 devices (maximum of 7 W each)	556 W	1
5	Not applicable	Not applicable	7
6	48 class 2 devices (maximum of 7 W each)	336 W	7

Other than ensuring that the PoE interfaces are enabled for PoE, this example performs no configuration of the PoE interfaces because the default settings for the PoE interfaces are acceptable in this example. You can, however, configure the PoE interfaces on an

EX6200 or EX8200 switch as described in “[Configuring PoE \(CLI Procedure\)](#)” on page 25 or as shown in “[Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch](#)” on page 11.

## Configuration

To configure PoE on an EX8200 switch:

### CLI Quick Configuration

To quickly configure the PoE power budget for PoE line cards and to set the power priority for high-priority line cards, copy the following commands and paste them into the switch terminal window:

```
[edit]
set poe interface all
set poe fpc 3 maximum-power 640
set poe fpc 4 maximum-power 556
set poe fpc 1 maximum-power 336
set poe fpc 2 maximum-power 336
set poe fpc 6 maximum-power 336
set chassis fpc 3 power-budget-priority 0
set chassis fpc 4 power-budget-priority 1
```

### Step-by-Step Procedure

To configure PoE on an EX8200 switch:

1. Verify that PoE is enabled on all PoE interfaces by entering the **[edit poe]** hierarchy and showing the current configuration:

```
[edit]
user@switch# edit poe

[edit poe]
user@switch# show
interface all;
```

If the **interface all** statement does not appear, enable PoE on all PoE interfaces:

```
[edit poe]
user@switch# set interface all
```

2. Set the PoE power budget for line card 3 to 640 W:

```
[edit poe]
user@switch# set fpc 3 maximum-power 640
```

3. Set the PoE power budget for line card 4 to 556 W:

```
[edit poe]
user@switch# set fpc 4 maximum-power 556
```

4. Set the PoE power budgets to 336 W for the remaining PoE line cards:

```
[edit poe]
user@switch# set fpc 1 maximum-power 336
```

```
[edit poe]
user@switch# set fpc 2 maximum-power 336
```

```
[edit poe]
user@switch# set fpc 6 maximum-power 336
```

5. Enter the [edit chassis] hierarchy and set the line card power priority to 0 and 1 for line cards 3 and 4:

```
[edit poe]
user@switch# top edit chassis
```

```
[edit chassis]
user@switch# set fpc 3 power-budget-priority 0
```

```
[edit chassis]
user@switch# set fpc 4 power-budget-priority 1
```

**Results** Check the results of the configuration:

```
[edit]
user@switch# show

chassis {
  fpc 3 {
    power-budget-priority 0;
  }
  fpc 4 {
    power-budget-priority 1;
  }
}
poe {
  fpc 3 {
    maximum-power 640;
  }
  fpc 4 {
    maximum-power 556;
  }
  fpc 1 {
    maximum-power 336;
  }
  fpc 2 {
    maximum-power 336;
  }
  fpc 6 {
    maximum-power 336;
  }
  interface all;
}
```

## Verification

To verify that the PoE line cards have been configured correctly and that their PoE power budgets have been fully allocated, perform the following tasks:

- [Verifying the Poe Line Card Configuration and Power Budgets on page 21](#)
- [Verifying the Power Budget for the Switch and Line Card Power Priorities on page 22](#)

### Verifying the Poe Line Card Configuration and Power Budgets

**Purpose** Verify that the line card PoE power budgets have been allocated correctly.

**Action** Show the PoE controller settings for the line cards:

```
user@switch> show poe controller
```

Controller index	Maximum power	Power consumption	Guard band	Management	Status
1	336.00W	0.00W	0W	Class	AT/AF COMBO
2	336.00W	0.00W	0W	Class	AT/AF COMBO
3	640.00W	0.00W	0W	Class	AT/AF COMBO
4	556.00W	0.00W	0W	Class	AT/AF COMBO
6	336.00W	0.00W	0W	Class	AT/AF COMBO

**Meaning** As shown by the **Maximum power** field, the PoE power budgets for the PoE line cards have been correctly configured and power management was able to allocate the configured PoE power budgets to the line cards.

### Verifying the Power Budget for the Switch and Line Card Power Priorities

**Purpose** Verify the overall power budget for the switch and the line card power priorities.

**Action** Show the power budget for the switch:

```
user@switch# show chassis power-budget-statistics
```

PSU 0	(EX8200-AC2K)	:	1200 W	Online
PSU 1	(EX8200-AC2K)	:	1200 W	Online
PSU 2	(EX8200-AC2K)	:	1200 W	Online
PSU 3	(EX8200-AC2K)	:	1200 W	Online
PSU 4	(EX8200-AC2K)	:	1200 W	Online
PSU 5	(EX8200-AC2K)	:	1200 W	Online
Total Power supplied by all Online PSUs		:	7200 W	
Power Redundancy Configuration		:	N+1	
Power Reserved for the Chassis		:	1600 W	
FPC Statistics			Base power	PoE power      Priority
FPC 0	(EX8200-48T)	:	350 W	0 W      7
FPC 1	(EX8200-48PL)	:	267 W	336 W      7
FPC 2	(EX8200-48PL)	:	267 W	336 W      7
FPC 3	(EX8200-2XS-40P)	:	387 W	640 W      0
FPC 4	(EX8200-2XS-40P)	:	387 W	556 W      1
FPC 5	(EX8200-48T)	:	350 W	0 W      7
FPC 6	(EX8200-48PL)	:	267 W	336 W      7
Total (non-PoE) Power allocated		:	3875 W	
Total Power allocated for PoE		:	2204 W	
Power Available (Redundant case)		:	2675 W	
Total Power Available		:	1306 W	

**Meaning** After each PoE line card has been allocated its configured PoE power budget, 1306 W remain unallocated on the switch. If one of the 1200 W power supplies fails, the PoE line cards will still receive their configured PoE power budgets.

Line cards 3 and 4 have the highest priorities, priority 0 and 1 respectively. The remaining line cards have the same assigned priority, 7. Within the group of line cards of the same assigned priority, power priority is determined by slot number, with lower-numbered slots having higher priority. Thus PoE line cards are allocated PoE power in this order: line card 3, 4, 1, 2, 6. If two or more power supplies fail, PoE power is removed from the line cards in reverse priority order, starting with line card 6.



**Related  
Documentation**

- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Troubleshooting PoE Interfaces on page 43](#)



## CHAPTER 3

# Configuring PoE

- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Configuring PoE \(J-Web Procedure\) on page 31](#)

### **Configuring PoE (CLI Procedure)**

---

Power over Ethernet (PoE) ports on EX Series switches supply electric power over the same ports that are used to connect network devices. These ports allow you to plug in devices that require both network connectivity and electric power, such as voice over IP (VoIP) phones, wireless access points, and some IP cameras.

This topic describes:

- [PoE Configurable Options on page 26](#)
- [Configuring the PoE Controller on EX2200, EX3200, EX3300, and EX4200 Switches on page 27](#)
- [Configuring the PoE Controllers on EX6200 and EX8200 Switches on page 29](#)
- [Configuring PoE Interfaces on page 30](#)

## PoE Configurable Options

For EX Series switches that support PoE ports, the factory default configuration enables PoE on the PoE-capable ports, with default settings in effect. You might not have to do any additional configuration if the default settings work for you. [Table 8 on page 26](#) shows the configurable PoE options and their default settings for the PoE controller and for the PoE interfaces.



**NOTE:** On EX8200 switches, the factory default configuration enables PoE on all interfaces starting at Junos OS Release 11.2. Switches that have been upgraded to Release 11.2 from a previous release might not have PoE enabled by default. To enable PoE on all PoE-capable ports on a switch, use the `set poe interface all configuration` command.

**Table 8: Configurable PoE Options and Default Settings**

Option	Default	Description
<b>PoE Controller Options</b>		
<code>guard-band</code>	0 W	Reserves a specified amount of power from the PoE power budget to be used in the case of a spike in PoE power consumption: <ul style="list-style-type: none"> <li>Up to 15 W on EX6200 and EX8200 switches</li> <li>Up to 19 W on all other switches</li> </ul>
<code>management</code>	<code>class</code>	Sets the PoE power management mode for the switch or line card: <ul style="list-style-type: none"> <li><b>class</b>—The maximum power delivered by an interface is determined by the class of the connected powered device. No power is allocated to the interface until a powered device is connected.</li> <li><b>static</b>—The maximum power delivered by an interface is statically configured and independent of the class of the connected powered device. The maximum power is allocated to the interface even if a powered device is not connected.</li> </ul>
<code>maximum-power</code>	<p>792 W for the EX8200-2XS-40P (40-port PoE+ with 4-port SFP and 2-port SFP+) line card</p> <p>915 W for the EX8200-48PL (48-port PoE+ 20 Gbps) line card</p> <p>1440 W for the EX6200-48P (48-port PoE+) line card</p>	(EX6200 and EX8200 switches only) Sets the PoE power budget for the line card: <ul style="list-style-type: none"> <li>37 W through 792 W for the EX8200-2XS-40P line card</li> <li>37 W through 915 W for the EX8200-48PL line card</li> <li>37 W through 1440 W for the EX6200-48P line card</li> </ul>
<code>notification-control</code>	Not included in default configuration	When included in the configuration, enables the PoE controller to send PoE SNMP traps.

Table 8: Configurable PoE Options and Default Settings (*continued*)

Option	Default	Description
<b>Interface Options</b>		
<b>af-mode</b>	Not included in default configuration	(EX6200 switches only) When included in the configuration, restricts a PoE interface to supporting IEEE 802.3af only. The maximum power that can be delivered by the PoE interface is 15.4 W.
<b>disable</b>	Not included in default configuration	When included in the configuration, disables PoE on the interface. The interface maintains network connectivity but no longer supplies power to a connected powered device. Power is not allocated to the interface.
<b>maximum-power (Interface)</b>	<p>30.0 W for interfaces that support PoE+ (IEEE 802.3at)</p> <p>15.4 W for interfaces that support PoE (IEEE 802.3af)</p>	<p>Sets the maximum power that can be delivered by a PoE interface when the power management mode is <b>static</b>:</p> <ul style="list-style-type: none"> <li>Up to 30 W for EX2200, EX3300, EX4200, EX6200, and EX8200 switches</li> <li>Up to 18.6 W for EX3200 switches</li> </ul> <p>This setting is ignored if the power management mode is <b>class</b>.</p> <p><b>NOTE:</b> The <b>maximum-power</b> setting permitted by the CLI might be greater than the maximum power a given PoE port can deliver. For example, the CLI permits you to set any port on an EX8200 line card to 30 W; however, only ports 0 through 11 support 30 W. Similarly, the CLI permits you to set any port on an EX4200 switch to 30 W, but some EX4200 models support only 18.6 W per port. If you configure a <b>maximum-power</b> value that is greater than the maximum power supported by a port, the power allocated to the port will be the maximum supported.</p>
<b>priority</b>	<b>low</b>	<p>Sets an interface's power priority to either <b>low</b> or <b>high</b>. If power is insufficient for all PoE interfaces, the PoE power to low priority interfaces is shut down before power to high priority interfaces is shut down. Among interfaces that have the same assigned priority, the power priority is determined by port number, with lower-numbered ports having higher priority.</p> <p>On EX6200 and EX8200 switches, <b>priority</b> determines the interface's power priority relative to the other interfaces on the line card, not the interfaces on the switch as a whole. If power management cannot provide the line card with its full PoE power budget, PoE power to interfaces with low priority is shut down first.</p>
<b>telemetries</b>	Not included in default configuration	When included in the configuration, enables the logging of power consumption records on an interface. Logging occurs every 5 minutes for 1 hour unless you specify a different value for <b>interval</b> or <b>duration</b> .

## Configuring the PoE Controller on EX2200, EX3200, EX3300, and EX4200 Switches

To configure the PoE controller on EX2200, EX3200, EX3300, and EX4200 switches:

- To change the management mode or to configure a guard band setting for a standalone switch or for all members of an EX3300 Virtual Chassis, an EX4200 Virtual Chassis, or a mixed EX4200 and EX4500 Virtual Chassis that supports PoE:

```
[edit]
user@switch# set poe management mode guard-band watts
```

For example, to set the management mode to static and to configure a guard band of 15 W:

```
[edit]
user@switch# set poe management static guard-band 15
```



**NOTE:** If the PoE power budget for the switch is insufficient to provide maximum power to all the PoE ports, we recommend that you do not change the management mode from class to static. If you change the power management mode to static and do not change the other default settings, the PoE controller allocates maximum power to the PoE ports in the order of port number, which means PoE will be disabled on higher-numbered ports when the PoE power budget runs out.

In class mode, on the other hand, the PoE controller does not allocate power to a port until a powered device is connected. The class of the connected device determines the amount of power allocated. Thus in class mode, any PoE port can be used to power a device and all the PoE ports on the switch can be used as long as the combined power demand does not exceed the PoE power budget.



**NOTE:** On EX3200 and EX4200 switches that support enhanced PoE, you must change the management mode from class mode to static mode to take advantage of the higher per-port power limits of enhanced PoE.

- To enable PoE SNMP traps on a standalone switch or on an specific member of a Virtual Chassis:

```
[edit]
user@switch# set poe notification-control fpc number
```

For example, to enable PoE SNMP traps on a standalone switch or on member 0 of a Virtual Chassis:

```
[edit]
user@switch# set poe notification-control fpc 0
```

## Configuring the PoE Controllers on EX6200 and EX8200 Switches

On EX6200 and EX8200 switches, each line card that supports PoE has its own PoE controller. This means that the PoE controller options are configured separately for each line card.

In addition, each line card has its own separate, configurable PoE power budget. The default power budget for a line card is the amount of power needed to supply all PoE ports on the line card with their maximum supported power. Because there might not be enough power available in a switch to supply each PoE line card with the default PoE power budget, you can configure smaller power budgets for one or more line cards, freeing up power for other line cards.

To configure the line card PoE controllers in an EX6200 or EX8200 switch:

- To configure a guard band setting, to change the management mode, or to configure the PoE power budget for a specific line card:

```
[edit]
user@switch# set poe fpc number guard-band watts management mode
maximum-power watts
```

For example, to configure a PoE budget of 350 W and a guard band of 15 W on line card 1:

```
[edit]
user@switch# set poe fpc 1 guard-band 15 maximum-power 350
```



**NOTE:** If you configure a PoE power budget for a line card that is smaller than the default power budget, we recommend that you do not change the management mode from class to static. If you change the power management mode to static and do not change the interface default settings, the PoE controller allocates maximum power to the PoE ports in the order of port number. As a result, PoE will be disabled on higher-numbered ports when the PoE power budget runs out.

In class mode, on the other hand, the PoE controller does not allocate power to a port until a powered device is connected. The class of the connected device determines the amount of power allocated. Thus in class mode, any PoE port can be used to power a device and all the PoE ports on the switch can be used as long as the combined power demand does not exceed the PoE power budget.

- To configure the same guard band value, management mode, or PoE power budget for all line cards in a switch:

```
[edit]
user@switch# set poe fpc all guard-band watts management mode maximum-power
watts
```

For example, to configure a PoE budget of 1000 W and static management mode for all line cards in a switch:

```
[edit]
user@switch# set poe fpc all management static maximum-power 1000
```

If you configure different settings for a specific line card, those settings override the settings configured with the **fpc all** statement.

- To enable PoE SNMP traps on a line card:

```
[edit]
user@switch# set poe notification-control fpc number
```

For example, to enable PoE SNMP traps on line card 7:

```
[edit]
user@switch# set poe notification-control fpc 7
```

## Configuring PoE Interfaces

To configure the PoE interfaces on a switch that supports PoE:

- To configure all PoE interfaces with the same setting or settings:

```
[edit]
user@switch# set poe interface all options
```

For example, to enable telemetry collection on all interfaces, using the default collection duration and interval:

```
[edit]
user@switch# set poe interface all telemetries
```



**NOTE:** For PoE to be enabled on all PoE-capable interfaces, the configuration must include the **interface all** statement in the **[edit poe]** hierarchy. With the exception of EX8200 switches that were shipped from the factory with a Junos OS release earlier than Release 11.2, the factory default configurations of switches that support PoE include this statement.

- To configure individual PoE interfaces with different settings:

```
[edit]
user@switch# set poe interface interface-name options
```

For example:

```
[edit]
user@switch# set poe interface ge-0/0/0 priority high telemetries duration 24
```

```
[edit]
user@switch# set poe interface ge-0/0/1
```

```
[edit]
user@switch# set poe interface ge-0/0/5 maximum-power 18.6
```

```
[edit]
user@switch# set poe interface ge-5/0/7 disable
```



When you configure an individual interface, its configuration overrides any settings you configure with the **set poe interface all** command. For example, **ge-0/0/1** in the preceding example retains the default settings, regardless of any settings configured with the **set poe interface all** command.

#### Related Documentation

- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16](#)
- [Verifying PoE Configuration and Status \(CLI Procedure\) on page 37](#)
- [PoE and EX Series Switches Overview on page 3](#)

## Configuring PoE (J-Web Procedure)

Power over Ethernet (PoE) ports supply electric power over the same ports that are used to connect network devices to EX Series switches. These ports allow you to plug in devices that require both network connectivity and electric power, such as VoIP phones, wireless access points, and some IP cameras. Using the Power over Ethernet (PoE) Configuration page in the J-Web interface, you can modify the settings of all interfaces that are PoE-enabled.

To configure PoE:

1. Select **Configure > Power over Ethernet**.

The page displays a list of all interfaces except uplink ports. Specific operational details about an interface are displayed in the Details section of the page. The details include the PoE Operational Status and Port class.



**NOTE:** After you make changes to the configuration in this page, you must commit the changes for them to take effect. To commit all changes to the active configuration, select **Commit Options > Commit**. See [Using the Commit Options to Commit Configuration Changes](#) for details about all commit options.

2. Click one:

- **Edit**—Changes PoE settings for the selected port as described in [Table 9 on page 31](#).
- **System Settings**—Modifies general PoE settings as described in [Table 10 on page 32](#).

**Table 9: PoE Edit Settings**

Field	Description	Your Action
Enable PoE	Specifies that PoE is enabled on the interface.	Select this option to enable PoE on the interface.

Table 9: PoE Edit Settings (*continued*)

Field	Description	Your Action
Priority	Lists the power priority (Low or High) configured on ports enabled for PoE.	Set the priority as <b>High</b> or <b>Low</b> .
Maximum Power	Specifies the maximum PoE wattage available to provision active PoE ports on the switch.	Select a value in watts. If no value is specified, the default is 15.4.

Table 10: System Settings

Field	Description	Your Action
PoE Management	<p>Specifies the power management mode. The options are: <b>static</b> and <b>class</b>.</p> <p><b>NOTE:</b> When the power management mode is set to <b>class</b>, the maximum power value is overridden by the maximum power value of the class of power device that is connected to the switch on the PoE port.</p>	By default the power management mode is <b>static</b> . Select <b>class</b> to change the power management mode.
Guard Band (watts)	Specifies the band to control power availability on the switch.	Enter a value to set the guard band value in watts. The default value is 0.

**Related Documentation**

- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Monitoring PoE on page 33](#)
- [PoE and EX Series Switches Overview on page 3](#)

## CHAPTER 4

# Administering PoE

- [Monitoring PoE on page 33](#)
- [Monitoring PoE Power Consumption \(CLI Procedure\) on page 34](#)
- [Verifying PoE Configuration and Status \(CLI Procedure\) on page 37](#)
- [Upgrading the PoE Controller Software for Enhanced PoE Support on page 40](#)

## Monitoring PoE

---

**Purpose** Use the monitoring functionality to view real-time data of the power consumed by each PoE interface, and to enable and configure telemetry values. When telemetry is enabled, the software measures the power consumed by each interface and stores the data for future reference.

**Action** To monitor PoE using the J-Web interface, select **Monitor > Power over Ethernet**.

To monitor PoE power consumption with CLI commands in the CLI Terminal in the J-Web interface:

1. Select **Troubleshoot > CLI Terminal**.

2. Type a CLI command:

- [show poe controller](#)
- [show poe interface](#)
- [show poe telemetries interface](#)

For detailed information about using these CLI commands to monitor PoE power consumption, see [Monitoring PoE Power Consumption \(CLI Procedure\)](#) in the EX Series documentation at <http://www.juniper.net/techpubs>.

**Meaning** In the J-Web interface the PoE Monitoring screen is divided into two parts. The top half of the screen displays real-time data of the power consumed by each interface and a list of ports that utilize maximum power.

Select a particular interface to view a graph of the power consumed by the selected interface.

The bottom half of the screen displays telemetry information for interfaces. The Telemetry Status field displays whether telemetry has been enabled on the interface. Click the **Show Graph** button to view a graph of the telemetries. The graph can be based on power or voltage. To modify telemetry values, click **Edit**. Specify Interval in minutes, Duration in hours, and select **Log Telemetries** to enable telemetry on the selected interface.

**Related Documentation**

- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Configuring PoE \(J-Web Procedure\) on page 31](#)
- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Monitoring PoE Power Consumption \(CLI Procedure\) on page 34](#)
- [Verifying PoE Configuration and Status \(CLI Procedure\) on page 37](#)

## Monitoring PoE Power Consumption (CLI Procedure)

---

You can monitor Power over Ethernet (PoE) power consumption, both for the switch as a whole and for individual PoE interfaces.

This topic describes how to monitor:

- [PoE Power Consumption on a Switch on page 34](#)
- [Current Power Consumption for PoE Interfaces on page 34](#)
- [Power Consumption for PoE Interfaces over Time on page 36](#)

### PoE Power Consumption on a Switch

**Purpose** Determine the current PoE power consumption on a switch.

**Action** Enter the following command:

```
user@switch> show poe controller
Controller Maximum Power Guard Management Status
index      power  consumption band
0          405.00W 130.00W 0W Class AT_MODE
```

**Meaning** At the time the command was executed, the PoE interfaces on the switch were consuming 130 W out of the PoE power budget of 405 W.

### Current Power Consumption for PoE Interfaces

**Purpose** Determine the current power consumption for individual PoE interfaces.

**Action** To monitor the power consumption of all PoE interfaces on the switch, use the following command:

```
user@switch> show poe interface
Interface Admin status Oper status Max power Priority Power consumption Class
```

ge-0/0/0	Enabled	ON	15.4W	Low	7.4W	0
ge-0/0/1	Enabled	ON	15.4W	High	12.0W	0
ge-0/0/2	Enabled	ON	15.4W	Low	12.4W	0
ge-0/0/3	Enabled	ON	7.0W	Low	5.3W	2
ge-0/0/4	Enabled	ON	4.0W	Low	4.0W	1
ge-0/0/5	Enabled	ON	7.0W	Low	6.1W	2
ge-0/0/6	Enabled	ON	15.4W	Low	12.3W	3
ge-0/0/7	Disabled	Disabled	0.0W	Low	0.0W	not-

applicable

To monitor the power consumption of the PoE interfaces on a specific EX6200 or EX8200 line card, use the following command:

```
user@switch> show poe interface fpc-slot 3
```

Interface	Admin status	Oper status	Max power	Priority	Power consumption	Class
ge-3/0/0	Enabled	ON	30.0W	Low	20.3W	4
ge-3/0/1	Enabled	ON	30.0W	Low	17.8W	4
ge-3/0/2	Enabled	ON	30.0W	High	16.3W	4
ge-3/0/3	Enabled	ON	30.0W	High	16.2W	4
ge-3/0/4	Enabled	ON	30.0W	Low	25.9W	4
ge-3/0/5	Enabled	ON	30.0W	Low	10.1W	4
ge-3/0/6	Enabled	ON	30.0W	Low	16.2W	4
ge-3/0/7	Enabled	ON	30.0W	Low	6.4W	4
ge-3/0/8	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/9	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/10	Enabled	ON	30.0W	Low	21.5W	4
ge-3/0/11	Enabled	ON	30.0W	Low	21.7W	4
ge-3/0/12	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/13	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/14	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/15	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/16	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/17	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/18	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/19	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/20	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/21	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/22	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/23	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/24	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/25	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/26	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/27	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/28	Enabled	ON	15.4W	Low	7.0W	0
ge-3/0/29	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/30	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/31	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/32	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/33	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/34	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/35	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/36	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/37	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/38	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/39	Enabled	ON	15.4W	Low	2.2W	1

To monitor the power consumption of an individual PoE interface (for example, **ge-0/0/3**), use the following command:

```
user@switch> show poe interface ge-0/0/3
PoE interface status:
```

```

PoE interface           : ge-0/0/3
Administrative status   : Enabled
Operational status      : ON
Power limit on the interface : 7.0W
Priority                 : Low
Power consumed           : 5.3W
Class of power device    : 2

```

**Meaning** At the time the command was executed, the individual PoE ports were consuming the amount of power shown. For example, interface **ge-0/0/3** was consuming 5.3 W at the time the command was executed.

## Power Consumption for PoE Interfaces over Time

**Purpose** Monitor the power consumption of a PoE interface over a period of time. The records collected remain available for future viewing.

You can specify the intervals at which power consumption data is collected, from once every minute to once every 30 minutes. The default is once every 5 minutes. You can also specify the duration over which the records are collected, from 1 hour (default) to 24 hours.

**Action** To collect historical records of PoE interface power consumption and display those records:

1. Add the **telemetries** statement to the PoE interface configuration:

```

[edit]
user@switch# set poe interface ge-0/0/5 telemetries interval 10

```

When you commit the configuration, record collection begins.

2. Display the collected records:

```

user@switch> show poe telemetries interface ge-0/0/5 all
S1 No    Timestamp      Power    Voltage
  1  03-19-2010 13:00:07 UTC  3.9W    50.9V
  2  03-19-2010 12:50:07 UTC  3.9W    50.9V
  3  03-19-2010 12:40:07 UTC  3.9W    50.9V
  4  03-19-2010 12:30:07 UTC  3.9W    50.9V
  5  03-19-2010 12:20:07 UTC  3.9W    50.9V
  6  03-19-2010 12:10:07 UTC  3.9W    50.9V

```

To start another session of record collection on the interface, you must commit the configuration again.

**Meaning** Over the hour in which the PoE power consumption data on **ge-0/0/5** was collected, the connected powered device consistently consumed 3.9 W.

**Related Documentation**

- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)

- [Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16](#)
- [Verifying PoE Configuration and Status \(CLI Procedure\) on page 37](#)

## Verifying PoE Configuration and Status (CLI Procedure)

You can verify the Power over Ethernet (PoE) configuration and status on an EX Series switch.

This topic describes how to verify:

- [PoE Controller Configuration and Status on page 37](#)
- [PoE Interface Configuration and Status on page 38](#)
- [PoE SNMP Trap Generation Status on page 39](#)

### PoE Controller Configuration and Status

**Purpose** Verify the PoE controller configuration and status, such as the PoE power budget, total PoE power consumption, power management mode, and the supported PoE standard.

**Action** Enter the following command:

```
user@switch> show poe controller
```

Example output for an EX2200 switch:

Controller index	Maximum power	Power consumption	Guard band	Management Class	Status
0	405.00W	130.00W	19W	Class	AT_MODE

Example output for an EX8200 switch:

Controller index	Maximum power	Power consumption	Guard band	Management Class	Status
3	540.00W	435.25W	0W	Static	AT/AF COMBO
4	915.00W	627.01W	15W	Class	AT/AF COMBO

- Meaning**
- For the EX2200 switch—The switch has a PoE power budget of 405 W, of which 130 W were being used by the PoE ports at the time the command was executed. The **Guard band** field shows that 19 W is reserved out of the PoE power budget to protect against spikes in power demand. The power management mode is class. The PoE ports on the switch support PoE+ (IEEE 802.3at).
  - For the EX8200 switch—Line card 3 has a PoE power budget of 540 W, of which 435.25 W were being used by the PoE ports on the line card at the time the command was executed. The management mode for line card 3 is static and the line card has a mix of PoE (IEEE 802.3af) and PoE+ (IEEE 802.3at) ports.

Line card 4 has a PoE power budget of 915 W, of which 627.01 W were being used by the PoE ports on the line card at the time the command was executed. The **Guard band** field shows that 15 W is reserved out of the PoE power budget to protect against spikes in power demand. The management mode for line card 4 is class and the line card has a mix of PoE (IEEE 802.3af) and PoE+ (IEEE 802.3at) ports.

## PoE Interface Configuration and Status

**Purpose** Verify that PoE interfaces are enabled and set to the correct maximum power and priority settings. Also verify current operational status and power consumption.

**Action** To view configuration and status for all PoE interfaces, enter:

```
user@switch> show poe interface
```

Interface	Admin status	Oper status	Max power	Priority	Power consumption	Class
ge-0/0/0	Enabled	ON	15.4W	Low	7.9W	3
ge-0/0/1	Enabled	ON	30.0W	High	4.8W	0
ge-0/0/2	Enabled	ON	30.0W	High	4.8W	0
ge-0/0/3	Enabled	ON	7.0W	High	3.3W	2
ge-0/0/4	Enabled	ON	7.0W	Low	3.3W	2
ge-0/0/5	Enabled	ON	7.0W	Low	3.2W	2
ge-0/0/6	Enabled	ON	7.0W	Low	3.3W	2
ge-0/0/7	Enabled	OFF	30.0W	Low	0.0W	not-

applicable

To view the configuration and status for the PoE interfaces on an EX6200 or EX8200 line card:

```
user@switch> show poe interface fpc-slot 3
```

Interface	Admin status	Oper status	Max power	Priority	Power consumption	Class
ge-3/0/0	Enabled	ON	30.0W	Low	20.3W	4
ge-3/0/1	Enabled	ON	30.0W	Low	17.8W	4
ge-3/0/2	Enabled	ON	30.0W	High	16.3W	4
ge-3/0/3	Enabled	ON	30.0W	High	16.2W	4
ge-3/0/4	Enabled	ON	30.0W	Low	25.9W	4
ge-3/0/5	Enabled	ON	30.0W	Low	10.1W	4
ge-3/0/6	Enabled	ON	30.0W	Low	16.2W	4
ge-3/0/7	Enabled	ON	30.0W	Low	6.4W	4
ge-3/0/8	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/9	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/10	Enabled	ON	30.0W	Low	21.5W	4
ge-3/0/11	Enabled	ON	30.0W	Low	21.7W	4
ge-3/0/12	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/13	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/14	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/15	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/16	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/17	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/18	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/19	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/20	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/21	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/22	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/23	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/24	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/25	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/26	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/27	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/28	Enabled	ON	15.4W	Low	7.0W	0
ge-3/0/29	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/30	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/31	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/32	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/33	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/34	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/35	Enabled	ON	15.4W	Low	2.2W	1



ge-3/0/36	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/37	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/38	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/39	Enabled	ON	15.4W	Low	2.2W	1

To view configuration and status for a single PoE interface, enter:

```
user@switch> show poe interface ge-0/0/3
PoE interface status:
PoE interface           : ge-0/0/3
Administrative status   : Enabled
Operational status     : ON
Power limit on the interface : 7.0W
Priority                 : High
Power consumed          : 3.3W
Class of power device   : 2
PoE Mode                : 802.3at
```

**Meaning** The command output shows the status and configuration of interfaces. For example, the interface **ge-0/0/3** is administratively enabled. Its operational status is **ON**; that is, the interface is currently delivering power to a connected powered device. The maximum power allocated to the interface is 7.0 W. The interface has a high power priority. At the time the command was executed, the powered device was consuming 3.3 W. The IEEE 802.3af class of the powered device is class 2. If the PoE power management mode is class, the class of the powered device determines the maximum power allocated to the interface, which is 7 W in the case of class 2 devices.

The PoE Mode field, which appears only on EX6200 and EX8200 switches, indicates that the interface supports IEEE 802.3at. On EX8200 switches, whether an interface supports IEEE 802.3af or IEEE 802.3at is determined by hardware; on EX6200 switches, an interface can be configured to support either IEEE 802.3af or IEEE 802.3at.

## PoE SNMP Trap Generation Status

**Purpose** Verify the status of the [notification-control](#) option, which determines whether or not PoE SNMP traps are enabled.

**Action** Enter the following command:

```
user@switch> show poe notification-control
FPC slot      Notification-control-status
0              OFF
```

**Meaning** PoE SNMP traps are not enabled.

**Related Documentation**

- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Example: Configuring PoE Interfaces on an EX Series Switch on page 9](#)
- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Monitoring PoE Power Consumption \(CLI Procedure\) on page 34](#)

## Upgrading the PoE Controller Software for Enhanced PoE Support

Starting with Junos OS Release 11.1, the Power over Ethernet (PoE) controller software on EX3200 and EX4200 switches supports enhanced PoE, which allows PoE ports to supply up to 18.6 W per port when PoE power management is in static mode. For a switch running Junos OS Release 10.4 or earlier, you can upgrade the PoE controller software after you have upgraded the switch software to Junos OS Release 11.1 or later. The controller software upgrade process downloads a copy of the upgraded PoE controller software from the Junos OS image to the PoE controller and then reboots the switch.



**NOTE:** Upgrading the PoE controller requires a reboot of the switch or Virtual Chassis member. In addition, powered devices are not guaranteed to receive power while the new software is being downloaded to the PoE controller, a process that can take up to 45 minutes. If your powered devices do not require more than 15.4 W, you do not need to upgrade the PoE controller software.

We recommend that all member switches of an EX4200 Virtual Chassis or a mixed EX4200 and EX4500 Virtual Chassis run the same version of the PoE controller software.



**NOTE:** After you upgrade the PoE controller software, the default maximum power per port is not increased—it is still 15.4 W per port. You must explicitly set the maximum power for a port to 18.6 W.

This topic describes how to upgrade the PoE controller software. On an EX4200 Virtual Chassis or mixed EX4200 and EX4500 Virtual Chassis, perform this procedure from the master switch to upgrade the controller software for all member switches that require upgrading.

To upgrade the PoE controller:

1. Verify that the PoE controller software requires upgrading:

```
user@switch> show poe controller
Controller Maximum Power Guard Management Status
index power consumption band
0** 130 W 0W 15W Static AF_MODE
**New PoE software upgrade available.
Use 'request poe software upgrade'
Note: reboot of fpc is required after the software upgrade.
```

The **New PoE software upgrade available** statement indicates that the PoE controller requires upgrading.

2. Upgrade the controller:

```
user@switch> request poe software upgrade
fpc0:
-----
```

PoE software download time is about 35-45 minutes  
 Use 'show poe controller' to get the download status  
 WARNING: reboot is required after the download

3. Monitor the progress of the controller software download with the **show poe controller** command:

```
user@switch> show poe controller
Controller  Maximum  Power      Guard   Management  Status
index      power    consumption band
0**        130 W    0W         15W
**New PoE software upgrade available.
Use 'request poe software upgrade'
Note: reboot of fpc is required after the software upgrade.
```

The **status** field is updated during the download process to show the following stages of the download:

- POE\_SW\_ERASE
- SW\_DOWNLOAD(n%)
- REBOOT\_REQUIRED



**NOTE:** During the software download, some PoE operational commands, such as [show poe interface](#), might not show correct output.

4. When you see **REBOOT\_REQUIRED** in the **status** field, reboot the switch.
5. After the switch has finished rebooting, verify that the PoE controller software has been upgraded:

```
user@switch> show poe controller
Controller  Maximum  Power      Guard   Management  Status
index      power    consumption band
0          130 W    0W         15W     Static      AF_ENHANCE
```

The **status** field now shows **AF\_ENHANCE**, indicating the PoE controller now supports enhanced PoE.

- Related Documentation**
- [Configuring PoE \(CLI Procedure\) on page 25](#)
  - [PoE and EX Series Switches Overview on page 3](#)



## CHAPTER 5

# Troubleshooting PoE Configuration

- [Troubleshooting PoE Interfaces on page 43](#)

### Troubleshooting PoE Interfaces

**Problem** A Power over Ethernet (PoE) interface is not supplying power to the powered device.

**Solution** Check for the items shown in [Table 11 on page 43](#).

**Table 11: Troubleshooting a PoE Interface**

Items to Check	Explanation
Is the switch a full PoE model or a partial PoE model?	If you are using a partial PoE model, only interfaces <b>ge-0/0/0</b> through <b>ge-0/0/7</b> can function as PoE ports.
Has PoE capability been disabled for that interface?	Use the <a href="#">show poe interface</a> command to check PoE interface status.
Is the cable properly seated in the port socket?	Check the hardware.
Has the PoE power budget been exceeded for the switch?	Use the <a href="#">show poe controller</a> command to check the PoE power budget and consumption for the switch.
Does the powered device require more power than is available on the interface?	Use the <a href="#">show poe interface</a> command to check the maximum power provided by the interface.
If the <a href="#">telemetries</a> option has been enabled for the interface, check the history of power consumption.	Use the <a href="#">show poe telemetries interface</a> command to display the history of power consumption.

**Related Documentation**

- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Verifying PoE Configuration and Status \(CLI Procedure\) on page 37](#)
- [Monitoring PoE Power Consumption \(CLI Procedure\) on page 34](#)
- [Configuring PoE \(CLI Procedure\) on page 25](#)



## CHAPTER 6

# Configuration Statements for PoE

- [\[edit poe\] Configuration Statement Hierarchy on page 45](#)

### [\[edit poe\] Configuration Statement Hierarchy](#)

---

For switches other than EX6200 and EX8200 switches:

```
poe {  
  guard-band watts;  
  interface (all | interface-name) {  
    disable;  
    maximum-power (Interface) watts;  
    priority (high | low);  
    telemetries {  
      disable;  
      duration hours;  
      interval minutes;  
    }  
  }  
  management (class | static);  
  notification-control {  
    fpc slot-number {  
      disable;  
    }  
  }  
}
```

For EX6200 and EX8200 switches:

```
poe {  
  fpc (all | slot-number) {  
    guard-band watts;  
    management (class | static);  
    maximum-power watts;  
  }  
  interface (all | interface-name) {  
    af-mode;  
    disable;  
    maximum-power (Interface) watts;  
    priority (high | low);  
    telemetries {  
      disable;  
      duration hours;  
    }  
  }  
}
```

```
        interval minutes;
    }
}
notification-control {
    fpc slot-number {
        disable;
    }
}
}
```

**Related Documentation**

- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [PoE and EX Series Switches Overview on page 3](#)
- [Configuring PoE \(CLI Procedure\) on page 25](#)
- [Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16](#)

---

## af-mode

<b>Syntax</b>	af-mode;
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 11.3 for EX Series switches.
<b>Description</b>	Configure a PoE port on an EX6200 switch to support IEEE 802.3af only. The maximum power the port can deliver in either class or static mode is 15.4 W.
<b>Default</b>	PoE ports on an EX6200 switch support IEEE 802.3at (PoE+) by default.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>



## disable

<b>Syntax</b>	disable;
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> )], [edit poe <a href="#">interface</a> (all   <i>interface-name</i> ) <a href="#">telemetries</a> ], [edit poe <a href="#">notification-control</a> <a href="#">fpc</a> <i>slot-number</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	<p>Disable a PoE interface, disable the collection of power consumption data for a PoE interface, or disable the generation of the PoE SNMP traps. The action of the <b>disable</b> statement depends on which statement it is used with:</p> <ul style="list-style-type: none"> <li>When used with <b>interface</b>—Disable the PoE capability of this interface. The interface operates as a standard network access interface, and power is no longer allocated to it from the PoE power budget. Although the PoE capability is disabled, the PoE configuration for the interface is retained. To re-enable the PoE capability of this interface, delete the <b>disable</b> statement from the <b>interface</b> entry in the configuration.</li> <li>When used with <b>telemetries</b>—Disable the collection of PoE power consumption records for this interface. Any previously collected records are deleted. However, the <b>telemetries</b> configuration is retained, including the values for <a href="#">interval</a> and <a href="#">duration</a>. To re-enable record collection, delete the <b>disable</b> statement from the <b>telemetries</b> entry in the configuration.</li> <li>When used with <b>notification-control</b>—Disable the generation of PoE SNMP traps. To re-enable PoE traps, delete the <b>disable</b> statement from the <b>notification-control</b> entry in the configuration.</li> </ul>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li><a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li> <li><a href="#">Configuring PoE (CLI Procedure) on page 25</a></li> </ul>

## duration

---

<b>Syntax</b>	<code>duration <i>hours</i>;</code>
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> ) <a href="#">telemetries</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Modify the duration over which data is collected when you are monitoring the power consumption of a PoE interface.
<b>Options</b>	<b><i>hours</i></b> —Number of hours over which the data is to be collected. <b>Range:</b> 1 through 24 <b>Default:</b> 1
<b>Required Privilege Level</b>	<b>system</b> —To view this statement in the configuration. <b>system-control</b> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

## fpc (Line Card)

---

<b>Syntax</b>	<pre>fpc ( all   <i>slot-number</i> ) {     guard-band watts;     management (class   static);     maximum-power watts; }</pre>
<b>Hierarchy Level</b>	[edit poe]
<b>Release Information</b>	Statement introduced in Junos OS Release 11.2 for EX Series switches.
<b>Description</b>	Configure PoE options for an EX6200 or EX8200 line card.
<b>Options</b>	<p><b>all</b>—All line cards that support PoE that have not been individually configured for PoE. If a line card has been individually configured for PoE, that configuration overrides any settings specified with <b>all</b>.</p> <p><b><i>slot-number</i></b>—The line card slot number.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li> <li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li> </ul>

## fpc (Notification Control)

---

<b>Syntax</b>	<code>fpc slot-number {     disable; }</code>
<b>Hierarchy Level</b>	[edit poe <a href="#">notification-control</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Enable the specified PoE controller to generate PoE traps.
<b>Default</b>	PoE traps are disabled by default.
<b>Options</b>	<p><i>slot-number</i>—Indicates the PoE controller by FPC slot number, where <i>slot-number</i> is:</p> <ul style="list-style-type: none"><li>• 0—On an EX2200, EX3200, standalone EX3300, or standalone EX4200 switch</li><li>• Member ID—On an EX3300 or EX4200 switch in a Virtual Chassis</li><li>• Line card slot number—On an EX6200 or EX8200 switch</li></ul> <p>The remaining statement is explained separately.</p>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

## guard-band

---

<b>Syntax</b>	<code>guard-band <i>watts</i>;</code>
<b>Hierarchy Level</b>	[edit poe], [edit poe (all   fpc <i>slot-number</i> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Reserve a specified amount of power from the PoE power budget for the switch or the line card in case of a spike in PoE consumption.
<b>Options</b>	<b>watts</b> —Amount of power to be reserved in case of a spike in PoE consumption. <b>Range:</b> 0 through 15 for EX6200 and EX8200 switches and 0 through 19 for all other switches <b>Default:</b> 0
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

## interface

---

<b>Syntax</b>	<pre>interface (all   <i>interface-name</i>) {   af-mode;   disable;   maximum-power <i>watts</i>;   priority (high   low);   telemetries {     disable;     duration <i>hours</i>;     interval <i>minutes</i>;   } }</pre>
<b>Hierarchy Level</b>	[edit poe]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Specify a PoE interface to be configured.
<b>Options</b>	<p><b>all</b>—All PoE interfaces on the switch that have not been individually configured for PoE. If a PoE interface has been individually configured, that configuration overrides any settings specified with <b>all</b>.</p> <p><b><i>interface-name</i></b>—Name of the specific interface being configured.</p> <p>If you use the <b>interface</b> statement without any substatements, PoE is enabled on all interfaces or the specified interface with default values for the remaining statements.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

---

## interval

---

<b>Syntax</b>	<code>interval <i>minutes</i>;</code>
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> ) <a href="#">telemetries</a> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Modify the interval at which data is collected when you are monitoring the power consumption of a PoE interface.
<b>Options</b>	<b><i>minutes</i></b> —Frequency of data collection. <b>Range:</b> 1 through 30 <b>Default:</b> 5
<b>Required Privilege Level</b>	<b>system</b> —To view this statement in the configuration. <b>system-control</b> —To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li><li>• <a href="#">Configuring PoE (J-Web Procedure) on page 31</a></li></ul>

## management

---

<b>Syntax</b>	management (class   static);
<b>Hierarchy Level</b>	[edit poe], [edit poe (all   fpc slot-number)]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Designate how the PoE controller allocates power to the PoE interfaces.
<b>Default</b>	class
<b>Options</b>	<ul style="list-style-type: none"><li>• <b>class</b>—The amount of power allocated to the interface is determined by the class of the connected powered device. If no powered device is connected, no power is allocated to the interface. See <a href="#">“PoE and EX Series Switches Overview” on page 3</a> for more information about classes of powered devices.</li><li>• <b>static</b>—The amount of power allocated to the interface is determined by the value of the <a href="#">maximum-power</a> statement, not the class of the connected powered device. This amount is allocated even when a powered device is not connected to the interface, ensuring that power is available when needed.</li></ul>
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li><li>• <a href="#">PoE and EX Series Switches Overview on page 3</a></li></ul>



## maximum-power (Interface)

<b>Syntax</b>	<code>maximum-power watts;</code>
<b>Hierarchy Level</b>	[edit poe <b>interface</b> (all   <i>interface-name</i> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Set the maximum amount of power that the switch can supply to the PoE port.



**NOTE:** Although you can set this value when PoE power management is in class mode, it does not establish the maximum power for the port. Instead, the IEEE 802.3af (PoE) or IEEE 802.3at (PoE+) class of the connected device determines the maximum power for the port.

**Options** **watts**—The maximum number of watts that can be supplied to the port.

For EX2200 switches, EX3300 switches, EX4200 switches, EX6200 switches, and EX8200 switches:

**Range:** 0.0 through 30.0

**Default:** 15.4 W for ports that support IEEE 802.3af and 30 W for ports that support IEEE 802.3at

For EX3200 switches:

**Range:** 0.0 through 18.6

**Default:** 15.4 W



**NOTE:** The **maximum-power** setting permitted by the CLI might be greater than the maximum power a given PoE port can deliver. For example, the CLI permits you to set any PoE port on an EX8200 line card to 30 W; however, only ports 0 through 11 support 30 W. Similarly, the CLI permits you to set any PoE port on an EX4200 switch to 30 W, but some models of EX4200 switch support only 18.6 W per port. If you configure a **maximum-power** value that is greater than the maximum power supported by a port, the power allocated to the port will be the maximum supported.

If you use the **all** option to set **maximum-power** to a value greater than 15.4 W on all interfaces on an EX8200 line card, the maximum power allocated to all ports is 15.4 W.




**NOTE:** Support for a maximum of 18.6 W per port instead of 15.4 W per port on EX3200 switches and P and T models of EX4200 switch requires Junos OS Release 11.1 or later. In addition to requiring an upgrade of Junos OS to

Release 11.1 or later, switches that are running a previous Junos OS release require the PoE controller software be upgraded as described in [“Upgrading the PoE Controller Software for Enhanced PoE Support” on page 40](#). If the controller software is not upgraded and you set `maximum-power` to a value greater than 15.4 W, the configuration is accepted when you commit it, but the actual power allocated to the port will be 15.4 W.

---

<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

## maximum-power (Line Card)

<b>Syntax</b>	<code>maximum-power watts;</code>
<b>Hierarchy Level</b>	<code>[edit poe fpc (all   <i>slot-number</i>)]</code>
<b>Release Information</b>	Statement introduced in Junos OS Release 11.2 for EX Series switches.
<b>Description</b>	Set the PoE power budget for an EX6200 or an EX8200 line card.
<b>Options</b>	<p><b>watts</b>—The maximum number of watts that is supplied to the line card for its PoE power budget.</p> <p>For the EX6200-48P (48-port PoE+) line card:  <b>Range:</b> 37 through 1440  <b>Default:</b> 1440</p> <p>For the EX8200-2XS-40P (40-port PoE+ with 4-port SFP and 2-port SFP+) line card:  <b>Range:</b> 37 through 792  <b>Default:</b> 792</p> <p>For the EX8200-48PL (48-port PoE+ 20 Gbps) line card:  <b>Range:</b> 37 through 915  <b>Default:</b> 915</p>
	<div>  <p><b>NOTE:</b> If you configure a value for watts that is greater than the maximum value supported by the line card, the power budget for the line card is set to its supported maximum. If you configure a value for watts that is lower than 37 W, the power budget for the line card is set at 37 W. Because of a hardware constraint, at least 37 W of PoE power must always be allocated to the PoE line cards.</p> </div>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring PoE on an EX6200 or EX8200 Switch on page 16</a></li> <li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li> </ul>

## notification-control

---

**Syntax**    notification-control {  
              fpc slot-number {  
                  disable;  
              }  
          }

**Hierarchy Level**    [edit poe]

**Release Information**    Statement introduced in Junos OS Release 9.0 for EX Series switches.

**Description**    Enable or disable the generation of PoE SNMP traps. If PoE traps are enabled, an SNMP trap is sent whenever a PoE interface is enabled or disabled.

The remaining statements are explained separately.

**Required Privilege Level**    system—To view this statement in the configuration.  
                                  system-control—To add this statement to the configuration.

**Related Documentation**

- [Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11](#)
- [Configuring PoE \(CLI Procedure\) on page 25](#)

## priority

<b>Syntax</b>	<code>priority (low   high);</code>
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Set the power priority for individual interfaces when there is insufficient power for all PoE interfaces. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, low priority devices are shut down before high priority devices. Among interfaces that have the same assigned priority, priority is determined by port number, with lower-numbered ports having higher priority.
<b>Default</b>	<code>low</code>
<b>Options</b>	<p><i>value</i>—high or low:</p> <ul style="list-style-type: none"> <li>• <b>high</b>—Specifies that this interface is to be treated as high priority in terms of power allocation. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, power is not shut down on this interface until it has been shut down on all the low priority interfaces.</li> <li>• <b>low</b>—Specifies that this interface is to be treated as low priority in terms of power allocation. If the switch needs to shut down powered devices because PoE demand exceeds the PoE budget, power is shut down on this interface before it is shut down on high priority interfaces.</li> </ul>
<b>Required Privilege Level</b>	<p>system—To view this statement in the configuration.</p> <p>system-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li> <li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li> </ul>

## telemetries

---

<b>Syntax</b>	<pre>telemetries {   disable;   duration <i>hours</i>;   interval <i>minutes</i>; }</pre>
<b>Hierarchy Level</b>	[edit poe <a href="#">interface</a> (all   <i>interface-name</i> )]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	<p>Enable the logging of power consumption of a PoE interface over time.</p> <p>If you want to log the power consumption of a PoE interface, you must explicitly specify the <b>telemetries</b> statement. When you commit the configuration, logging begins, with data being collected at the specified intervals. Logging stops at the end of the specified duration. If you did not specify the <b>duration</b> and <b>interval</b> statements, data is collected at five minute intervals for one hour.</p> <p>The remaining statements are explained separately.</p>
<b>Default</b>	Logging of power consumption is disabled.
<b>Required Privilege Level</b>	system—To view this statement in the configuration. system-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Example: Configuring PoE Interfaces with Different Priorities on an EX Series Switch on page 11</a></li><li>• <a href="#">Configuring PoE (CLI Procedure) on page 25</a></li></ul>

## CHAPTER 7

# Operational Commands for PoE

## request poe software upgrade

---

<b>Syntax</b>	request poe software upgrade
<b>Release Information</b>	Command introduced in Junos OS Release 11.1 for EX Series switches.
<b>Description</b>	<p>Upgrade the PoE controller software on EX3200 and EX4200 switches.</p> <p>The Junos OS image running on the switch contains a copy of the PoE controller software. This command compares the Junos OS version with the PoE controller version. If the Junos OS version is a more recent version, the command erases the software on the PoE controller and downloads the more recent version to the controller. A reboot of the switch is required to complete the upgrade.</p> <p>If you execute this command on a Virtual Chassis master switch, all PoE controllers on member switches that require a software upgrade will be upgraded. You can execute this command on the master switch of a mixed EX4200 and EX4500 Virtual Chassis when the master switch is an EX4500 switch. We recommend that all members of a Virtual Chassis run the same version of the PoE controller software.</p> <p>Download of the software to the controller can take up to 45 minutes. During this period, power to the powered devices is not guaranteed. Use the <a href="#">show poe controller</a> command to monitor the progress of the software download.</p>
<b>Required Privilege Level</b>	maintenance
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">show poe controller on page 64</a></li><li>• <a href="#">Upgrading the PoE Controller Software for Enhanced PoE Support on page 40</a></li></ul>
<b>List of Sample Output</b>	<a href="#">request poe software upgrade (EX4200 Virtual Chassis) on page 63</a>
<b>Output Fields</b>	<p>When you enter this command, you are provided feedback on the status of your request:</p> <ul style="list-style-type: none"><li>• If the PoE controller software needs to be upgraded, the command displays how long the PoE controller software download takes and advises you to use the <b>show poe controller</b> command to monitor the download process.</li><li>• If the switch does not support the command (for example, the switch does not have a PoE controller), the command displays the message <b>Download Not supported on this FPC</b>.</li><li>• If the PoE controller software is current with the software in the Junos OS image, the command displays the message <b>PoE software update NOT required</b> and provides the version numbers for the software currently running on the controller and for the copy of the controller software contained in the Junos OS image.</li></ul>



## Sample Output

```
request poe software      user@switch> request poe software upgrade reboot
upgrade (EX4200           fpc0:
Virtual Chassis)         -----
                          Download Not supported on this FPC

                          fpc1:
                          -----
                          PoE software download time is about 35-45 minutes
                          use 'show poe controller' to get the download status
                          WARNING: reboot is required after the download

                          fpc2:
                          -----
                          PoE software download time is about 35-45 minutes
                          use 'show poe controller' to get the download status
                          WARNING: reboot is required after the download

                          fpc3:
                          -----
                          PoE software update NOT required...
                          software version --> 614
                          file version --> 614
```

## show poe controller

<b>Syntax</b>	<code>show poe controller</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Display configuration and status of the PoE controllers.
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show poe interface on page 66</a></li> <li>• <a href="#">request poe software upgrade on page 62</a></li> <li>• <a href="#">Verifying PoE Configuration and Status (CLI Procedure) on page 37</a></li> <li>• <a href="#">Monitoring PoE Power Consumption (CLI Procedure) on page 34</a></li> <li>• <a href="#">Upgrading the PoE Controller Software for Enhanced PoE Support on page 40</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show poe controller (EX3200 Switch) on page 65</a> <a href="#">show poe controller (EX8200 Switch) on page 65</a>
<b>Output Fields</b>	Table 12 on page 64 lists the output fields for the <b>show poe controller</b> command. Output fields are listed in the approximate order in which they appear.

**Table 12: show poe controller Output Fields**

Field Name	Field Description
<b>Controller index</b>	PoE controller number: <ul style="list-style-type: none"> <li>• 0 for EX2200, EX3200, standalone EX3300, and standalone EX4200 switches.</li> <li>• Member ID for switches in an EX3300 Virtual Chassis, EX4200 Virtual Chassis, or a mixed EX4200 and EX4500 Virtual Chassis.</li> <li>• Slot number for line cards with a PoE controller in an EX6200 or EX8200 switch.</li> </ul>
<b>Maximum power</b>	The PoE power budget for the switch or line card. The PoE controller allocates power to the PoE ports from this budget.
<b>Power consumption</b>	Total amount of power being used by the PoE ports at the time the command is executed.
<b>Guard Band</b>	Amount of power that has been placed in reserve for power demand spikes and that cannot be allocated to a PoE interface.
<b>Management</b>	Power management mode: either <b>Class</b> or <b>Static</b> .

Table 12: show poe controller Output Fields (*continued*)

Field Name	Field Description
<b>Status</b>	<p>Status of the PoE controller:</p> <ul style="list-style-type: none"> <li>• <b>AF_ENHANCE</b>—Controller supports enhanced PoE. The maximum power per PoE port is 18.6 W in static mode (15.4 W in class mode).</li> <li>• <b>DEVICE FAIL</b>—Software download to the controller has failed or the PoE controller is not initialized because of a hardware failure.</li> <li>• <b>AF_MODE</b>—Controller supports standard IEEE 802.3af. The maximum power per PoE port is 15.4 W.</li> <li>• <b>AT/AF COMBO</b>—Controller supports a mix of standard IEEE 802.3af and IEEE 802.3at (PoE+) ports. The maximum power per port is 30 W for IEEE 802.3at (PoE+) ports and 15.4 W for the IEEE 802.3af ports.</li> <li>• <b>AT_MODE</b>—Controller supports IEEE 802.3at (PoE+). The maximum power per PoE port is 30 W.</li> <li>• <b>POE_SW_ERASE</b>—Controller software is being erased in preparation to downloading and installing new software.</li> <li>• <b>REBOOT_REQUIRED</b>—Controller software finished downloading. A reboot of the switch is now required to complete the controller software upgrade.</li> <li>• <b>SW_DOWNLOAD (n%)</b>—Software download to the controller is in progress.</li> </ul>

### Sample Output

**show poe controller**  
(EX3200 Switch)

user@switch> show poe controller

Controller index	Maximum power	Power consumption	Guard band	Management	Status
0	130.00W	81.20W	10W	Static	AF_ENHANCE

**show poe controller**  
(EX8200 Switch)

user@switch> show poe controller

Controller index	Maximum power	Power consumption	Guard band	Management	Status
0	792.00W	603.50W	0W	Class	AT/AF COMBO
4	915.00W	781.00W	0W	Class	AT/AF COMBO
7	915.00W	0.00W	0W	Class	AT/AF COMBO

## show poe interface

<b>Syntax</b>	<code>show poe interface</code> <code>&lt;fpc-slot number&gt;</code> <code>&lt;interface-name&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	Display the status of PoE interfaces.
<b>Options</b>	<p>none—Display status of all PoE interfaces on the switch.</p> <p><b>fpc-slot number</b>—(Optional) (EX6200 or EX8200 switches only) Display the status of the PoE interfaces on the specified line card.</p> <p><b>interface-name</b>—(Optional) Display the status of a specific PoE interface on the switch.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show poe controller on page 64</a></li> <li>• <a href="#">Verifying PoE Configuration and Status (CLI Procedure) on page 37</a></li> <li>• <a href="#">Monitoring PoE Power Consumption (CLI Procedure) on page 34</a></li> <li>• <a href="#">Troubleshooting PoE Interfaces on page 43</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show poe interface on page 67</a> <a href="#">show poe interface ge-0/0/3 on page 67</a> <a href="#">show poe interface fpc-slot 3 on page 67</a>
<b>Output Fields</b>	Table 13 on page 66 lists the output fields for the <b>show poe interface</b> command. Output fields are listed in the approximate order in which they appear.

Table 13: show poe interface Output Fields

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Interface	PoE Interface	Interface name.
Admin status	Administrative status	Administrative state of the PoE interface: <b>Enabled</b> or <b>Disabled</b> . If the PoE interface is disabled, it can provide network connectivity, but it cannot provide power to connected devices.
Oper status	Operational status	Operational state of the PoE interface: <ul style="list-style-type: none"> <li>• <b>ON</b>—The interface is currently supplying power to a powered device.</li> <li>• <b>OFF</b>—PoE is enabled on the interface, but the interface is not currently supplying power to a powered device.</li> <li>• <b>Disabled</b>—PoE is disabled on the interface.</li> </ul>

Table 13: show poe interface Output Fields (*continued*)

Field Name (All Interfaces Output)	Field Name (Single Interface Output)	Field Description
Max power	Power limit on the interface	Maximum power that can be provided by the interface.
Priority	Priority	Interface power priority: either <b>High</b> or <b>Low</b> .
Power consumption	Power consumed	Amount of power being used by the interface at the time the command is executed.
Class	Class of power device	IEEE 802.3af (PoE) or IEEE 802.3at (PoE+) class of the powered device. Class 0 is the default class and is used when the class of the powered device is unknown. If no powered device is connected, this field contains <b>not applicable</b> .
	PoE Mode	(EX6200 and EX8200 switches only) IEEE PoE standard supported by the interface—either <b>802.3af</b> or <b>802.3at</b> .

## Sample Output

**show poe interface**    user@switch> **show poe interface**

```

Interface Admin status Oper status Max power Priority Power consumption Class
ge-0/0/0 Enabled      ON      15.4W Low      7.9W      0
ge-0/0/1 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/2 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/3 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/4 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/5 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/6 Enabled      ON      15.4W Low      3.2W      2
ge-0/0/7 Enabled      ON      15.4W Low      3.2W      2

```

**show poe interface**    user@switch> **show poe interface ge-0/0/3**  
**ge-0/0/3**

```

PoE interface status:
PoE interface           : ge-0/0/3
Administrative status    : Enabled
Operational status      : ON
Power limit on the interface : 7.0W
Priority                 : Low
Power consumed          : 5.3W
Class of power device    : 2
PoE Mode                : 802.3af

```

**show poe interface**    user@switch> **show poe interface fpc-slot 3**  
**fpc-slot 3**

```

Interface Admin status Oper status Max power Priority Power consumption Class
ge-3/0/0 Enabled      ON      30.0W Low      20.3W      4
ge-3/0/1 Enabled      ON      30.0W Low      17.8W      4
ge-3/0/2 Enabled      ON      30.0W High     16.3W      4
ge-3/0/3 Enabled      ON      30.0W High     16.2W      4
ge-3/0/4 Enabled      ON      30.0W Low      25.9W      4
ge-3/0/5 Enabled      ON      30.0W Low      10.1W      4
ge-3/0/6 Enabled      ON      30.0W Low      16.2W      4
ge-3/0/7 Enabled      ON      30.0W Low      6.4W       4

```

ge-3/0/8	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/9	Enabled	ON	30.0W	Low	5.2W	4
ge-3/0/10	Enabled	ON	30.0W	Low	21.5W	4
ge-3/0/11	Enabled	ON	30.0W	Low	21.7W	4
ge-3/0/12	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/13	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/14	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/15	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/16	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/17	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/18	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/19	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/20	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/21	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/22	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/23	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/24	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/25	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/26	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/27	Enabled	ON	15.4W	Low	9.4W	0
ge-3/0/28	Enabled	ON	15.4W	Low	7.0W	0
ge-3/0/29	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/30	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/31	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/32	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/33	Enabled	ON	15.4W	Low	2.0W	1
ge-3/0/34	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/35	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/36	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/37	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/38	Enabled	ON	15.4W	Low	2.2W	1
ge-3/0/39	Enabled	ON	15.4W	Low	2.2W	1

show poe notification-control

Syntax	show poe notification-control
Release Information	Command introduced in Junos OS Release 9.0 for EX Series switches.
Description	Display the state of the PoE <b>notification-control</b> option, which enables or disables PoE SNMP traps.
Required Privilege Level	view
Related Documentation	<ul style="list-style-type: none"><li>• <a href="#">show poe controller on page 64</a></li><li>• <a href="#">show poe interface on page 66</a></li><li>• <a href="#">Verifying PoE Configuration and Status (CLI Procedure) on page 37</a></li></ul>
List of Sample Output	<a href="#">show poe notification-control on page 70</a>
Output Fields	<a href="#">Table 14 on page 69</a> lists the output fields for the <b>show poe notification-control</b> command. Output fields are listed in the approximate order in which they appear.

Table 14: show poe notification-control Output Fields

Field Name	Field Description
FPC slot	FPC slot number: <ul style="list-style-type: none"><li>• 0 for a standalone switch</li><li>• Member ID for a Virtual Chassis</li></ul>
Notification-control-status	Status of notification control: <ul style="list-style-type: none"><li>• <b>ON</b>—PoE traps are enabled.</li><li>• <b>OFF</b>—PoE traps are disabled.</li></ul>

## Sample Output

```
show poe notification-control user@switch> show poe notification-control
notification-control          FPC slot      Notification-control-status
                             0              OFF
```



## show poe telemetries interface

<b>Syntax</b>	<code>show poe telemetries interface <i>interface-name</i> ( all   <i>n</i> )</code>
<b>Release Information</b>	Command introduced in Junos OS Release 9.0 for EX Series switches.
<b>Description</b>	<p>Display a history of power consumption on the specified interface.</p> <p>Telemetries must be enabled on the interface before you can display a history of power consumption.</p>
<b>Options</b>	<p><i>interface-name</i>—Display power consumption records for the specified PoE interface.</p> <p><i>all</i>—Display all power consumption records for the PoE interface.</p> <p><i>n</i>—Display the specified number of power consumption records for the PoE interface. The records displayed are the most recent.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">show poe interface on page 66</a></li> <li>• <a href="#">show poe controller on page 64</a></li> <li>• <a href="#">Monitoring PoE Power Consumption (CLI Procedure) on page 34</a></li> <li>• <a href="#">Verifying PoE Configuration and Status (CLI Procedure) on page 37</a></li> <li>• <a href="#">Troubleshooting PoE Interfaces on page 43</a></li> </ul>
<b>List of Sample Output</b>	<p><a href="#">show poe telemetries interface (Last 10 Records) on page 72</a></p> <p><a href="#">show poe telemetries interface (All Records) on page 72</a></p>
<b>Output Fields</b>	<p><a href="#">Table 15 on page 71</a> lists the output fields for the <code>show poe telemetries interface</code> command. Output fields are listed in the approximate order in which they appear.</p>

**Table 15: show poe telemetries interface Output Fields**

Field Name	Field Description
<b>SI No</b>	Number of the record for the specified port. Record number 1 is the most recent.
<b>Timestamp</b>	Date and time when the power-consumption data was gathered.
<b>Power</b>	Amount of power provided by the specified interface at the time the data was gathered.
<b>Voltage</b>	Maximum voltage provided by the specified interface at the time the data was gathered.

## Sample Output

```
show poe telemetries user@switch> show poe telemetries interface ge-0/0/0 10
interface (Last 10
Records)
SI No      Timestamp                Power    Voltage
1         01-27-2008 18:19:58 UTC  15.4W    51.6V
2         01-27-2008 18:18:58 UTC  15.4W    51.6V
3         01-27-2008 18:17:58 UTC  15.4W    51.6V
4         01-27-2008 18:16:58 UTC  15.4W    51.6V
5         01-27-2008 18:15:58 UTC  15.4W    51.6V
6         01-27-2008 18:14:58 UTC  15.4W    51.6V
7         01-27-2008 18:13:58 UTC  15.4W    51.6V
8         01-27-2008 18:12:57 UTC  15.4W    51.6V
9         01-27-2008 18:11:57 UTC  15.4W    51.6V
10        01-27-2008 18:10:57 UTC  15.4W    51.6V
```

```
show poe telemetries user@switch> show poe telemetries interface ge-0/0/0 all
interface (All Records)
SI No      Timestamp                Power    Voltage
1         01-27-2008 18:19:58 UTC  15.4W    51.6V
2         01-27-2008 18:18:58 UTC  15.4W    51.6V
3         01-27-2008 18:17:58 UTC  15.4W    51.6V
4         01-27-2008 18:16:58 UTC  15.4W    51.6V
5         01-27-2008 18:15:58 UTC  15.4W    51.6V
6         01-27-2008 18:14:58 UTC  15.4W    51.6V
7         01-27-2008 18:13:58 UTC  15.4W    51.6V
8         01-27-2008 18:12:57 UTC  15.4W    51.6V
9         01-27-2008 18:11:57 UTC  15.4W    51.6V
10        01-27-2008 18:10:57 UTC  15.4W    51.6V
11        01-27-2008 18:09:57 UTC  15.4W    51.6V
12        01-27-2008 18:08:57 UTC  15.4W    51.6V
13        01-27-2008 18:07:57 UTC  15.4W    51.6V
14        01-27-2008 18:06:57 UTC  15.4W    51.6V
15        01-27-2008 18:05:57 UTC  15.4W    51.6V
16        01-27-2008 18:04:56 UTC  15.4W    51.6V
17        01-27-2008 18:03:56 UTC  15.4W    51.6V
18        01-27-2008 18:02:56 UTC  15.4W    51.6V
19        01-27-2008 18:01:56 UTC  15.4W    51.6V
20        01-27-2008 18:00:56 UTC  15.4W    51.6V
21        01-27-2008 17:59:56 UTC  15.4W    51.6V
22        01-27-2008 17:58:56 UTC  15.4W    51.6V
23        01-27-2008 17:57:56 UTC  15.4W    51.6V
24        01-27-2008 17:56:55 UTC  15.4W    51.6V
25        01-27-2008 17:55:55 UTC  15.4W    51.6V
26        01-27-2008 17:54:55 UTC  15.4W    51.6V
27        01-27-2008 17:53:55 UTC  15.4W    51.6V
28        01-27-2008 17:52:55 UTC  15.4W    51.6V
29        01-27-2008 17:51:55 UTC  15.4W    51.6V
30        01-27-2008 17:50:55 UTC  15.4W    51.6V
31        01-27-2008 17:49:55 UTC  15.4W    51.6V
32        01-27-2008 17:48:55 UTC  15.4W    51.6V
33        01-27-2008 17:47:54 UTC  15.4W    51.6V
34        01-27-2008 17:46:54 UTC  15.4W    51.6V
35        01-27-2008 17:45:54 UTC  15.4W    51.6V
36        01-27-2008 17:44:54 UTC  15.4W    51.6V
37        01-27-2008 17:43:54 UTC  15.4W    51.6V
38        01-27-2008 17:42:54 UTC  15.4W    51.6V
39        01-27-2008 17:41:54 UTC  15.4W    51.6V
40        01-27-2008 17:40:54 UTC  15.4W    51.6V
41        01-27-2008 17:39:53 UTC  15.4W    51.6V
42        01-27-2008 17:38:53 UTC  15.4W    51.6V
```

43	01-27-2008 17:37:53 UTC	15.4W	51.6V
44	01-27-2008 17:36:53 UTC	15.4W	51.6V

