ProCurve
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Planning and
Implementation Guide

PoE (Power over Ethernet) Devices

Power over Ethernet Devices

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Power over Ethernet (PoE)

Planning and Implementation Guide

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Applicable Products

ProCurve Switch 5406zl	(J8697A)
ProCurve Switch 5406zl-48G	(J8699A)
ProCurve Switch 5412zl	(J8698A)
ProCurve Switch 5412zl-96G	(J8700A)
ProCurve Switch 3500yl-24G-PWR	(J8762A)
ProCurve Switch 3500yl-48G-PWR	(J8693A)
ProCurve 620 Redundant and External Power Supply	(J8696A)
ProCurve Switch zl Power Supply Shelf	(J8714A)
ProCurve Switch 8212zl	(J8715A)
ProCurve Switch 2626-PWR	(J8164A)
ProCurve Switch 2650-PWR	(J8165A)
ProCurve Switch 2600-8-PWR with Gigabit Uplink	(J8762A)
ProCurve Switch 2610-24/12PWR	(J9086A)
ProCurve Switch 2610-24-PWR	(J9087A)
ProCurve Switch 2610-48-PWR	(J9089A)
ProCurve Switch xl PoE Module	(J8161A)
ProCurve 600 Redundant and External Power Supply	(J8168A)
ProCurve 610 External Power Supply	(J8169A)

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Introduction

This chapter provides an overview of Power over Ethernet (PoE) and a list of reasons why you might want to implement PoE in your environment. It discusses how PoE transmits power over twisted pair cable and the capabilities of the devices used to provide PoE.

Overview

Power over Ethernet technology allows IP telephones, wireless LAN Access Points and other appliances to receive power as well as data over existing LAN cabling, without needing to modify the existing Ethernet infrastructure.

Power over Ethernet has become a standard feature of ethernet switches, as the cost of adding power supplies to the Ethernet switches is small. IEEE 802.3af is an extension to the existing Ethernet standards. It offers the first truly international standard for power distribution (consider how many different AC power plugs exist worldwide).

Almost all appliances require both data connectivity and a power supply. Just as telephones are powered from the telephone exchange through the same twisted pair that carries the voice, we can now do the same thing with Ethernet devices.

The technology is bound to make a big impact in the world of embedded computing. In the realm of embedded computers, where the systems are increasingly connected to LANs and the internet, the advantages of providing power and data through a single cable should be obvious. Consider a typical application: a system for a multi-level car parking garage that includes security cameras, information signs, call-for-help telephones and vehicle sensors. Such a system is distributed over a significant area, where main power is not easily available. A single link to a PoE Ethernet Switch makes implementing this system less expensive and faster than using a non-PoE switch.

Power over Ethernet connections to embedded computers will allow a less expensive installation (no AC cabling, lower labor costs), facilitate updating the installation and repositioning of end devices (wireless access points, security cameras, and so forth) without electricians, while maintaining full control over every node through the internet.

Figure 1-1 shows a typical system implemented to power telephones and wireless access points. The PoE Ethernet switches are installed to supply power over the twisted pair LAN cables to run phones or other appliances as required.

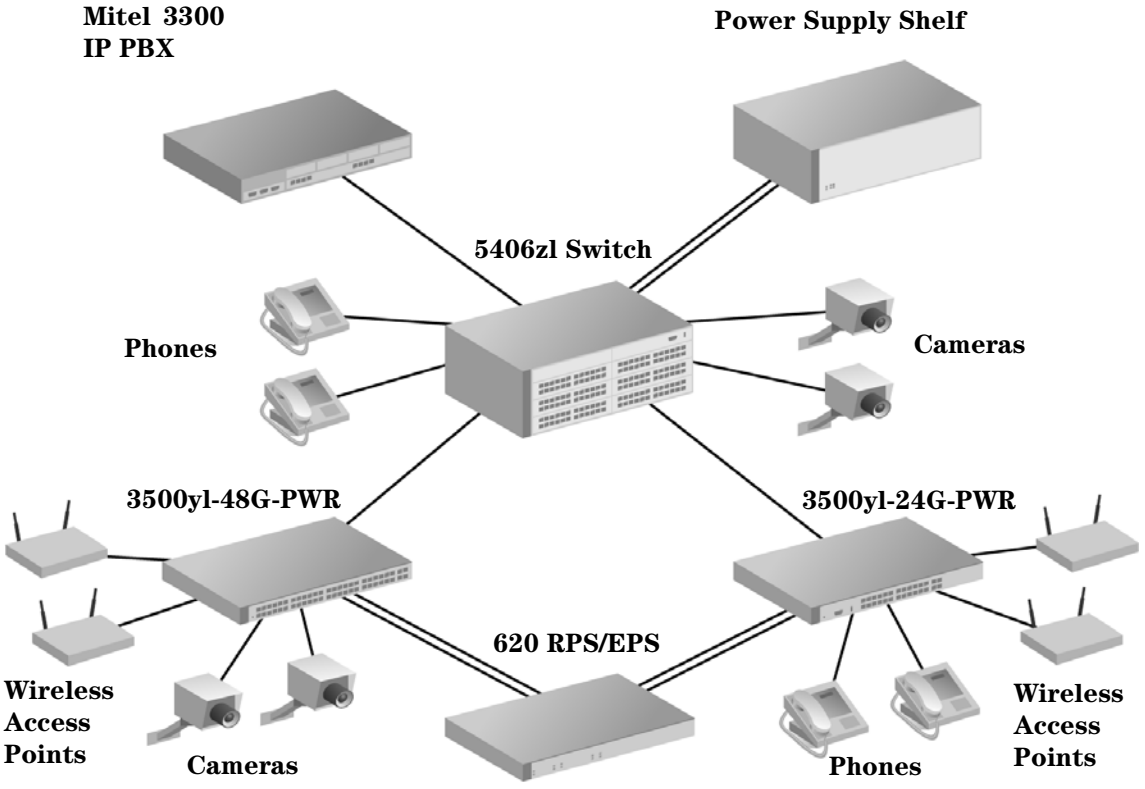


Figure 1-1. Example of a Typical Implementation

Here are some reasons why you might want to do this:

- Simplifies installation and saves space - only one set of wires to bring to your appliance.
- Saves time and money - there is no need to pay for additional electrical power runs or to delay your installation schedule to make them.
- Minimal disruption to the workplace - the appliance can be easily moved, to wherever you can lay a LAN cable.
- Safer - no AC voltages need to be added for additional network devices.
- As well as the data transfer to and from the appliance, you can use SNMP network management infrastructure to monitor and control the appliances.
- Appliances can be shut down or reset remotely - no need for a reset button or power switch.
- When implementing wireless LAN systems it simplifies the radio frequency (RF) survey task, as the access point can easily be moved and wired in.

Power Through the Cable

A standard CAT5 Ethernet cable has four twisted pairs, but only two of these pairs are used for 10Base-T and 100Base-TX data and all four are used for 1000Base-T data. The specification allows two options for using these cables for power:

- **The spare pairs are used.** The pair on pins 4 and 5 are connected together and form the positive supply, and the pair on pins 7 and 8 are connected and form the negative supply.
- **The data pairs are used.** Since Ethernet pairs are transformer coupled at each end, it is possible to apply DC power to the center tap of the isolation transformer without upsetting the data transfer. In this mode of operation the pair on pins 1 and 2 and the pair on pins 3 and 6 can be of either polarity.

The 802.3af standard does not allow both pairs (spare and data) to be used - a choice must be made. The Power Sourcing Equipment (PSE) applies power to either set of wires. ProCurve Networking switches, as a PSE, supply PoE power over the “data pair” or, pins 1 and 2, and the pair on pins 3 and 6. The Powered Device (PD) must be able to accept power from both options because mid-span equipment must (according to the specification) supply power over the “spare pair” or pins 4 and 5, and the pair on pins 7 and 8.

An obvious requirement of the specification is to prevent damage to existing Ethernet equipment. A discovery process, run from the PSE, examines the Ethernet cables, looking for devices that comply with the specification.

It does this by applying a small current-limited voltage to the cable and checks for the presence of a 25k ohm resistor in the remote device. Only if the resistor is present, will the full wattage be applied, but this is still current-limited to prevent damage to cables and equipment in fault conditions.

The PD must continue to draw a minimum current. If it does not (for example, when the device is unplugged) then the PSE removes the power and the discovery process begins again.

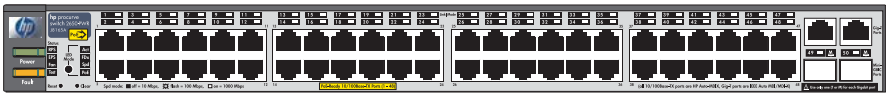
PoE Capabilities of the Products

These switch devices are designed to be used primarily in wiring closets directly connected to computers, printers, and servers to provide dedicated bandwidth to those devices. In addition, they support the PoE standard, IEEE 802.3af, and can supply power over a twisted-pair cable to power devices such as telephones and wireless access points.

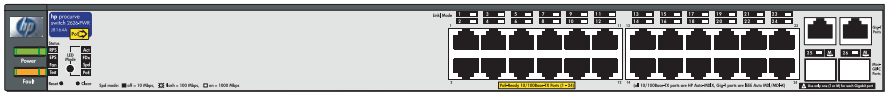
The ProCurve PoE switch devices are multiport switches that can be used to build high-performance switched workgroup networks with PoE. These switches are store-and-forward devices that offer low latency for high-speed networking. The ProCurve PoE switch devices are designed to support Redundant Power Supply and Power over Ethernet (PoE) technologies.

Switch 2600 Series

- The 2650-PWR (J8165A), has 48 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports.



- 2626-PWR (J8164A), has 24 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports.



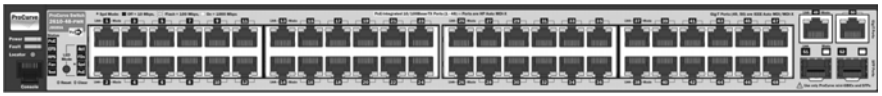
- 2600-8-PWR with Gigabit Uplink (J8762A), has 8 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with one dual-personality Gigabit Uplink port. The 2600-8-PWR also supports some pre-standard PoE devices. For a list of these devices, see the FAQs for your switch model. This feature must be enabled, it is not a default feature.

The dual-personality ports have either auto-sensing 10/100/1000Base-T RJ-45, or mini-GBIC connectivity. The dual-personality ports do not support PoE.

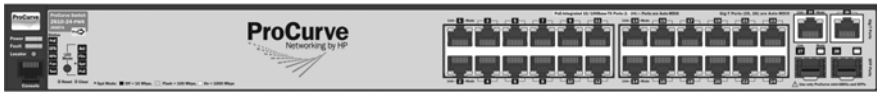
Switch 2610 Series

These switches support some pre-standard PoE devices. For a list of these devices, see the FAQs for your switch model. This feature must be enabled, it is not a default feature.

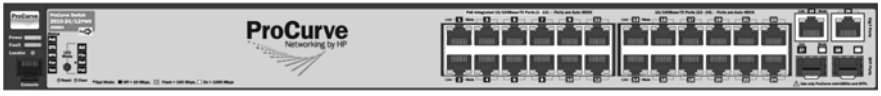
- The 2610-48-PWR (J9089A), has 48 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with four Gigabit Uplink ports.



- 2610-24-PWR (J9087A), has 24 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with four Gigabit Uplink ports.

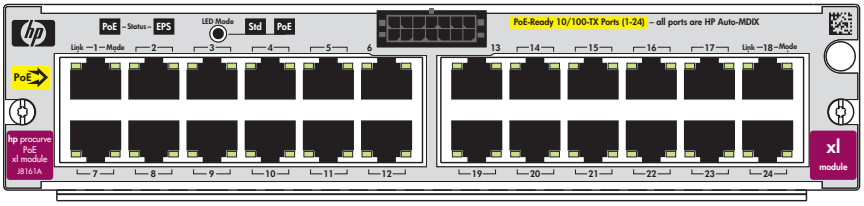


- 2610-24/12PWR (J9086A), has 24 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with four Gigabit Uplink ports.



Switch xl PoE Module

- The ProCurve Switch xl PoE Module (J8161A) is a module for the ProCurve 5300xl Switch and has 24 PoE-Ready auto-sensing 10/100-TX RJ-45 ports.



All 24 ports are capable of supplying PoE power. However, for the module ports to be able to supply PoE power it first must be connected to an EPS port on a ProCurve 600 Redundant and External Power Supply (J8168A), or the ProCurve 610 External Power Supply (J8169A), hereafter referred to as the 600 RPS/EPS or the 610 EPS, respectively.

Power Redundancy for the Switch 2600, 2610 Series and the Switch xl PoE module (J8161A)

The internal power supply in these switches provides both the 12V (RPS) and 50V (EPS) circuits. If either the 12V or 50V fails, the power supply shuts down which will bring down all switch and PoE connections. Therefore it is important to provide a redundant power supply for both the 12V and 50V circuits. Thus when you connect EPS from a 600 RPS/EPS device to one of the 2600-PWR Series or one of the 2610-PWR Series, you should also connect the RPS as well to provide full redundant power.

The Switch 2600-PWR Series and 2610-PWR Series can be connected to a 600 RPS/EPS and receive full redundant power from the RPS part of the unit for switch operation, if the internal power supply in the switch fails. If multiple switches are connected to the RPS ports and several switches lose power at the same time, the switch attached to the lowest RPS port number receives power. The 600 RPS/EPS unit can provide all the power necessary to keep one switch running.

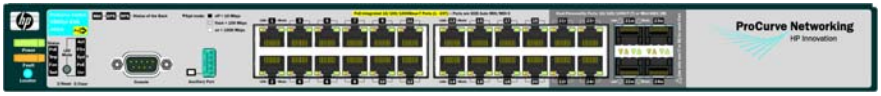
EPS power from the 600 RPS/EPS is the PoE capability of the device. It supplies backup and additional PoE power for the ports of the 2600-PWR and 2610-PWR switches. It also provides PoE power to the ProCurve Switch xl PoE Module.

The 610 EPS can also be used for this purpose, to supply PoE power only. The 610 EPS cannot supply RPS power, it can only supply PoE power. Refer to chapter three, four, and five for more information on capabilities and connectivity of these switches, components and accessories.

Switch 3500yl Series

- The ProCurve Switch 3500yl-48G-PWR (J8693A), has 48 Integrated PoE auto-sensing 10/100/1000Base-T RJ-45 ports with four dual-personality Gigabit Uplink ports.

- The ProCurve Switch 3500yl-24G-PWR (J8692A), has 24 Integrated PoE auto-sensing 10/100/1000Base-T RJ-45 ports with four dual-personality Gigabit Uplink ports.



These switches also support some pre-standard PoE devices. For a list of these devices, see the FAQs for your switch model. This feature is the default and you must disable it if you do not want to use it. For example:

```
ProCurve 3500yl#(config) no power pre-std-detect
```

For more information, refer to the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com**.

To display the list of downloadable manuals, click on the following links:

Technical support

Product manuals (all)

ProCurve Switch 3500yl or 6200yl Series.

(You may want to bookmark this Web page for easy access in the future.)

The dual-personality ports have either auto-sensing 10/100/1000Base-T RJ-45, or mini-GBIC connectivity. The mini-GBIC ports do not support PoE. If any of the mini-GBIC ports are used the corresponding RJ-45 port will not be supplied with PoE power.

Power Redundancy for the Switch 3500yl Series

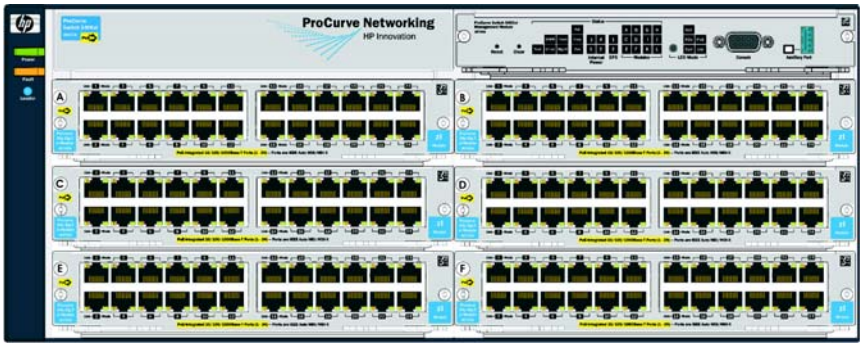
The internal power supply in these switches provides both the 12V (RPS) and 50V (EPS) circuits. If the 50V portion of the power supply fails, it will only shut down the PoE connections. However, if the 12V portion of the power supply fails, it will shut down the entire switch. Therefore it is important to provide a redundant power supply for both the 12V and 50V circuits. Therefore it is recommended that both EPS and RPS be connected to provide full redundancy.

The Switch 3500yl-PWR Series can be connected to a 620 RPS/EPS and receive full redundant power from the RPS part of the unit for switch operation, if the internal power supply in the switch fails. If two switches are connected to the RPS ports and both switches lose power at the same time, they both receive redundant power. The 620 RPS/EPS unit can provide all the power necessary to keep two switches running.

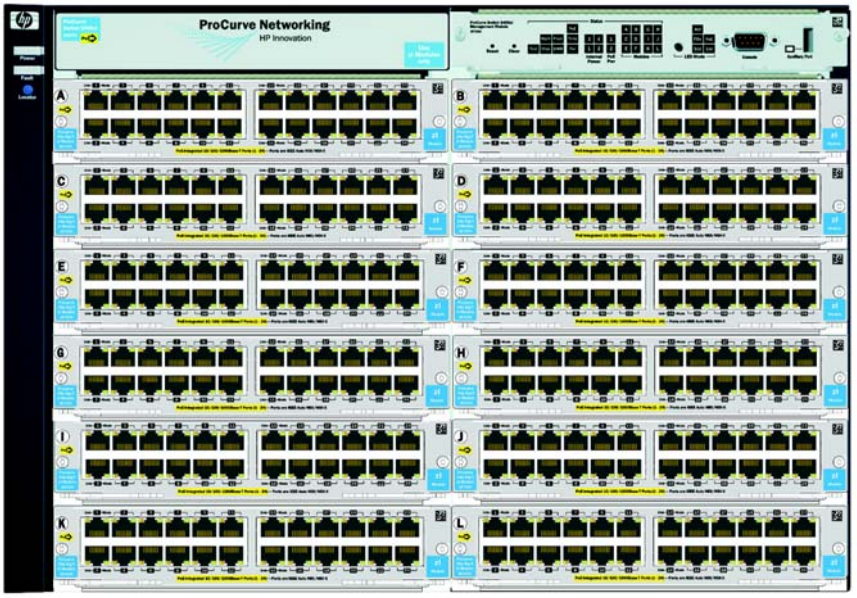
If maximum PoE power is to be used on all 48 ports, it becomes necessary to connect a 620 RPS/EPS, since the internal power supply only has enough power to supply 24 ports with maximum wattage. In this case, there is no redundancy.

Switch 5400zl/8212zl Series

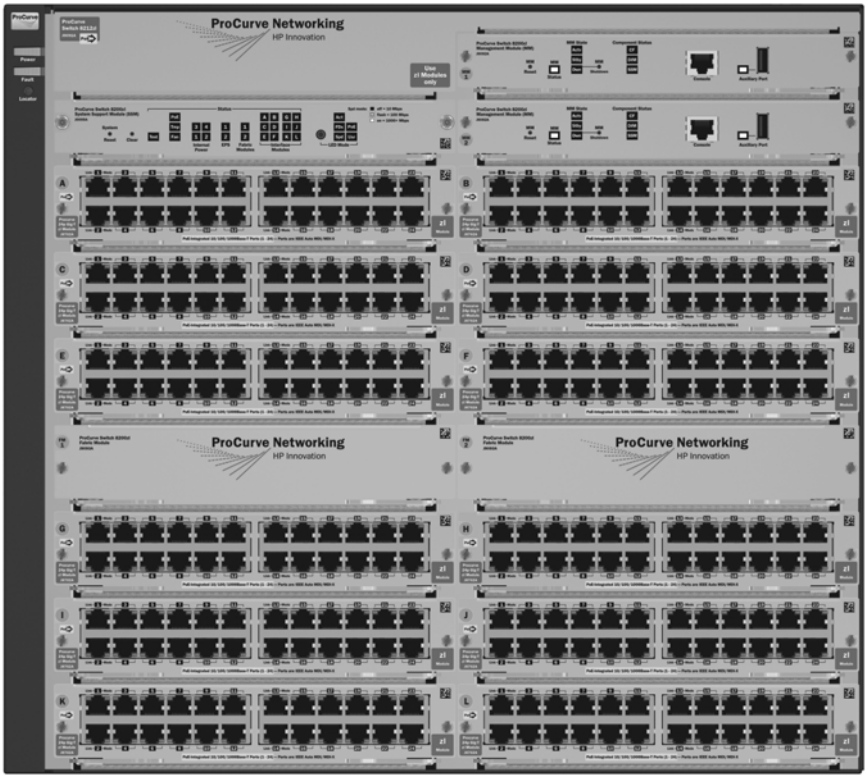
- The ProCurve Switch 5406zl is a chassis that can hold up to six 24-port modules to provide up to 144 10/100/1000Base-T RJ-45 ports for PoE power.



- The ProCurve Switch 5412zl is a chassis that can hold up to twelve 24-port modules to provide up to 288 10/100/1000Base-T RJ-45 ports for PoE power.



- TheProCurve Switch 8212zl is a chassis that can hold up to twelve 24-port modules to provide up to 288 10/100/1000Base-T RJ-45 ports for PoE power



Note

The 5412zl chassis and the 8212zl chassis share a completely common PoE implementation. Port counts, power supply wattages, specifications, and functionality for these two platforms are the same with respect to PoE.

Power Redundancy for the 5406zl, 5412zl, and 8212zl

There are two types of power supplied by the Series 5400zl/8200zl switch power supplies:

- 12V power or system power
- 50V power or PoE power

The 12V system power is used to operate the internal components of the switch. The 50V PoE power is used to power the PoE devices connected to the modules.

It is important to provide a secondary power supply for redundancy purposes for both the 12V and 50V circuits. The internal power supply in these switches provides both the 12V (system) and 50V (PoE) circuits. If the 12V (system) power fails the switch will shut down. If the 50V (PoE) fails, all PDs would lose power. Therefore, to keep the switch running should one power supply, or either power source fail, you should install a second power supply.

The 5406zl chassis can hold two internal power supplies and the 5412zl/8212zl chassis can hold four internal power supplies:

- J8712A, which operates at 100-127 volts drawing a maximum of 11.5 amps, or 200-240 volts drawing a maximum of 5.7 amps, and supplies 273 watts of PoE power
- J8713A, which operates at 200-220 volts drawing a maximum of 10 amps, and supplies 900 watts of PoE power

Using two J8712As, or two J8713As, or a mix of both is supported (however mixing power supplies is not recommended, see page 7-8 for more information) and necessary to ensure the switch has both 12V (system power) and 50V (PoE power) should one power supply fail. See the *ProCurve Switch zl Internal Power Supplies Installation Guide*, for more information and specifications on these power supplies.

When considering redundant power, also consider the power source for the power supplies. Each power supply should be connected to a separate power source circuit in order to supply complete redundancy. Should one circuit fail, it would then be possible for the other circuit to continue supplying power to the second power supply in the switch, keeping the switch running.

There is also an external power supply, the ProCurve Switch zl Power Supply Shelf (J8714A), that can be connected to either the 5400zl switches or the 8200zl switch for the purpose of adding extra or backup 50V (PoE power). The zl Power Supply Shelf will not supply any 12V (system power) to any zl switch, since the switch is provided with 12V redundancy when more than one power supply is installed in the chassis.

Configuring PoE Redundancy

When PoE redundancy is enabled, PoE redundancy occurs automatically. The switch keeps track of power use and won't supply PoE power to additional PoE devices trying to connect if that results in the switch not having enough power in reserve for redundancy if one of the power supplies should fail. There are three configurable redundancy methods:

- No PoE redundancy enforcement (default). All available power can be allocated.
- Full redundancy: half of the totally available PoE power can be allocated and half is held in reserve for redundancy. If power supplies with different ratings are used, the highest-rated power supply is held in reserve to ensure full redundancy.
- N+1. One of the power supplies is held in reserve for redundancy. If a single power supply fails, no powered devices are shut down. If power supplies with different ratings are used, the highest-rated power supply is held in reserve to ensure full redundancy.

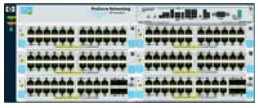
Note

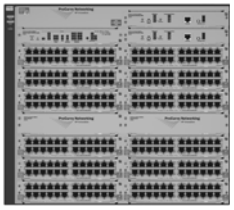
When changing from one method to another, always check the current level of PoE usage before implementing the change. The change could cause existing connection to loose PoE power.

For more information refer to the *Management and Configuration Guide* for your switch.

Quick Reference Table

Model/ Device	Port Type	Port Count/ PoE Watts per port[1]	Gig Uplink Ports	RPS/EPS	Maximum Power Internal and External
2600-8-PWR 	10/100	8 8 @ 15.4 Watts	1[2]	J8168A J8169A	126 watts available to ports 1-8 (provided by the internal source). 408/204[4] watts available, provided by the EPS source.
2626-PWR 	10/100	24 24 @ 15.4 Watts	2[2]	J8168A J8169A	Redundant 408/ 204[4] watts available to ports 1-24. Only if the internal power supply fails.
2650-PWR 	10/100	48 24 @ 15.4 Watts 48 @ 15.4 Watts	2[2]	J8168A J8169A	406 watts available to ports 1-24 (provided by the internal source). 408/204[4] watts available to ports 25-48 (provided by the EPS source).
2610-24/12-PWR 	10/100	8 @ 15.4 Watts 12 @ 10.5 Watts	4	J8168A J8169A	126 watts available to ports 1-12 (provided by the internal source). 408/204[4] watts available, provided by the EPS source.
2610-24-PWR 	10/100	24 24 @ 15.4 Watts	4	J8168A J8169A	406 watts available to ports 1-24 (provided by the internal source). 408/204[4] watts available, provided by the EPS source.

Model/ Device	Port Type	Port Count/ PoE Watts per port[1]	Gig Uplink Ports	RPS/EPS	Maximum Power Internal and External
2610-48-PWR 	10/100	48 48 @ 15.4 Watts	4	J8168A J8169A	406 watts available to ports 1-24 (provided by the internal source). 408/204[4] watts available to ports 25-48 (provided by the EPS source).
3500yl-24G-PWR 	10/100/1000	24 24 @ 15.4 Watts	4[2]	J8696A	398 watts available to ports 1-24 (provided by the internal source). 388 watts available as backup in case of failure, provided by the external source.
3500yl-48G-PWR 	10/100/1000	48 24 @ 15.4 Watts 48 @ 7.5 Watts	4[2]	J8696A	786 watts available to ports 1-48 (provided by both the internal and external sources).
Switch xl PoE Module 	10/100	24[3] 24 @ 15.4 Watts	0	J8168A J8169A	408/204[4] watts available to ports 1-24.
Switch 5406zl 	10/100/1000	Depends on which modules and how many modules. Range of 24-144	Depends on which modules and how many modules. Range of 4-24	J8714A	A maximum of 2 internal power supplies up to 1800 watts and the external source can provide up to 1800 watts depending on which power supplies are installed.

Model/ Device	Port Type	Port Count/ PoE Watts per port[1]	Gig Uplink Ports	RPS/EPS	Maximum Power Internal and External
Switch 5412zl 	10/100/1000	Depends on which modules and how many modules. Range of 24-288	Depends on which modules and how many modules. Range of 4-48	J8714A	A maximum of 4 internal power supplies up to 3600 watts and the external source can provide up to 1800 watts depending on which power supplies are installed.
Switch 8212zl 	10/100/1000	Depends on which modules and how many modules. Range of 24-288	Depends on which modules and how many modules. Range of 4-48	J8714A	A maximum of 4 internal power supplies up to 3600 watts and the external source can provide up to 1800 watts depending on which power supplies are installed.

[1] Redundant power and extra PoE power can be added by connecting a Redundant and external power supply.

[2] The uplink ports on this switch are dual-personality. If the RJ-45 port is used the mini-GBIC port is disabled.

[3] The PoE power for this module must come from an external power supply, it does not have any internal PoE power.

[4] The wattage available to each switch depends on the number of switches connected to the EPS.

Operating Rules

This chapter discusses the operating rules and characteristics of the ProCurve product capabilities, switches and external power supplies. The following products are discussed:

- The ProCurve Switch 2600-PWR Series.
- The ProCurve Switch 2610-PWR Series.
- The ProCurve Redundant and External Power Supplies: 600 RPS/EPS and 610 EPS.
- The ProCurve Switch 3500yl-PWR Series.
- The ProCurve External and Redundant Power Supply, 620 RPS/EPS.
- The ProCurve Switch 5400/8212zl Series.
- The ProCurve Power Supply Shelf.

Switch PoE Operation

The Switch 2626-PWR provisions (allocates power to) ports 1-24 with 406 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2650-PWR provisions ports 1-48 with 406 watts. This reduces the per port wattage by half as compared to the Switch 2626-PWR.

The Switch 2610-24/12PWR provisions (allocates power to) ports 1-12 with 126 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2610-24-PWR provisions ports 1-24 with 406 watts and the Switch 2610-48-PWR provisions ports 1-48 with 406 watts. This reduces the per port wattage by half as compared to the Switch 2610-24-PWR.

The Switch 3500yl-24G-PWR can supply up to 398 Watts of PoE power across the 24 ports. The Switch 3500yl-48G-PWR can supply up to 398 Watts of PoE power across the 48 ports.

The Switch 5406zl can supply up to 1800 watts of PoE power and the Switch 5412zl/8212zl can supply up to 3600 watts of PoE power. It depends on which power supply is installed. The J8712A power supply provides up to 273 watts of PoE power. If two J8712As are installed they can supply up to 546 watts of PoE power and if four are installed they can supply up to 1092 watts of PoE power.

The J8713A power supply provides up to 900 watts of PoE power. If two J8713As are installed they can supply up to 1800 watts of PoE power and if four are installed they can supply up to 3600 watts of PoE power. The two types of power supplies can be mixed (although not recommended), that is, one or two J8712As and one or two J8713As can be installed at the same time depending on which of the Series 5400zl/8200zl Switches are being used.

Note

ProCurve Networking highly recommends that the two types of power supplies are not mixed in the same 5400zl/8200zl chassis or Power Supply Shelf. See page 7-8 for more information.

Provisioning Power for PoE

All of these PoE switches support an external power supply that can provide either redundant or extra PoE power. It is important to understand how PoE power is provisioned in order to use these external power supplies efficiently. The following chapters will discuss this in detail.

By connecting an external power supply you can optionally provision more PoE wattage per port and or supply the switch with redundant 12V power to operate should an internal power supply fail.

By installing a second power supply in the 5406zl or a third power supply in a 5412zl/8212zl chassis, depending on how many PoE ports are being supplied with power, the switch can have redundant power if one power supply fails. A Power Supply Shelf (external power supply) can also be connected to the 5400zl/8200zl switches to provide extra or redundant PoE power.

For example, if the 5406zl has two 24-port PoE modules (J8702A) installed, and all ports are using 15.4 watts, then the total wattage used is 739.2 watts (48 x 15.4). Therefore to supply the necessary PoE wattage a J8713A power supply is installed in one of the power supply slots. Then to gain redundant power a second J8713A must be installed in the second power supply slot. If the first power supply fails, then the second power supply can supply all necessary power.

There is a CLI command available, the THRESHOLD command. It has an informational only result. This command sets a threshold, by percent, to inform you the switch is now using more than a certain percentage of PoE power.

For example if the threshold is set at 50%, the switch will issue an information message informing you the switch has exceeded the threshold when 51% of available PoE power is being used. Also see page 7-7 for an example. For more information on the threshold command, Refer to the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com**. (See page 1-8 for details.)

Maximum PoE Power

Switch 2600-PWR Series

The Switch 2600-8-PWR provisions (allocates power to) 8 ports with its internal PoE power supply of 126 watts for PoE applications compatible with the IEEE 802.3af standard and some pre-standard PoE devices.The Switch 2626-PWR provisions ports 1-24 with 406 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2650-PWR provisions ports 1-48 with 406 watts for PoE. This reduces the per port wattage by half as compared to the Switch 2626-PWR.

However, by connecting a 600 RPS/EPS or a 610 EPS, you can optionally provision ports 25-48 with 408 watts of external PoE power, thereby bringing the per port wattage up to 15.4 watts per port, unless you have the other EPS port of the 600 RPS/EPS or the other port of a pair on the 610 EPS connected to a ProCurve PoE device. In this case you cannot provision the full 408 watts to the Switch 2650-PWR, only half, or 204 watts.

Table 2-1. Maximum Power Allocations

PoE Devices	Internal Only	Internal and EPS	EPS Only
PoE for Switch 2600-8-PWR	126 watts available to ports 1-8.	126 watts available to ports 1-8 (provided by the internal source). 408/204* watts available, provided by the EPS source.	The internal power supply has failed, and the EPS provides 408/204* watts to ports 1-8.
PoE for Switch 2626-PWR	406 watts available to ports 1-24.	Redundant 408/204* watts available to ports 1-24. Only if the internal power supply fails.	408/204* watts available to ports 1-24. (The EPS provides PoE power to ports 1-24 *only* if the internal power supply fails.)
PoE for Switch 2650-PWR	406 watts available to ports 1-48.	406 watts available to ports 1-24 (provided by the internal source). 408/204* watts available to ports 25-48 (provided by the EPS source).	The internal power supply has failed, and the EPS provides 408/204* watts to ports 1-48. Note that 38 watts of this power are always allocated exclusively to ports 1-24 or 25-48.) See page 2-9.

* If both EPS ports on the 600 RPS/EPS or both ports of a pair on the 610 EPS are connected to switches, each switch can receive 204 watts of power. If a single switch is connected to the EPS ports, that switch can receive 408 watts.

Switch 2610-PWR Series

The Switch 2610-24/12PWR provisions (allocates power to) ports 1-12 with 126 watts of power for PoE. The Switch 2610-24-PWR provisions ports 1-24 with 406 watts of power for PoE and the Switch 2610-48-PWR provisions ports 1-48 with 406 watts of power for PoE. This reduces the per port wattage by half as compared to the Switch 2610-24-PWR. These switches support PoE applications compatible with the IEEE 802.3af standard and some pre-standard devices.

However, by connecting a 600 RPS/EPS or a 610 EPS, you can optionally provision ports 25-48 on the 2610-48-PWR switch with 408 watts of external PoE power, thereby bringing the per port wattage up to 15.4 watts per port, unless you have the other EPS port of the 600 RPS/EPS or the other port of a pair on the 610 EPS connected to a ProCurve PoE device. In this case you cannot provision the full 408 watts to the Switch 2610-48-PWR, only half, or 204 watts.

Table 2-2. Maximum Power Allocations

PoE Devices	Internal Only	Internal and EPS	EPS Only
PoE for Switch 2610-24/12PWR	126 watts available to ports 1-12	126 watts available to ports 1-12 (provided by the internal source). 408/204* watts available, provided by the EPS source.	The internal power supply has failed, and the EPS provides 408/204* watts to ports 1-12.
PoE for Switch 2610-24-PWR	406 watts available to ports 1-24.	Redundant 408/204* watts available to ports 1-24. Only if the internal power supply fails.	408/204* watts available to ports 1-24. (The EPS provides PoE power to ports 1-24 *only* if the internal power supply fails.)
PoE for Switch 2610-48-PWR	406 watts available to ports 1-48.	406 watts available to ports 1-24 (provided by the internal source). 408/204* watts available to ports 25-48 (provided by the EPS source).	The internal power supply has failed, and the EPS provides 408/204* watts to ports 1-48. Note that 22 watts of this power is always allocated exclusively to ports 1-24 or 25-48.) See page 2-10.

* If both EPS ports on the 600 RPS/EPS or both ports of a pair on the 610 EPS are connected to switches, each switch can receive 204 watts of power. If a single switch is connected to the EPS ports, that switch can receive 408 watts.

ProCurve Switch xl PoE Module

For the ProCurve Switch xl PoE Module to function it must be installed in an ProCurve Switch 5300xl. The module will receive it's operational power from the switch and it's PoE power from the 600 RPS/EPS or an 610 EPS.

Table 2-3. Maximum Power Allocations

PoE Devices	Internal Only	Internal and EPS	EPS Only
ProCurve Switch xl PoE Module	No internal PoE power.	No internal PoE power. (See EPS only.)	408/204* watts available to ports 1-24 on the module.

* If both EPS ports on the 600 RPS/EPS or both ports of a pair on the 610 EPS are connected to modules, each module can receive 204 watts of power. If a single module is connected to the EPS ports, that module can receive 408 watts.

Switch 3500yl PWR Series

The Switch 3500yl-24G-PWR provisions (allocates power to) ports 1-24 with 398 watts of power for PoE applications compatible with the IEEE 802.3af standard and some pre-standard devices. The Switch 3500yl-48G-PWR provisions ports 1-48 with 398 watts. This reduces the average per port wattage by half as compared to the Switch 3500yl-24G-PWR.

An external power supply, the 620 RPS/EPS (J8696A) can be connected to either of the 3500yl switches to provide redundant or extra PoE power. The 620 RPS/EPS can be connected to up to two switches and provide 388 watts of 50V power to each switch.

Table 2-4. Maximum Power Allocations for the 3500yl Switches

PoE Devices	Internal Only	Internal and External	External Only
PoE for Switch 3500yl-24G-PWR	398 watts available to ports 1-24.	398 watts available to ports 1-24 (provided by the internal source). 388 watts available as backup in case of failure, provided by the external source.	The internal power supply has failed, and the external source provides 388 watts to ports 1-24.
PoE for Switch 3500yl-48G-PWR	398 watts available to ports 1-48.	786 watts available to ports 1-48 (provided by both the internal and external sources).	The internal power supply has failed, and the external source provides 388 watts to ports 1-48. Note that a minimum of 22 watts will always be allocated to both port groups (ports 1-24 and ports 25-48). See page 2-11.

PoE Allocation Using LLDP Information

You can have the port automatically configure certain PoE link partner devices if the devices supports advertising of its PoE needs. By enabling PoE LLDP detection, available information about the power usage of the PD will be used by the switch to configure the power allocation. The default configuration is for PoE information to be ignored if detected through LLDP.

For more information refer to the *Management and Configuration Guide* for your switch.

The Switch 5400zl/8212zl Series

Each chassis provisions (allocates power to) ports 1-24 of each module with the watts associated with the specific power supply installed. The power for PoE applications is compatible with the IEEE 802.3af standard and some pre-standard devices. As soon as a module is installed into the switch, 22 watts is reserved for its use.

An external power supply, the ProCurve Switch zl Power Supply Shelf (J8914A) can be connected to these switches to provide extra PoE power. The Power Supply Shelf can be connected to up to two switches and provide up to 1800 watts depending on which power supplies are installed.

Table 2-5. Maximum Power Allocations for the 5400zl/8200zl Switches

PoE Devices	Internal Only	Internal and External	External Only
PoE for Switch 5406zl	1 power supply J8712A, 273 watts 2 power supplies J8712A, 546 watts 1 power supply J8713A, 900 watts 2 power supplies J8713A, 1800 watts 2 power supplies one J8712A and one J8713A (not recommended),1173 watts	A maximum of 2 internal power supplies up to 1800 watts and the external source can provide up to 1800 watts depending on which power supplies are installed.	The internal power supply has failed, and the external source provides up to 1800 watts depending on which power supplies are installed. Note that without internal power the switch will not be active since the EPS does not supply system power.
PoE for Switch 5412zl/8212zl	2 power supplies J8712A, 546 watts 2 power supplies J8713A, 1800 watts 2 power supplies, one J8712A and one J8713A (not recommended), 1173 watts 3 power supplies J8712A, 819 watts 3 power supplies J8713A, 2700 watts 3 power supplies, two J8712A and one J8713A (not recommended), 1446 watts 3 power supplies, one J8712A and two J8713A (not recommended), 2073 watts 4 power supplies J8712A, 1092 watts 4 power supplies J8713A, 3600 watts 4 power supplies, two J8712A and two J8713A (not recommended), 2346 watts	A maximum of 4 internal power supplies up to 3600 watts and the external source can provide up to 1800 watts depending on which power supplies are installed.	The internal power supply has failed, and the external source provides up to 1800 watts depending on which power supplies are installed. Note that without internal power the switch will not be active since the EPS does not supply system power.

PoE Allocation Using LLDP Information

See page 2-7.

PoE Power

It is important to understand the PoE power requirements of these switches because if the PoE power is not planned and implemented correctly, end devices connected to the PoE switch ports may not receive power if a switch PoE power source failure occurs or if the switch is over provisioned.

Switch 2600-PWR Series

The Switch 2600-8-PWR has 8 ports and its internal PoE power supply provides 126 watts across all 8 ports. If a 600 RPS/EPS or a 610 EPS device is connected to the Switch 2600-8-PWR for the purpose of supplying external power to the PoE portion of the switch, there will be either 408 watts or 204 watts of power available should the switch's internal PoE power supply fail. If a single switch is connected to the EPS ports on the 600 RPS/EPS or a single port of a pair on the 610 EPS, 408 watts are available, providing fully redundant PoE power to the switch. If two switch devices are connected to the EPS ports on the 600 RPS/EPS or to both ports of a pair on the 610 EPS, only 204 watts are provided to the switch if the internal PoE power supply fails. This will still provide enough wattage to be a full PoE backup for the Switch 2600-8-PWR because it only needs 126 watts.

The Switch 2626-PWR has 24 ports and its internal PoE power supply provides 406 watts across all 24 ports. If a 600 RPS/EPS or a 610 EPS device is connected to the Switch 2626-PWR for the purpose of supplying external power to the PoE portion of the switch, there will be either 408 watts or 204 watts of power available should the switch's internal PoE power supply fail. If a single switch is connected to the EPS ports on the 600 RPS/EPS or a single port of a pair on the 610 EPS, 408 watts are available, providing fully redundant PoE power to the switch. If two switch devices are connected to the EPS ports on the 600 RPS/EPS or to both ports of a pair on the 610 EPS, only 204 watts are provided to the switch if the internal PoE power supply fails.

The Switch 2650-PWR PoE power requirements are different. This switch has 48 ports and the internal PoE power supply supplies 406 watts across all 48 ports. The switch reserves 38 watts for either ports 1-24 or 25-48, so that neither set of ports receives the entire 406 watts.

By connecting a 600 RPS/EPS or a 610 EPS to the Switch 2650-PWR, more PoE power is provided to the switch. With the 600 RPS/EPS or the 610 EPS connected to the Switch 2650-PWR, the internal PoE power supply provides the first 24 ports (1-24) with 406 watts and the 600 RPS/EPS or the 610 EPS supplies the second 24 ports (25-48) with 408 or 204 watts (408 watts if only one switch is connected to the EPS ports; 204 watts if two switches are connected to the EPS ports). If the internal PoE power supply in the 2650-PWR switch fails, 408 watts or 204 watts are provided to ports 1-48. 38 watts of power are always allocated to ports 1-25 or 25-48.

Switch 2610-PWR Series

The Switch 2610-24/12PWR has 24 ports of which 1-12 can be used for PoE and its internal PoE power supply provides 126 watts across 12 ports. If a 600 RPS/EPS or a 610 EPS device is connected to the Switch 2610-24/12PWR for the purpose of supplying external power to the PoE portion of the switch, there will be either 408 watts or 204 watts of power available should the switch's internal PoE power supply fail. If a single switch is connected to the EPS ports on the 600 RPS/EPS or a single port of a pair on the 610 EPS, 408 watts are available, providing fully redundant PoE power to the switch. If two switch devices are connected to the EPS ports on the 600 RPS/EPS or to both ports of a pair on the 610 EPS, only 204 watts are provided to the switch if the internal PoE power supply fails. This will still provide enough wattage to be a full PoE backup for the Switch 2610-24/12PWR because it only needs 126 watts.

The Switch 2610-24-PWR has 24 ports and its internal PoE power supply provides 406 watts across all 24 ports. If a 600 RPS/EPS or a 610 EPS device is connected to the Switch 2610-24-PWR for the purpose of supplying external power to the PoE portion of the switch, there will be either 408 or 204 watts of power available should the switch's internal PoE power supply fail. If a single switch is connected to the EPS ports on the 600 RPS/EPS or a single port of a pair on the 610 EPS, 408 watts are available, providing fully redundant PoE power to the switch. If two switch devices are connected to the EPS ports on the 600 RPS/EPS or to both ports of a pair on the 610 EPS, only 204 watts are provided to the switch if the internal PoE power supply fails.

The Switch 2610-48-PWR PoE power requirements are different. This switch has 48 ports and the internal PoE power supply supplies 406 watts across all 48 ports. The switch reserves 22 watts for either ports 1-24 or 25-48, so that neither set of ports receives the entire 406 watts.

By connecting a 600 RPS/EPS or a 610 EPS to the Switch 2610-48-PWR, more PoE power is provided to the switch. With the 600 RPS/EPS or the 610 EPS connected to the Switch 2610-48-PWR, the internal PoE power supply provides the first 24 ports (1-24) with 406 watts and the 600 RPS/EPS or the 610 EPS supplies the second 24 ports (25-48) with 408 or 204 watts (408 watts if only one switch is connected to the EPS ports; 204 watts if two switches are connected to the EPS ports). If the internal PoE power supply in the 2610-48-PWR switch fails, 408 watts or 204 watts are provided to ports 1-48. 22 watts of power are always allocated to ports 1-25 or 25-48. See page 4-7.

Switch 3500yl PWR Series

The Switch 3500yl-24G-PWR has 24 ports with an internal PoE power supply that provides 398 watts of 50V power across all 24 ports. The Switch 3500yl-48G-PWR has 48 ports with 398 watts of 50V power across all 48 ports. There is a special power provision on the Switch 3500yl-48G-PWR, Where the switch reserves 22 watts for each bank of 24 ports, ports 1-24 and 25-48, so that neither set of ports receives the entire 398 watts. This is designed for the integrity and safety of PoE during power balancing to properly detect PDs and bring them online.

Switch 5400zl/8212zl Series

There are two PoE modules (J8702A and J8705A) for the 5400zl/8212zl chassis and they have the same requirement for reserving 22 watts (see above). There are 22 watts per module that is always held in reserve.

Each group of 24 ports is it's own management group and needs to have a minimum allocation associated with it in order to properly detect PDs and bring them online.

Remember that each group of 24 ports will have a PoE power allocation of at least 22 watts. This 22 watts must be subtracted from the total wattage when figuring how many PoE devices to connect to which ports on a switch or module. In order to be able to allocate the reserved 22 watts, either use the ports it is allocated to or the PoE power to all ports on the associated module must be turned off, refer to the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com**, for details. (See page 1-8.)

Allocate PoE Power by Class or User-defined Power Level.

The Switch 3500yl and the 5400zl/8212zl switches provide maximum flexibility by allowing the switch to detect and display 802.3af device class, but does not enforce the power level specified in each device class. In addition to this, the switch can allocate PoE power according to the power level specified in each device class or a level defined by the customer. There are three methods to allocate PoE power:

- By device usage (default). The switch does not enforce the power limit.
- By power level specified in 802.3af. The device class will be detected according to the specification and power limits will be enforced.
- By user-defined. Configurable per port values or a range of ports to power level 1-17 watts. Incorrectly setting the PoE maximum value to be less than the device requires will result in a PoE fault.

For more information refer to the *Management and Configuration Guide* for your switch.

Switch Port Priority

The lower the port number the higher the priority given. For example, port number one has a higher priority than port number two. Therefore when both ports need power, port number one is given power priority over port number two and so on throughout the rest of the ports.

A port can be assigned a power priority that alters the assignment of power to it by the switch. See the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com**, for details. (See page 1-8.)

Switch Priority Class

Port priority classification can be used by the switch to allocate power to ports. It is a prioritization scheme by which the user can assign a **low** (default), **high,** or **critical** priority to any given port. This assignment is done through the command line interface (see the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com** (See page 1-8.)), of the switch and alters the hardware port-number priority for power allocation.

- Low (default) - This priority class receives power only if all other priority classes are receiving power. If there is enough power to provision PDs on only some of the ports with a low priority, then power is allocated to the ports in ascending order, beginning with the lowest-numbered port in the class until all available power is in use.
- High - This priority class receives power only if all PDs on ports assigned with a critical priority are receiving full power. If there is not enough power to provision PDs on ports assigned with a high priority, then no power goes to the low priority ports. If there is enough power to provision PDs on only some of the high priority ports, then power is allocated to the high priority ports in ascending order, beginning with lowest-numbered high priority port, until all available power is in use.
- Critical - This priority class is the first to be allocated power. If there is not enough power to provision PDs on all of the ports configured for this class, then no power goes to “High or Low” priority ports. If there is enough power to provision PDs on only some of the critical ports, then power is allocated to the critical ports in ascending order, beginning with the lowest-numbered port in the class.

Line Loss

A certain amount of power is consumed by the resistance of the wire in the LAN cable connected from the switch to the powered device (typically less than 16% loss), which can be influenced by cable length, quality, and other factors. The IEEE 802.3af specification has addressed loss of power by providing more power than a powered device requires. As well, depending upon the classification (Class 0-3) of the device, the switch will provide more or less power to address the specific power needs of that end device.

PD Power Classification

A PD is classified based on the maximum power it draws across all input voltages and operational modes. The most common class is 0, in which the switch will allow a maximum draw of 15.4 watts per port. As an example, 15.4 watts - Power Loss (16%) = 12.95 watts. See table 2-6.

Table 2-6. Power Usage

Class	Usage	Minimum Power Levels at Output of PSE	Range of Maximum Power required by the PD
0	Default	15.4 Watts	0.44 to 12.95 Watts
1	Optional	4.0 Watts	0.44 to 3.84 Watts
2	Optional	7.0 Watts	3.84 to 6.49 Watts
3	Optional	15.4 Watts	6.49 to 12.95 Watts

As you can see in the table, any 802.3af compliant PD will never require more than 12.95 watts. The switch provides a minimum of 15.4 watts at the port in order to guarantee enough power to run a device, after accounting for line loss.

PD Power Requirements

When a PD is initially connected to a PoE port, a minimum of 17 watts of available power is required to begin the power-up sequence. This 17 watts is needed to determine the type of PD requesting power (see “PD Power Classification” on page 2-13). Once the power classification is determined and power is supplied, any power beyond the maximum power requirements for that class of PD is available for use.

In the default switch configuration all PoE ports have a Low priority. If the switch has less than 17 W of PoE power available, the switch transfers power from lower-priority ports to higher-priority ports.

See “Switch Priority Class” on page 2-12 for information on the use of PoE port priority classifications. Within each priority class, a lower numbered port is supplied power before a higher numbered port.

Disconnecting a PD from a port causes the switch to stop providing power to that port and makes that power available to other ports configured for PoE operation.

Planning and Implementation for the Switch 2600-PWR Series

This chapter discusses the planning process a user should follow to successfully implement PoE using a Switch 2600-PWR Series. After understanding what PoE is and its operating rules, the next step to implementation is planning. See "Specific Considerations for the 3500yl Switches" page A-2, for an example list of considerations during the planning phase.

Planning the PoE Configuration

This section assists you in building a PoE configuration. Using the following examples you can plan, build, and connect PoE devices quickly and easily.

There are three configurations:

- ProCurve Switch 2600-8-PWR with Gigabit Uplink
- ProCurve Switch 2626-PWR
- ProCurve Switch 2650-PWR

Each example shows a complete configuration including an optional 600 RPS/EPS or 610 EPS unit. A table shows the PoE power available to connected PoE devices when using just the switch or when using the switch and either the 600 RPS/EPS or 610 EPS unit. The tables show the available power when the 600 RPS/EPS or 610 EPS unit is providing PoE power to connected switch devices.

Once you have selected your specific configuration and the PoE power provided, you then add up the maximum amount of power each of your IEEE 802.3af-compliant devices require (use maximum power in watts, usually found on a product's data sheet). Adjust this total maximum power figure by adding 16% to account for possible line loss. This value must be less than the maximum power available shown in the table for your configuration.

If you are planning to include redundant power in your configuration you need to determine which PoE devices must receive redundant PoE power, then total their power requirements as explained in the paragraph above. The maximum power figure must be less than the maximum power available when the switch is powered by the 600 RPS/EPS or the 610 EPS unit, taking into consideration the number of switches the 600 RPS/EPS or 610 EPS unit is powering.

Note

Full redundancy is achieved by connecting both the RPS and EPS ports of the 2600-PWR Switches to the corresponding ports of a 600 RPS/EPS.

The following examples only show the EPS connections, however, remember these switches use a single internal power supply which provides two isolated output voltages for switch and PoE functionality. One supply voltage provides power for the switch functionality while the isolated voltage provides power for the PoE functionality. If either voltage fails, the entire power supply shuts down disconnecting all switch and PoE connections. Therefore it is important to provide redundancy for each isolated voltage.

ProCurve 2600-8-PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2600-8-PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, PoE power is available to the PoE ports should the internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or 610 EPS alone provides PoE power.

ProCurve Switch 2600-8-PWR

600 RPS/EPS

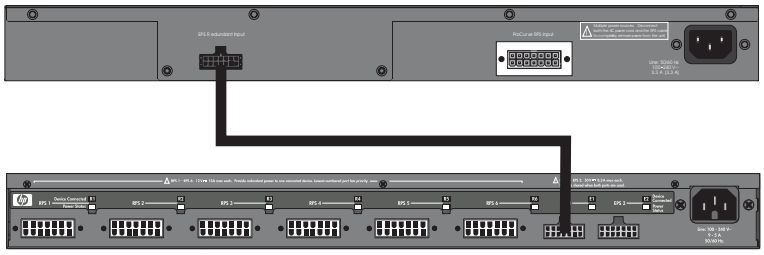


Figure 3-1. Example of a 600 RPS/EPS Powering One 2600-8-PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	126	8 @ average 15.4 W each	None
Internal plus External PoE Power Supply	126 + 408 1- 8	8 @ average 15.4 W each	8 @ average 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408	8 @ average 15.4 W each	None

- A single 2600-8-PWR switch with a dedicated 600 RPS/EPS unit has fully redundant PoE power for all 8 ports at 15.4 W per port.
- Also (not shown), two 2600-8-PWR switches with a dedicated 600 RPS/ EPS unit has full redundant PoE power for both switches. The 600 RPS/ EPS supplies 408 watts to one switch and 204 watts to each switch when two switches are connected to the 600 RPS/EPS.

ProCurve 2626-PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2626-PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, PoE power is available to the PoE ports should the internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or 610 EPS alone provides PoE power.

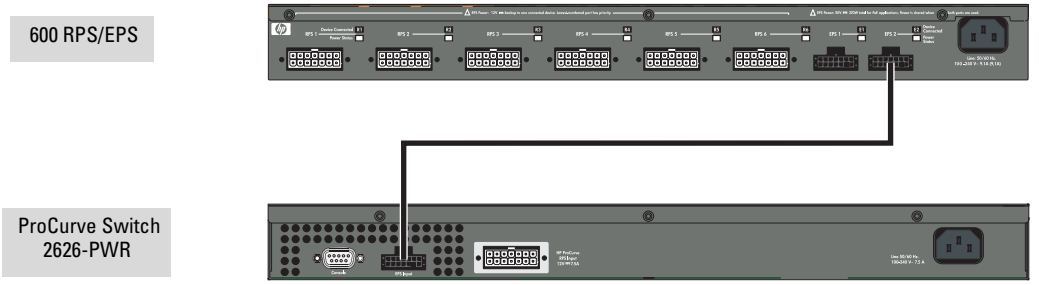


Figure 3-2. Example of an 600 RPS/EPS Powering One 2626-PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each	None
Internal plus External PoE Power Supply	406 + 408 1 - 24	24 @ average 15.4 W each	24 @ average 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408	24 @ average 15.4 W each	None

A single 2626-PWR switch with a dedicated 600 RPS/EPS unit has fully redundant PoE power for all 24 ports at 15.4 W per port.

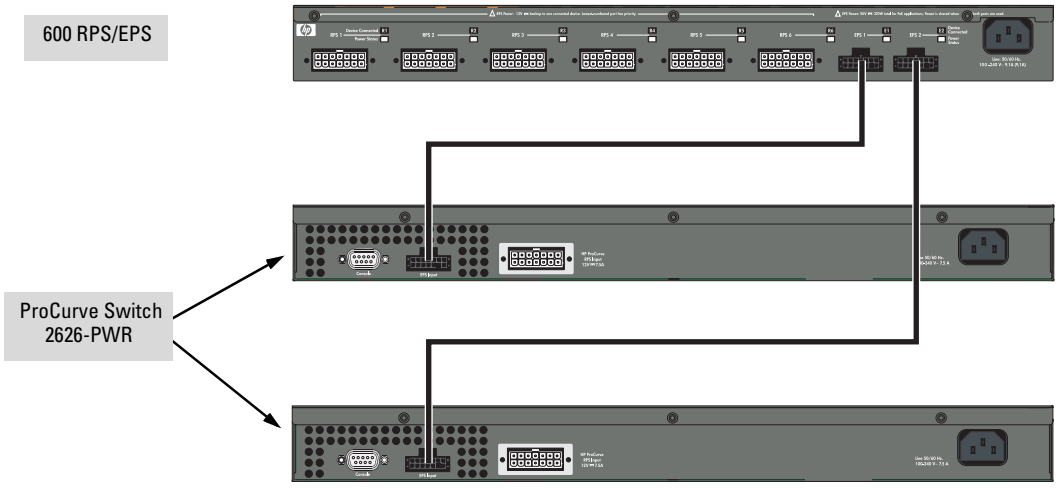


Figure 3-3. Example of an 600 RPS/EPS Powering Two 2626-PWR Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24	24 @ average 15.4 W each	24 @ 7.6 W each 12 @ 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204	24 @ 7.6 W each 12 @ 15.4 W each	None

- When two switches are connected to the 600 RPS/EPS ports, the PoE power available to each switch is a maximum of 204 W. If all of your PDs consume on average less than 7.6 W each (allowing for any line loss) then all 24 ports will receive redundant power should a switch's internal PoE power supply fail.

Redundant power is available as long as the total power required remains below 204 W.

ProCurve 2650-PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2650-PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, additional PoE power is available to the PoE ports and PoE power is available should the switch's internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or the 610 EPS alone provides PoE power.

In the following examples using the ProCurve 2650-PWR switch, reference is made to two blocks of ports: ports 1-24 and ports 25-48. This applies when external PoE power is available from an 600 RPS/EPS or 610 EPS unit. In that case, the internal switch PoE power supply provides 406 watts of power to ports 1-24 and the 600 RPS/EPS or 610 EPS provides 408 watts of power to ports 25-48.

If you are using the ProCurve Switch 2650-PWR with external PoE power, the number of ports with available PoE power when the switch is powered by just the 600 RPS/EPS or 610 EPS unit may be less than the number of ports powered when both the switch and the 600 RPS/EPS or 610 EPS unit are supplying power. In the default configuration the number and location of ports with redundant PoE power is determined by three factors:

- The number of switches drawing external PoE power from the 600 RPS/EPS or 610 EPS unit. If only a single switch is using external PoE power the 600 RPS/EPS or 610 EPS provides 408 watts of PoE power. If two switches are using external PoE power from the 600 RPS/EPS or two switches are connected to the same pair on the 610 EPS, a switch receives 204 watts of PoE power. Should the switch's internal PoE power supply fail, the 600 RPS/EPS or 610 EPS provides power up to the wattage stated above.
- When the internal PoE power supply fails, the 600 RPS/EPS reserves a minimum of 38 watts for the less-loaded bank of ports. In the default configuration, at a minimum, the first two ports in the bank (1 and 2 or 25 and 26) will have PoE power.

Note

It is the ports configured with the highest priority of either bank (1-24 or 25-48) that will receive PoE power. For example, if the highest priority ports have been re-configured to be 23, 24 and 47, 48, then they will have PoE power.

- In the default configuration PoE power priority is determined by port number, with the lowest numbered port having the highest priority.

If redundant PoE power is required, use the example tables to determine how much power is available to which ports.

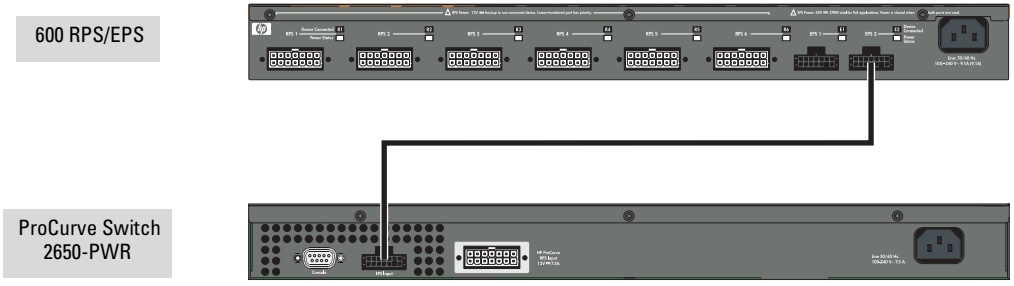


Figure 3-4. Example of an 600 RPS/EPS Power One Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 408 1 - 24 25 - 48	48 @ average 15.4 W each	24 @ average 15.4 W each 48 @ average 8.5 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408 (38 W is reserved for either ports 1-24 or 25-48)	24 @ average 15.4 W each 48 @ average 8.5 W each	None

The lowest loaded bank of ports (1-24 or 25-48) has 38 watts reserved. That power is available for use by the two highest priority ports in the bank, (in a default configuration ports 1 and 2, or 25 and 26).

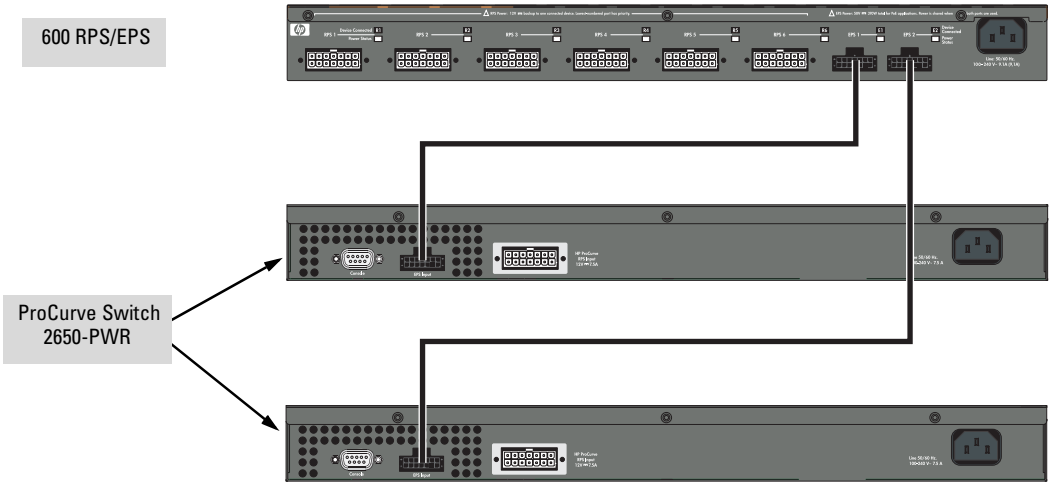


Figure 3-5. Example of an 600 RPS/EPS Powering Two Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24 25 - 48	24 @ average 15.4 W each and 24 @ 8.5 W each or 36 @ average 15.4 W each	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204 (38 W is reserved for either ports 1-24 or 25-48)	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each	None

The lowest loaded bank of ports (1-24 or 25-48) has 38 W reserved and is 'bank 2' in the table above.

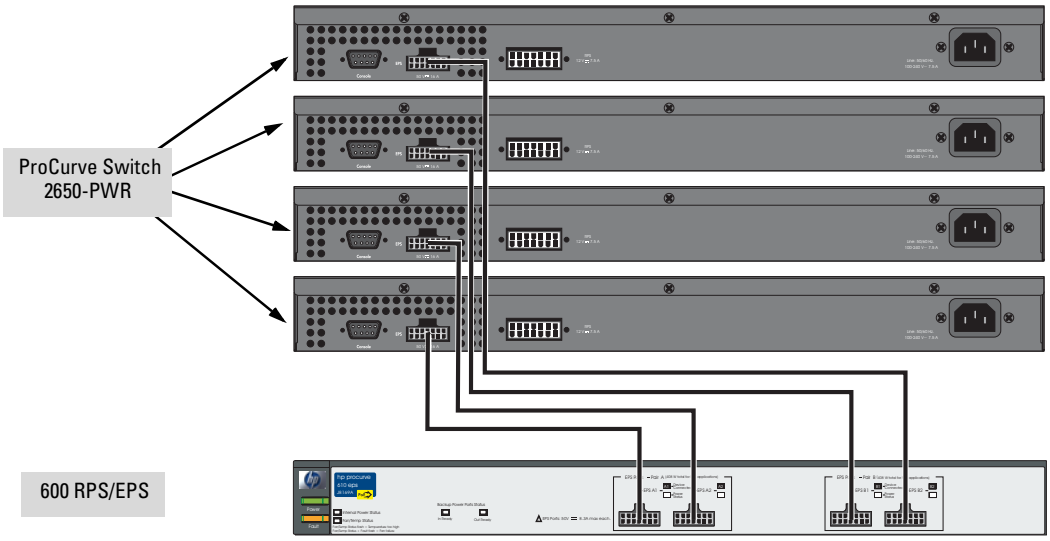


Figure 3-6. Example of an 610 EPS Powering Four Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24 25 - 48	24 @ average 15.4 W each and 24 @ 8.5 W each or 36 @ average 15.4 W each	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204 (38 W is reserved for either 1-24 or 25-48)	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each	None

With all four EPS ports in use, each switch only receives 204 watts.

Planning and Implementation for the Switch 2610-PWR Series

This chapter discusses the planning process a user should follow to successfully implement a PoE Series 2610-PWR Switch. The 2610-PWR switches and the 2600-PWR switches common PoE implementation. Port counts, power supply wattages, specifications, and functionality for these two platforms are the same with respect to PoE.

After understanding what PoE is and its operating rules, the next step to implementation is planning. See Appendix A for an example list of considerations during the planning phase.

Planning Your PoE Configuration

This section assists you in building a reliable and, if required, redundant PoE configuration. Using the following examples you can plan, build, and connect your PoE devices quickly and easily.

Your configuration may vary however this section discusses some of the more common configurations.

There are three configurations:

- ProCurve Switch 2610-24/12PWR
- ProCurve Switch 2610-24-PWR
- ProCurve Switch 2610-48-PWR

Each example shows a complete configuration including an optional 600 RPS/EPS or 610 EPS unit. A table shows the PoE power available to connected PoE devices when using just the switch or when using the switch and either the 600 RPS/EPS or 610 EPS unit. The tables show the available power when the 600 RPS/EPS or 610 EPS unit is providing PoE power to connected switch devices.

Once you have selected your specific configuration and the PoE power provided, you then add up the maximum amount of power each of your IEEE 802.3af-compliant devices require (use maximum power in watts, usually found on a product's data sheet). Adjust this total maximum power figure by adding 16% to account for possible line loss. This value must be less than the maximum power available shown in the table for your configuration.

If you are planning to include redundant power in your configuration you need to determine which PoE devices must receive redundant PoE power, then total their power requirements as explained in the paragraph above. The maximum power figure must be less than the maximum power available when the switch is powered by the 600 RPS/EPS or the 610 EPS unit, taking into consideration the number of switches the 600 RPS/EPS or 610 EPS unit is powering.

Note

Full redundancy is achieved by connecting both the RPS and EPS ports of the 2610-PWR switches to the corresponding ports of a 600 RPS/EPS.

The following examples only show the EPS connections, however, remember these switches use a single internal power supply which provides two isolated output voltages for switch and PoE functionality. One supply voltage provides power for the switch functionality while the isolated voltage provides power for the PoE functionality. If either voltage fails, the entire power supply shuts down disconnecting all switch and PoE connections. Therefore it is important to provide redundancy for each isolated voltage.

ProCurve 2610-24/12PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2610-24/12PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, PoE power is available to the PoE ports should the internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or 610 EPS alone provides PoE power.

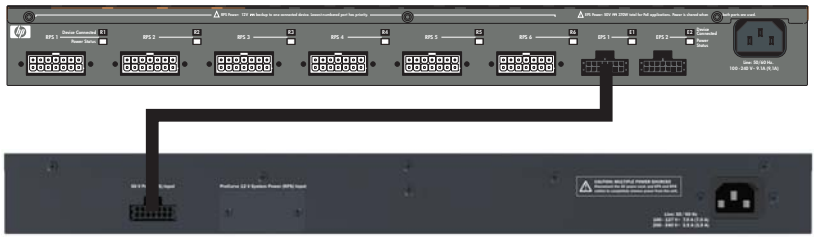


Figure 4-1. Example of a 600 RPS/EPS Powering One 2610-24/12PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	126	12 @ average 7.5 W each 8 @ average 15.4 W each	None
Internal plus External PoE Power Supply	126 + 408 1 - 12	12 @ average 15.4 W each	12 @ average 7.5 W each 12 @ average 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408	12 @ average 7.5 W each 12 @ average 15.4 W each	None

- A single 2610-24/12PWR switch with a dedicated 600 RPS/EPS unit has fully redundant PoE power for the 12 PoE ports at 7.5 W per port or 12 ports at 15.4 W per port. Only 12 ports can be PoE powered.
- The internal power supply can provide up to 126 W of power to be used on all 12 PoE ports. The power can be allocated up to the maximum of 12 ports, or 126 W, whichever is depleted first with a reserve of 22 W maintained by the switch for power management. If more power is needed to allow the maximum of 15.4 W on all 12 ports, an external power supply accessory is needed.
- Also (not shown), two 2610-24/12PWR switches with a dedicated 600 RPS/EPS unit has full redundant PoE power for both switches. The 600 RPS/EPS supplies 408 watts to one switch and 204 watts to each switch when two switches are connected to the 600 RPS/EPS.

ProCurve 2610-24-PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2610-24-PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, PoE power is available to the PoE ports should the internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or 610 EPS alone provides PoE power.

Figure 4-2. Example of an 600 RPS/EPS Powering One 2610-24-PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each	None
Internal plus External PoE Power Supply	406 + 408 1 - 24	24 @ average 15.4 W each	24 @ average 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408	24 @ average 15.4 W each	None

A single 2610-24-PWR switch with a dedicated 600 RPS/EPS unit has fully redundant PoE power for all 24 ports at 15.4 W per port.

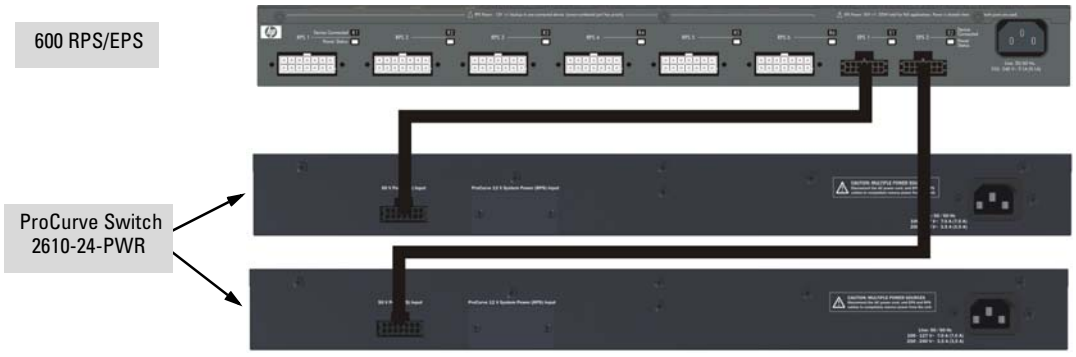


Figure 4-3. Example of an 600 RPS/EPS Powering Two 2610-24-PWR Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24	24 @ average 15.4 W each	24 @ 7.5 W each 12 @ 15.4 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204	24 @ 7.5 W each 12 @ 15.4 W each	None

- When two switches are connected to the 600 RPS/EPS ports, the PoE power available to each switch is a maximum of 204 W. If all of your PDs consume on average less than 7.6 W each (allowing for any line loss) then all 24 ports will receive redundant power should a switch's internal PoE power supply fail.

Redundant power is available as long as the total power required remains below 204 W.

ProCurve 2610-48-PWR Configurations

The tables in the example configurations contain entries that show the PoE power available when the 2610-48-PWR is used alone. When used with the 600 RPS/EPS or 610 EPS unit, additional PoE power is available to the PoE ports and PoE power is available should the switch's internal PoE power supply fail. Table entries show the PoE power available when the 600 RPS/EPS or the 610 EPS alone provides PoE power.

In the following examples using the ProCurve 2610-48-PWR switch, reference is made to two blocks of ports: ports 1-24 and ports 25-48. This applies when external PoE power is available from an 600 RPS/EPS or 610 EPS unit. In that case, the internal switch PoE power supply provides 406 watts of power to ports 1-24 and the 600 RPS/EPS or 610 EPS provides 408 watts of power to ports 25-48.

If you are using the ProCurve Switch 2610-48-PWR with external PoE power, the number of ports with available PoE power when the switch is powered by just the 600 RPS/EPS or 610 EPS unit may be less than the number of ports powered when both the switch and the 600 RPS/EPS or 610 EPS unit are supplying power. In the default configuration the number and location of ports with redundant PoE power is determined by three factors:

- The number of switches drawing external PoE power from the 600 RPS/EPS or 610 EPS unit. If only a single switch is using external PoE power the 600 RPS/EPS or 610 EPS provides 408 watts of PoE power. If two switches are using external PoE power from the 600 RPS/EPS or two switches are connected to the same pair on the 610 EPS, a switch receives 204 watts of PoE power. Should the switch's internal PoE power supply fail, the 600 RPS/EPS or 610 EPS provides power up to the wattage stated above.
- When the internal PoE power supply fails, the 600 RPS/EPS reserves a minimum of 22 watts for the less-loaded bank of ports. In the default configuration, at a minimum, the first two ports in the bank (1 and 2 or 25 and 26) will have PoE power.

Note

It is the ports configured with the highest priority of either bank (1-24 or 25-48) that will receive PoE power. For example, if the highest priority ports have been re-configured to be 23, 24 and 47, 48, then they will have PoE power.

- In the default configuration PoE power priority is determined by port number, with the lowest numbered port having the highest priority.

If redundant PoE power is required, use the example tables to determine how much power is available to which ports.

Figure 4-4. Example of an 600 RPS/EPS Powering One 2610-48-PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 408 1 - 24 25 - 48	48 @ average 15.4 W each	24 @ average 15.4 W each 48 @ average 8.5 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	408 (22 W is reserved for either ports 1-24 or 25-48)	24 @ average 15.4 W each 48 @ average 8.5 W each	None

The lowest loaded bank of ports (1-24 or 25-48) has 22 watts reserved. That power is available for use by the two highest priority ports in the bank, (in a default configuration ports 1 and 2, or 25 and 26).

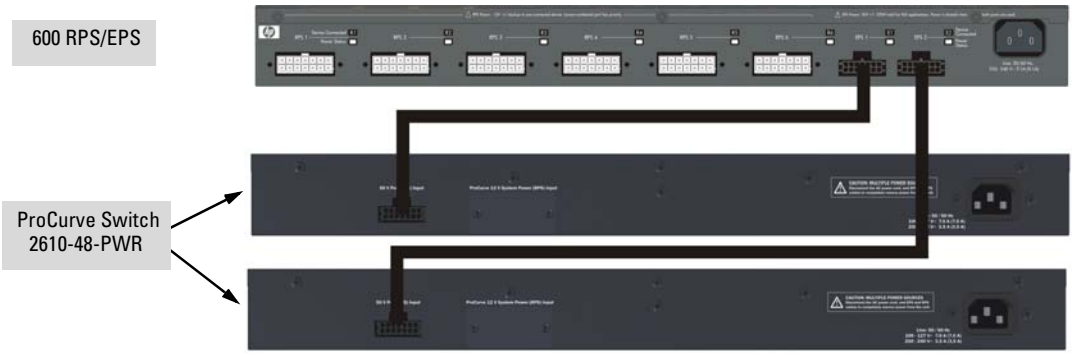


Figure 4-5. Example of an 600 RPS/EPS Powering Two 2610-48-PWR Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24 25 - 48	24 @ average 15.4 W each and 24 @ 8.5 W each or 36 @ average 15.4 W each	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204 (22 W is reserved for either ports 1-24 or 25-48)	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each	None

The lowest loaded bank of ports (1-24 or 25-48) has 22 W reserved and is 'bank 2' in the table above.

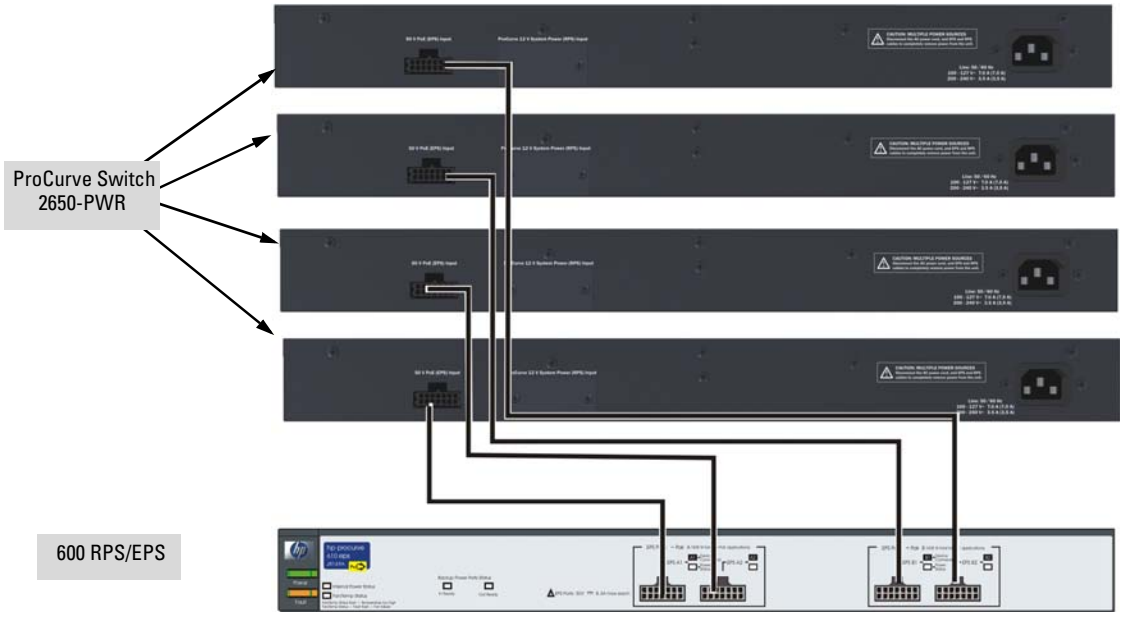


Figure 4-6. Example of an 610 EPS Powering Four 2610-48-PWR Switches

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	406	24 @ average 15.4 W each 48 @ average 8.5 W each	None
Internal plus External PoE Power Supply	406 + 204 1 - 24 25 - 48	24 @ average 15.4 W each and 24 @ 8.5 W each or 36 @ average 15.4 W each	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each
External PoE Power Supply (Failed Internal PoE Power Supply)	204 (22 W is reserved for either 1-24 or 25-48)	10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 8.5 W each 48 @ average 4.2 W each	None

With all four EPS ports in use, each switch only receives 204 watts.

Planning and Implementation for the Switch xl PoE module

This chapter discusses the planning process a user should follow to successfully implement PoE using a Series 5300xl PoE module. After understanding what PoE is and its operating rules, the next step to implementation is planning. See Appendix A for an example list of considerations during the planning phase.

Planning Your PoE Configuration

This section assists you in building a reliable PoE configuration. Using the following examples you can plan, build, and connect your PoE devices quickly and easily.

Your configuration may vary however this section discusses some of the more common configurations.

There are five configurations:

- One module with a 600 RPS/EPS
- Two modules with a 600 RPS/EPS
- Two modules with a 610 EPS using a separate pair of power ports
- Two modules with a 610 EPS using the same pair of power ports
- Four modules with a 610 EPS

Each example shows a complete configuration using either a 600 RPS/EPS or 610 EPS unit. A table shows the PoE power available to connected PoE devices

Once you have selected your specific configuration and the PoE power provided, you then add up the maximum amount of power each of your IEEE 802.3af-compliant devices require (use maximum power in watts, usually found on a product's data sheet). Adjust this total maximum power figure by adding 16% to account for possible line loss. This value must be less than the maximum power available shown in the table for your configuration.

ProCurve Switch PoE xl Module Configurations with a 600 RPS/EPS

For the ProCurve Switch xl PoE Module to function it must be installed in an ProCurve Switch 5300xl. The module will receive it's operational power from the switch and it's PoE power from the 600 RPS/EPS or an 610 EPS.

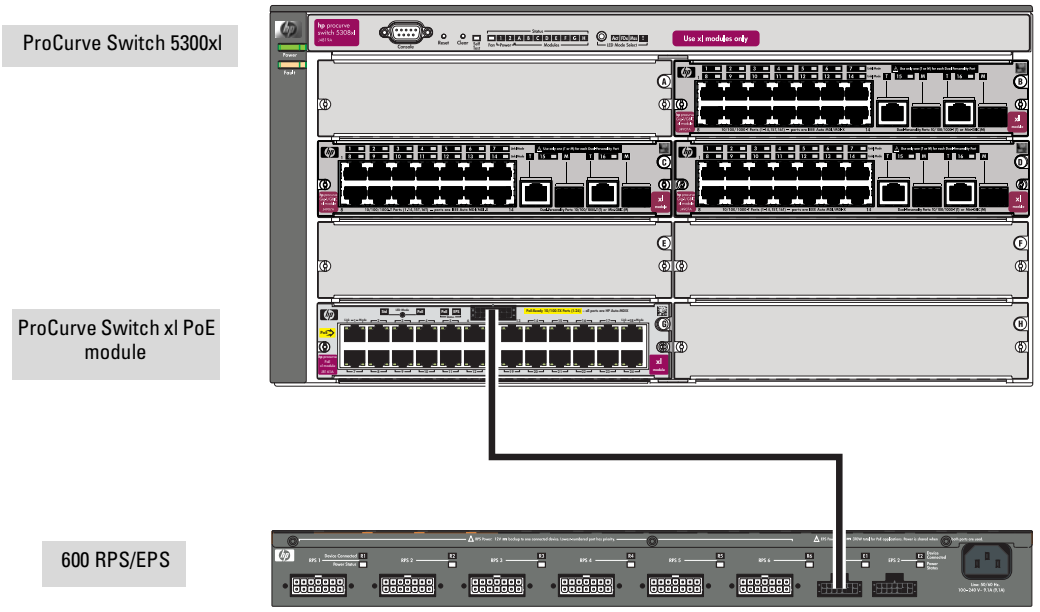


Figure 5-1. Example of an 600 RPS/EPS Powering One Module

In this example there is only one module connected to the 600 RPS/EPS, therefore it will be supplied with 408 watts of PoE power to be distributed to all it's 24 ports at 15.4 watts per port.

Note

When planning the installation of the ProCurve Switch xl PoE Module you must pay attention to the cabling. In a rack type installation, the 600 RPS/EPS is installed with the EPS ports in the rear, opposite this graphic. This means the EPS cable must come from the back of the 600 RPS/EPS unit and connect to the front of the module.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
External PoE Power Supply	408	24 @ average 15.4 W each	None

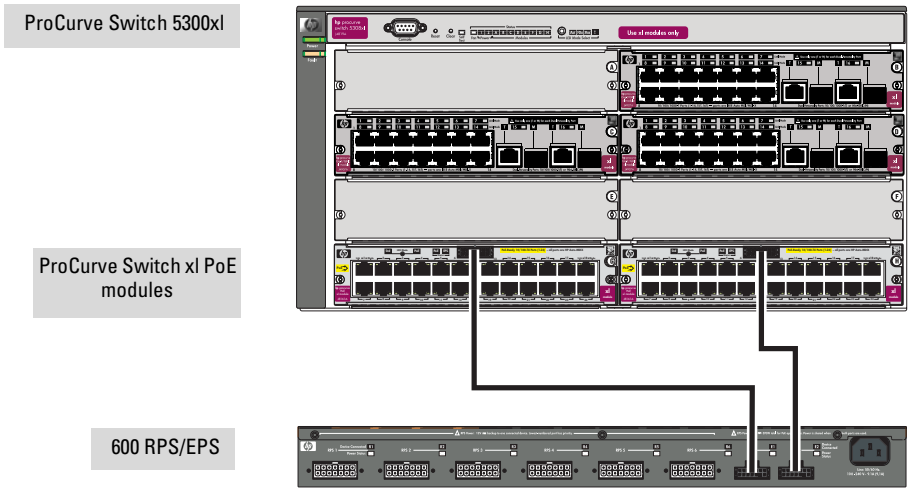


Figure 5-2. Example of an 600 RPS/EPS Powering Two Modules

In this example there are two modules connected to the 600 RPS/EPS, therefore each module will be supplied with 204 watts of PoE power to be distributed to each modules 24 ports at 8.5 watts per port.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
External PoE Power Supply	204/each module	24 @ average 8.5 W each	None

ProCurve Switch PoE xl Module Configurations with a 610 EPS

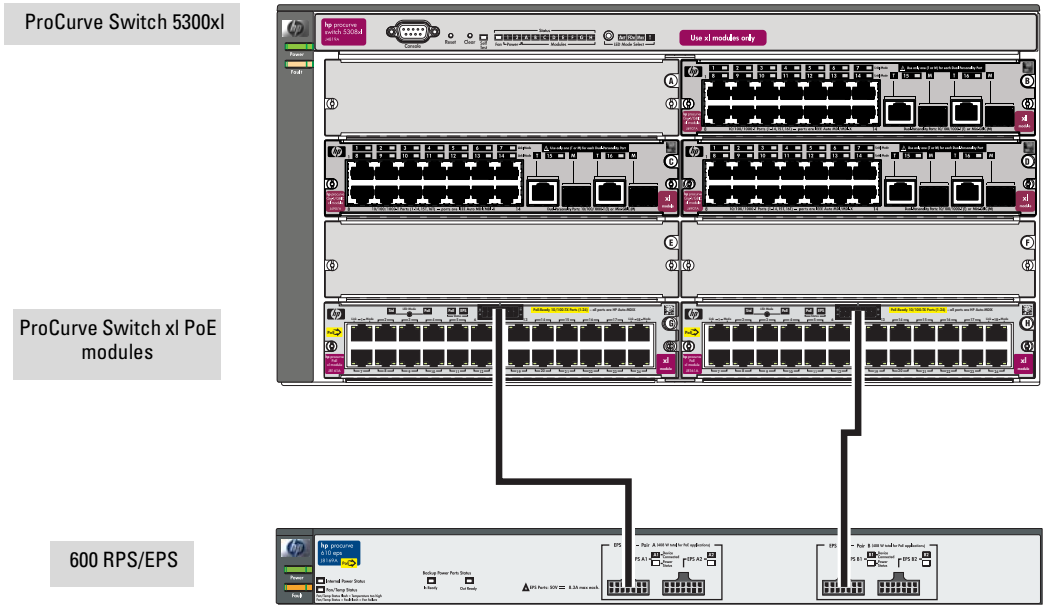


Figure 5-3. Example of an 610 EPS Powering Two Modules

In this example there are two modules connected to the 610 EPS. Each module will be supplied with 408 watts of PoE power to be distributed to each modules 24 ports at 15.4 watts per port, because each module is connected to a different pair. One module to one port of pair A and one module to one port of pair B.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
External PoE Power Supply	408/each module	24 @ average 15.4 W each	None

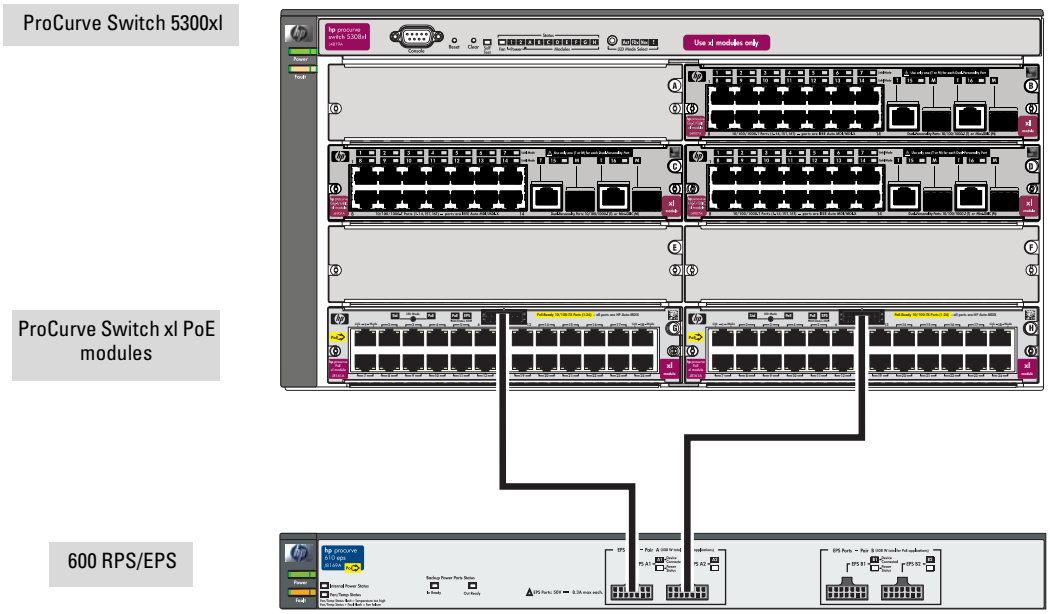


Figure 5-4. Example of an 610 EPS Powering Two Modules

In this example there are two modules connected to the 610 EPS, however each module will be supplied with 204 watts of PoE power to be distributed to each module's 24 ports at 8.5 watts per port, because both modules are connected to the same pair of ports, pair A.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
External PoE Power Supply	204/each module	24 @ average 8.5 W each	None

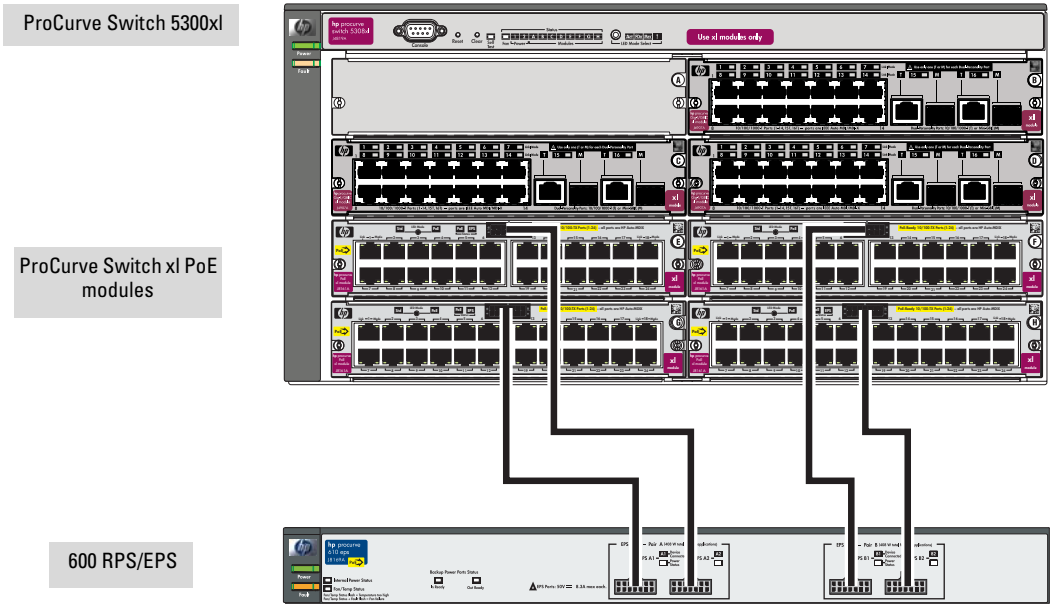


Figure 5-5. Example of an 610 EPS Powering Four Modules

In this example there are four modules connected to the 610 EPS, therefore each module will be supplied with 204 watts of PoE power to be distributed to each module's 24 ports at 8.5 watts per port.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
External PoE Power Supply	204/each module	24 @ average 8.5 W each	None

Planning and Implementation for the Switch 3500yl Series

This chapter discusses the planning process a user should follow to successfully implement PoE using a Series 3500yl Switch. After understanding what PoE is and its operating rules, the next step to implementation is planning. See "Specific Considerations for the 3500yl Switches" page A-2, for an example list of considerations during the planning phase.

Planning Your PoE Configuration

This section assists you in building a PoE configuration. Using the following examples you can plan, build, and connect PoE devices quickly and easily.

There are four configurations:

- ProCurve Switch 3500yl-24G-PWR
- ProCurve Switch 3500yl-24G-PWR connecting an external power supply.
- ProCurve Switch 3500yl-48G-PWR
- ProCurve Switch 3500yl-48G-PWR connecting an external power supply.

Each example shows a complete configuration. A table shows the PoE power available to connected PoE devices when using just the switch.

Once you have selected your specific configuration and the PoE power provided, you then add up the maximum amount of power each device requires (use maximum power in watts, usually found on a product's data sheet). Adjust this total maximum power figure by adding 16% to account for possible line loss. This value must be less than the maximum power available shown in the table for your configuration.

ProCurve 3500yl-24G-PWR Configuration

The table in this example configuration contains entries that show the PoE power available for the 3500yl-24G-PWR.

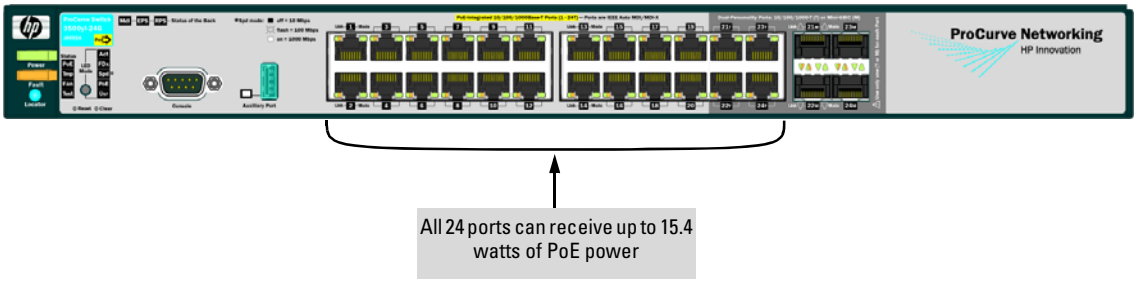


Figure 6-1. Example of a 3500yl-24G-PWR Switch

If any of the mini-GBIC ports are used (21-24) the corresponding RJ-45 port will not be supplied with PoE power. Therefore that needs to be taken into consideration when planning per port PoE wattage.

If for example, port 24 is used for a mini-GBIC, then the RJ45-port 24 is disabled. Therefore the PoE power that was being supplied to the RJ45-port 24 is returned to the total available pool of PoE power.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	398	24 @ average 15.4 W each for a total of 369.6 W	None

The table in this example configuration contains entries that show the PoE power available for the 3500yl-24G-PWR.

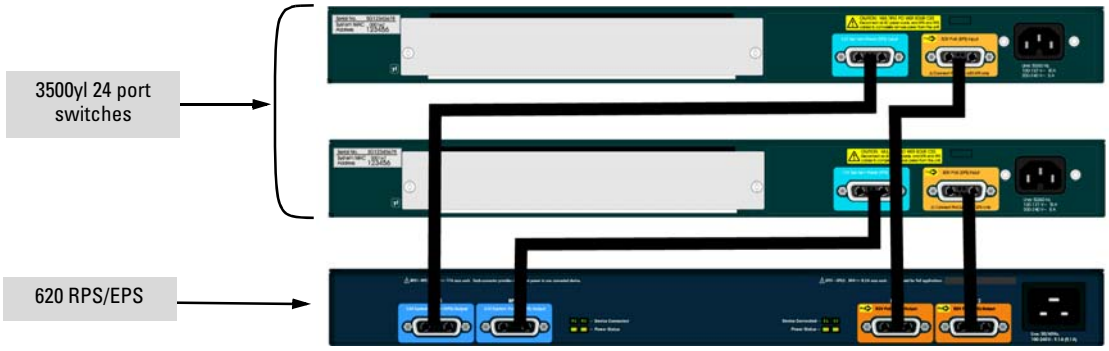


Figure 6-2. Example of two 3500yl-24G-PWR Switches connecting to a ProCurve 620 External and Redundant Power Supply (J8696A)

The same considerations for the mini-GBIC ports apply as in the previous example.

As shown in this illustration, two 3500yl-24G-PWR switches can be supported by one 620 RPS/EPS. This is a full redundant configuration. Both of the switches can be supplied with power should either of their internal power supplies fail. The 620 RPS/EPS can supply system power to keep the switch powered on and PoE power to supply the attached PoE devices with power.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port from internal supply	# of Ports Powered and Average Watts/Port from external supply
Internal PoE Power Supply	398	24 @ average 15.4 W each for a total of 369.6 W	None
Internal plus External PoE Power Supply	398 + 388 1 - 24 25 - 48	24 @ average 15.4 W each and 24 @ 8.5 W each or 36 @ average 15.4 W each	24 @ average 15.4 W each for a total of 369.6 W
External PoE Power Supply (failed Internal PoE Power Supply)	388	24 @ average 15.4 W each for a total of 369.6 W	None

ProCurve 3500yl-48G-PWR Configuration

PoE power requirements are figured differently for the 3500yl-48G-PWR switch, see PoE Power on page 2-9. The table in this example configuration contains entries that show the PoE power available for the 3500yl-48G-PWR switch.

In the default configuration PoE power priority is determined by port number, with the lowest numbered port (port 1) having the highest priority, and the highest numbered port (port 48) having the lowest priority.

Note

It is the ports configured with the highest priority of either bank (1-24 or 25-48) that will receive PoE power first. For example, if the highest priority ports have been re-configured to be 23, 24 and 47, 48, then they will receive PoE power before the lower priority ports.

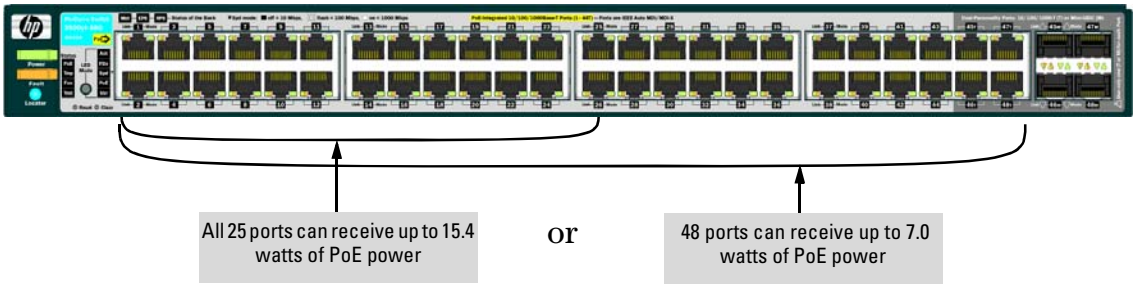


Figure 6-3. Example of a 3500yl-48G-PWR Switch

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/ Port
Internal PoE Power Supply	398	25 @ average 15.4 W each 48 @ average 7.0 W each 48 @ average 4.0 W each	None

- The lowest loaded bank of ports (1-24 or 25-48) has 22 watts reserved. That power is available for use by the two highest priority ports in the bank, (in a default configuration ports 1 and 2, or 25 and 26).

For example, the switch starts with 398 watts. Then it reserves 22 watts per bank leaving 354 watts total for allocation. If ports 1-24 are chosen to be used then the 22 watts that was held in reserve for that bank of ports will be added back in for a total of 376 watts.

It takes 369.6 watts to fully provision 24 ports (plus 5 watts to account for load fluctuations), leaving 1.4 watts to be returned to the pool of available watts. This can then be added to the 22 watts held in reserve for the bank of ports 25-48, giving a total of available watts of 23.4 watts.

Since a port requires 17 watts to power up a device, there is enough available power to power one more device in a port, somewhere between 25-48, giving a total number of powered ports of 25.

Another example would be to load balance or split the number of devices and wattage between the two banks of ports. In this example the total wattage of 398 would be divided in half, 199 watts would be allocated to ports 1-24, and 199 watts would be allocated to ports 25-48.

By load balancing in this manner there could be 12 devices on one bank of ports, say 1-24, and 13 on the other bank of ports, 25-48.

Both of these examples use maximum device wattage. If however, devices using lower wattages are connected there could be more devices connected to the switch than shown in these examples. Each environment will be different.

There is a CLI command available, the THRESHOLD command. It has an informational only result. This command sets a threshold, by percent, to inform you the switch is now using more than a certain percentage of PoE power. For example if the threshold is set at 50%, the switch will issue an information message informing you the switch has exceeded the threshold when 51% of available PoE power is being used. Also see page 7-7 for an example. For more information on the threshold command, Refer to the *Management and Configuration Guide* which is on the ProCurve Web site, **www.procurve.com**. (See page 1-8 for details.)

The table in this example configuration contains entries that show the PoE power available for the 3500yl-48G-PWR.

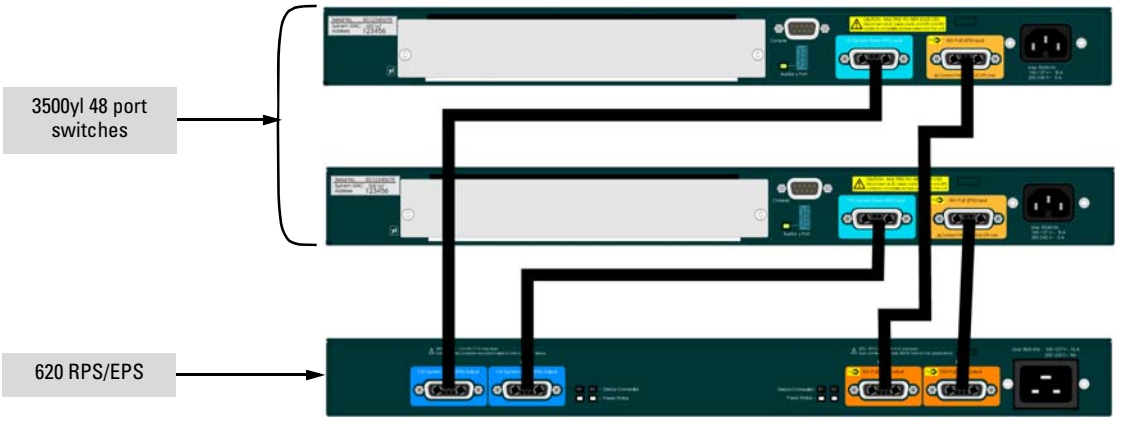


Figure 6-4. Example of two 3500yl-48G-PWR Switches connecting to a ProCurve 620 External and Redundant Power Supply (J8696A)

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Internal PoE Power Supply	398	25 @ average 15.4 W each 48 @ average 7.0 W each 48 @ average 4.0 W each	None
Internal plus External PoE power Supply	398 + 388	48 @ average 15.4 W each	24 @ average 15.4 W each 48 @ average 7.0 W each
External PoE Power Supply (failed Internal Power Supply)	388 (22 W is reserved for either ports 1-24 or 25-48)	25 @ average 15.4 W each 48 @ average 7.0 W each 48 @ average 4.0 W each	None

Each of the two switches can receive full redundant power from the 620 RPS/EPS should one of the switches internal power supplies fail. The lowest loaded bank of ports (1-24 or 25-48) has 22 watts reserved. That power is available for use by the two highest priority ports in the bank, (in a default configuration ports 1 and 2, or 25 and 26).

Planning and Implementation for the Switch 5400zl/8200zl Series

This chapter discusses the planning process a user should follow to successfully implement a PoE Series 5400zl/8200zl Switch. The 5412zl chassis and the 8212zl chassis share a completely common PoE implementation. Port counts, power supply wattages, specifications, and functionality for these two platforms are the same with respect to PoE.

After understanding what PoE is and its operating rules, the next step to implementation is planning. See Appendix A for an example list of considerations during the planning phase.

Planning Your PoE Configuration

This section assists you in building a reliable and, if required, redundant PoE configuration. Using the following examples you can plan, build, and connect your PoE devices quickly and easily.

Your configuration may vary however this section discusses some of the more common configurations.

Table 7-1. 5406zl Power Configurations

Switch Model 5406zl	Number of Power Supplies		Redundancy Model	Non-Redundant Power Available
	J8712A (110 or 220 volts)	J8713A (220 volts only)		
Standard PoE Power	1	0	None	273 W
	2	0	Full — Up to 273 W of PoE power	546 W
High PoE Power (Optimum)	0	1	None	900 W
	0	2	Full[1] — Up to 900 W of PoE power	1800 W
Mixed PoE Power (Not Recommended)	1	1	System and Redundancy — up to 273 W of PoE power, see page 7-8	1173 W

[1] If you go above 900 watts, you no longer have redundant PoE power unless a Power Supply Shelf is connected.

Table 7-2. 5412zl/8212zl Power Configurations

Switch Model 5412zl/ 8212zl	Power Supply Model		Redundancy System and PoE
	J8712A (110 or 220 volts)	J8713A (220 volts only)	
Standard PoE Power	2	0	None
	3	0	N+1 - Up to 546 W of PoE power
	4	0	Full - Up to 546 W of PoE power
High PoE Power (Optimum)	0	2	None
	0	3	N+1 - Up to 1800 W of PoE power
	0	4	Full - Up to 1800 W of PoE power Or N+1 - up to 2700 W of PoE power
Mixed PoE Power (Not Recommended)	2	1	System only See page 7-17
	1	2	System only See page 7-18
	2	2	System only See page 7-19

The following table contains the calculations for adding additional PoE power by connecting a Power Supply Shelf (J8714A) to a zl switch. The Power Supply Shelf does not provide any system power, only PoE power.

Table 7-3. Power Supply Shelf Power Configurations

Power Supply Shelf	Number of Power Supplies		Redundancy model	Non-Redundant Power Available
	J8712A (110 or 220 volts)	J8713A (220 volts only)		
Standard PoE Power	1	0	No System Redundancy — up to 273 W of PoE power[2]	273 W
	2	0	No System Redundancy — up to 546 W of PoE power[2]	546 W
Power Supply Shelf High PoE Power (Optimum)	0	1	No System Redundancy — up to 900 W of PoE power[2]	900 W
	0	2	No System Redundancy — up to 1800 W of PoE power[2]	1800 W
Power Supply Shelf Mixed PoE Power (Not Recommended)	1	1	No System Redundancy — up to 1173 W of PoE power[2]	1173 W

[2] The redundancy values shown here assume all the power supply bays in the switch are filled. Always fill internal bays before adding an external supply to ensure redundancy of system power.

In the following configuration examples, each example shows a complete configuration. A table shows the PoE power available to connected PoE devices when using just the switch and when connecting an external power supply.

Once you have selected your specific configuration and the PoE power provided, you then add up the maximum amount of power each of your IEEE 802.3af-compliant devices require (use maximum power in watts, usually found on a product's data sheet). Adjust this total maximum power figure by adding 16% to account for possible line loss. This value must be less than the maximum power available shown in the table for your configuration.

ProCurve 5406zl Configurations

The table in each example configuration contains entries that show the PoE power available for the PoE modules.

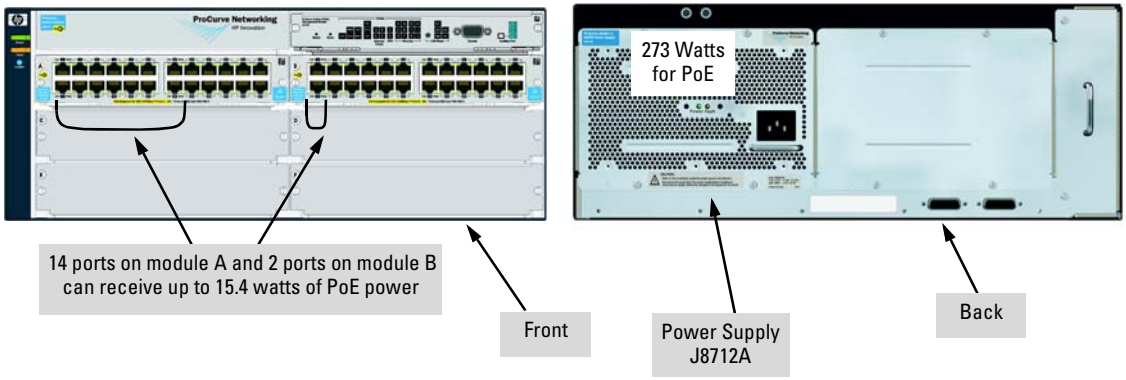


Figure 7-1. Example of a 5406zl with one power supply, J8712A

In this example there is one J8712A power supply supplying 273 watts for PoE usage.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Single Internal Power Supply (J8712A)	273	16 @ average 15.4 W 39 @ average 7.0 W each 68 @ average 4.0 W each	None

To achieve the 16 ports at 15.4 watts the PoE devices must be divided up and connected to two different modules. Remember, as soon as a module is installed into the switch, 22 watts is reserved for its use.

In order to use those watts, devices must be connected to that module or PoE power must be disabled to all ports on that module.

If PoE power is disabled to all ports on a module the 22 watts that was reserved for that module is returned to the pool of available watts and can be used by another module's ports.

In this example, there are three modules in the chassis and therefore 22 watts is reserved for each module. In order to use the 22 watts, PDs must be connected to each module, or all ports on one module could have the PoE power disabled.

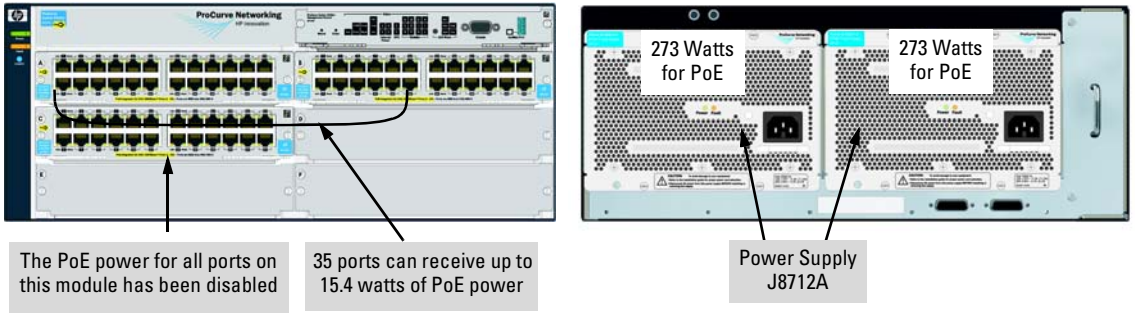


Figure 7-2. Example of a 5406zl with two power supplies, J8712A

In this example there are two power supplies supplying 273 watts each for a maximum of 546 watts.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Two Internal Power Supplies (J8712A)	546 (without redundancy)	35 @ average 15.4 W each 78 @ average 7.0 W each 136 @ average 4.0 W each	17 @ average 15.4 W 39 @ average 7.0 W each 68 @ average 4.0 W each
Two External Power Supplies (J8712A)	Additional 546	70 @ average 15.4 W each 144 @ average 7.0 W each 144 @ average 4.0 W each	35 @ average 15.4 W 78 @ average 7.0 W each 136 @ average 4.0 W each

In this example the load must be balanced or split between two or three modules in order to effectively use all 546 watts. The number of devices and wattage must be split between the modules. This would also help limit the effects of a single module failure. If one module fails, only the devices on that module would lose power.

Or, one power supply could be used to supply PoE power at 273 watts and the other power supply could be held in reserve as a secondary power supply if the primary power supply fails. If both power supplies are connected to different power sources, one could backup the other in case of failure. With this option the user must manage the PoE usage in order to maintain redundancy.

Connecting a fully loaded external power supply can double the available PoE power. See page 7-9.

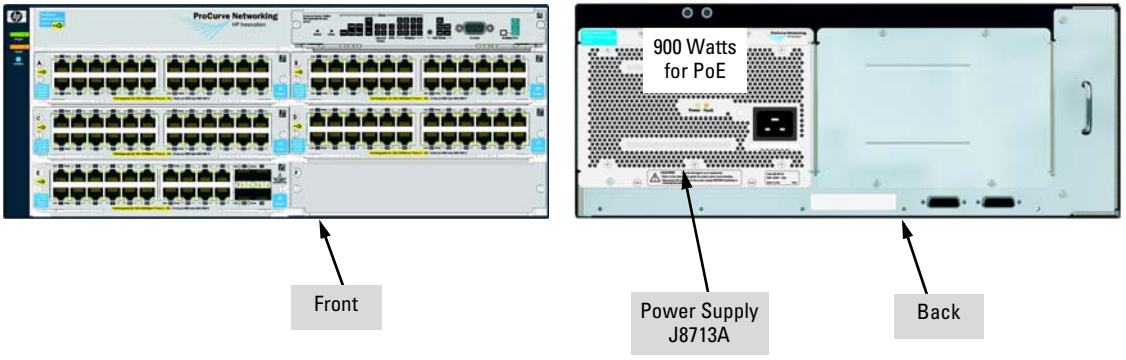


Figure 7-3. Example of a 5406zl with one power supply, J8713A

In this example there is one J8713A power supply supplying 900 watts for PoE usage. Compared to the J8712A, one J8713A power supply can supply more PoE wattage than two J8712As.

This configuration offers 116 ports of which all can be powered at 7.0 watts each, and offers fiber optic gigabit connectivity.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Single Internal PoE Power Supply (J8713A)	900	58 @ average 15.4 W each 116 @ average 7.0 W each 144 @ average 4.0 W each	None

If low wattage devices (4.0 watts) are connected to the switch, a 24 port module could be installed in each of the six slots providing 144 ports and all ports could be powered by a single J8713A power supply.

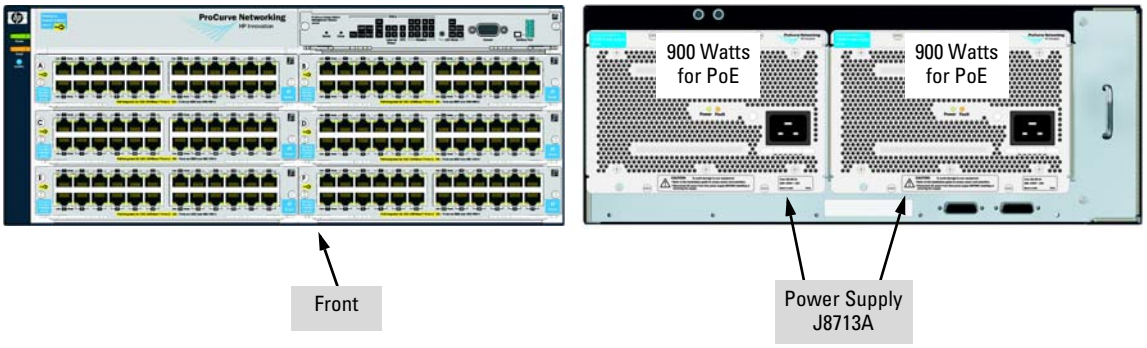


Figure 7-4. Example of a 5406zl with two power supplies, J8713A

This configuration is an example of two power supplies supplying 900 watts each for a maximum of 1800 watts to a fully loaded chassis of 144 ports. Therefore out of the total 144 available ports, 116 can be powered at 15.4 watts each.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Two Internal PoE Power Supplies (J8713A)	1800 (without redundancy)	116 @ average 15.4 W each 144 @ average 7.0 W each 144 @ average 4.0 W each	58 @ average 15.4 W each 116 @ average 7.0 W each 144 @ average 4.0 W each
Two External Power Supplies (J8713A)	Additional 1800	144 @ average 15.4 W each 144 @ average 7.0 W each 144 @ average 4.0 W each	116 @ average 15.4 W each 144 @ average 7.0 W each 144 @ average 4.0 W each

Or, one power supply could be used to supply PoE power at 900 watts and the other power supply could be used as a secondary power supply. If both power supplies are connected to different power sources, one could backup the other in case of failure. With this option the user must manage the PoE usage in order to maintain redundancy.

In this example the threshold command could be set at 50%, and if the switch begins to use more than 900 watts an event message would be logged. Thereby allowing you to adjust the PoE load or add a Power Supply Shelf for additional power as required to obtain the best power balance for your operation.

Connecting a fully loaded external power supply can double the available PoE power. See page 7-9.

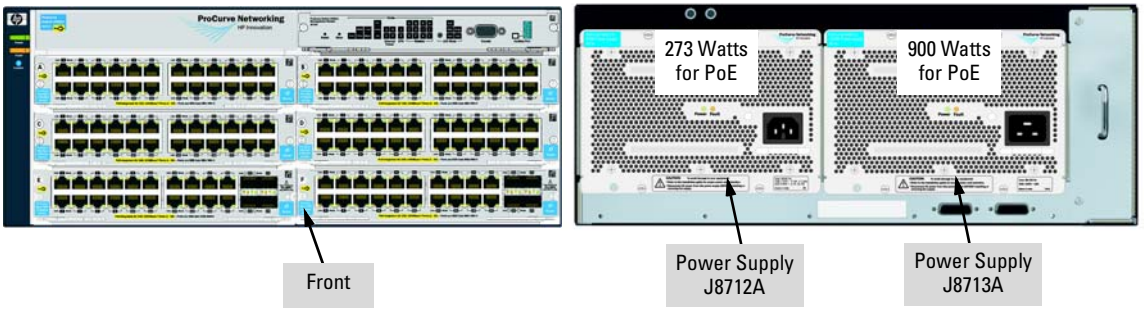


Figure 7-5. Example of a 5406zl with two power supplies (J8712A and J8713A)

In this example there is one J8712A and one J8713A power supply supplying 1173 watts for PoE usage. This configuration offers 136 ports of which all can be powered at 7.0 watts each, and offers eight ports for fiber optic gigabit connectivity. ProCurve Networking highly recommends that the two types of power supplies are not mixed in the same 5406zl chassis.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Two Internal PoE Power Supplies: one J8712A one J8713A	1173 (without redundancy)	76 @ average 15.4 W each 136 @ average 7.0 W each 136 @ average 4.0 W each	17 @ average 15.4 W 39 @ average 7.0 W each 68 @ average 4.0 W each

One power supply (J8712A) could be used to supply PoE power at 273 watts and the other power supply (J8713A) could be used as a secondary power supply. If both power supplies are connected to different power sources, one could backup the other in case of failure. However, if the J8713A power supply fails, the J8712A can keep the switch running but cannot supply all the PoE power that the J8713A was supplying. Therefore you need to plan very carefully when using this configuration.

In a system with mixed power supplies, failover is calculated based on the largest power supply failing. If it turns out to be the smaller power supply that fails, some of the ports that were powered off during the power failure will come back on. For example, in figure 4-5 there are mixed power supplies offering 900 W+ 273 W for 1173 W total. Failover power will be calculated at 273 W, so if a power supply fails all the controllers will fall back to a power level that can be supported by 273 W. If it turns out the 273 W supply failed, the system will detect that during the power supply polling cycle and increase power back up to 900 W total. This would result in some load coming back on if the total power used by all the loads in the box was greater than 273 W.

ProCurve 5406zl Configurations using the Power Supply Shelf

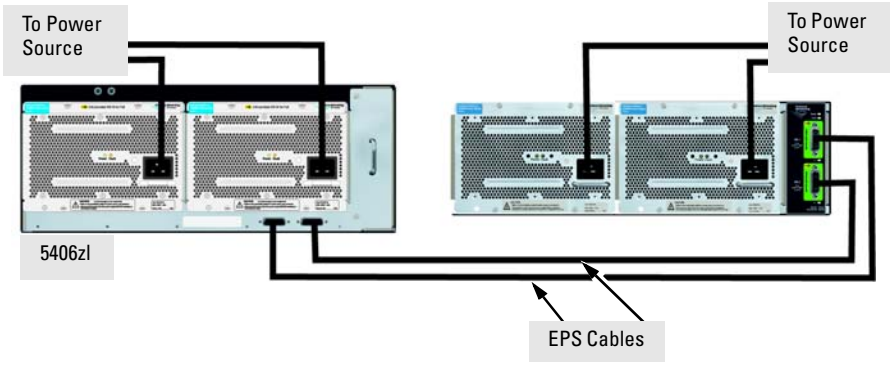


Figure 7-6. Connecting the EPS to one 5406zl switch

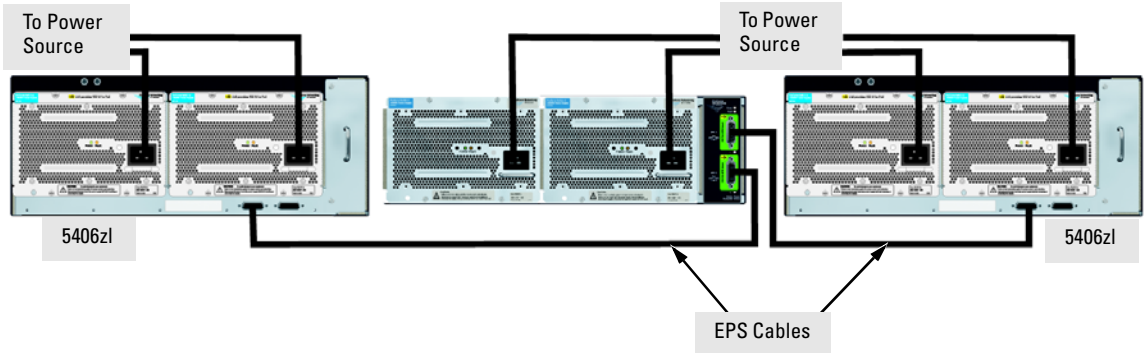


Figure 7-7. Connecting the EPS to two 5406zl switches

As shown in figures 4-6 and 4-7 the Power Supply Shelf can be connected to the 5406zl to supply extra or redundant PoE power to the PoE modules installed in the 5406zl.

ProCurve 5412zl/8212zl Configurations

The 5412zl chassis and the 8212zl chassis share a completely common PoE implementation. Port counts, power supply wattages, specifications, and functionality for these two platforms are the same with respect to PoE.

This section is divided into 3 sub-sections:

- Standard J8712A Configurations
- Standard J8713A Configurations
- Mixed J8712A and J8713A Configurations

Standard J8712A Configurations

The table in each example configuration contains entries that show the PoE power available for the PoE modules. There needs to be two power supplies in the 5412zl/8212zl chassis to power all 12 slots. Only one power supply in the 5412zl/8212zl is an unsupported configuration.

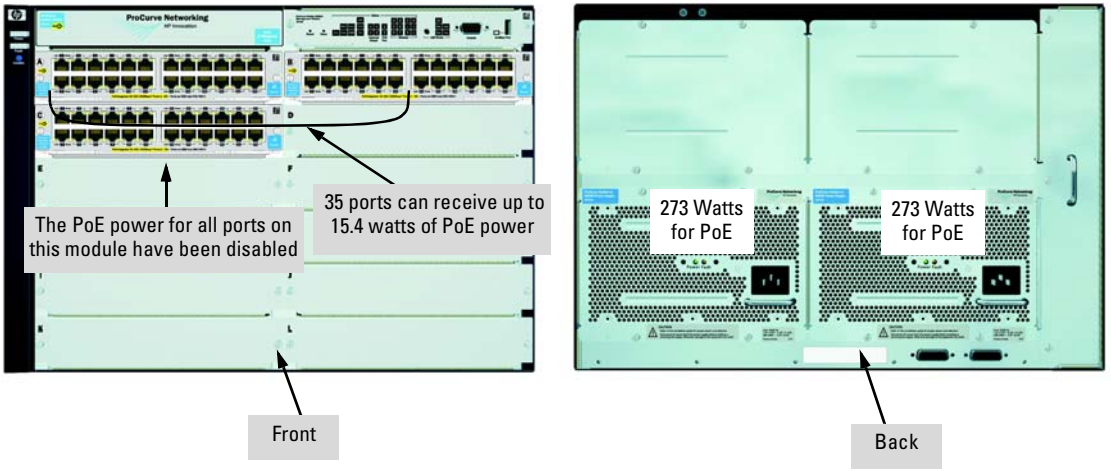


Figure 7-8. Example of a 5412zl with two power supplies, J8712A

In this example there are two power supplies supplying 273 watts each for a maximum of 546 watts.

To achieve the 35 ports at 15.4 watts the PoE devices must be divided up and connected to two different modules. Remember, as soon as a module is installed into the switch, 22 watts is reserved for its use.

In order to use those watts, devices must be connected to that module or PoE power must be disabled to all ports on that module.

If PoE power is disabled to all ports on a module the 22 watts that was reserved for that module is returned to the pool of available watts and can be used by another module's ports.

In this example the load must be balanced or split between two or three modules in order to effectively use all 546 watts. The number of devices and wattage must be split between the modules. This would also help limit the effects of a single module failure. If one module fails, only the devices on that module would lose power.

In this example, there are three modules in the chassis and therefore 22 watts is reserved for each module. In order to use the 22 watts, PDs must be connected to each module. Or all ports on one module could have the PoE power disabled.

Also in this configuration, there is no redundant power. Should a power supply fail, the remaining power supply can keep the switch running, but cannot supply all the PoE power needed by the modules.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Two Internal Power Supplies (J8712A)	546 (without redundancy)	35 @ average 15.4 W each 78 @ average 7.0 W each 136 @ average 4.0 W each	None

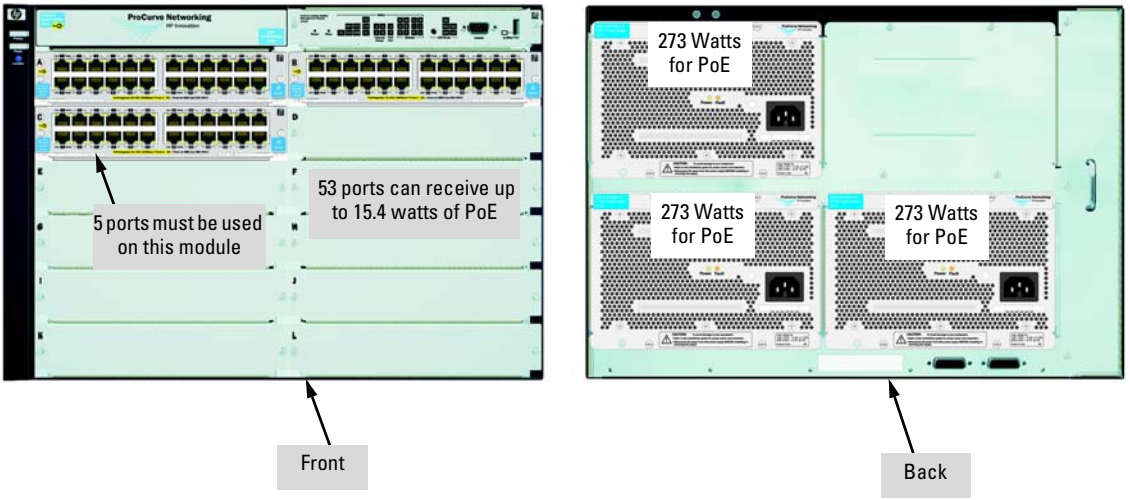


Figure 7-9. Example of a 5412zl with three power supplies, J8712A

In this example there are three power supplies supplying 273 watts each for a maximum of 819 watts.

To achieve the 53 ports at 15.4 watts the PoE devices must be divided up and connected to three different modules. Remember, as soon as a module is installed into the switch, 22 watts is reserved for its use.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Three Internal Power Supplies (J8712A)	819 (without redundancy)	53 @ average 15.4 W each 117 @ average 7.0 W each 204 @ average 4.0 W each	17 @ average 15.4 W 39 @ average 7.0 W each 68 @ average 4.0 W each

In this configuration one power supply (273 watts) could be used for redundant power. However, remember it can only support a limited number of ports depending on the wattages that are being supplied to the ports.

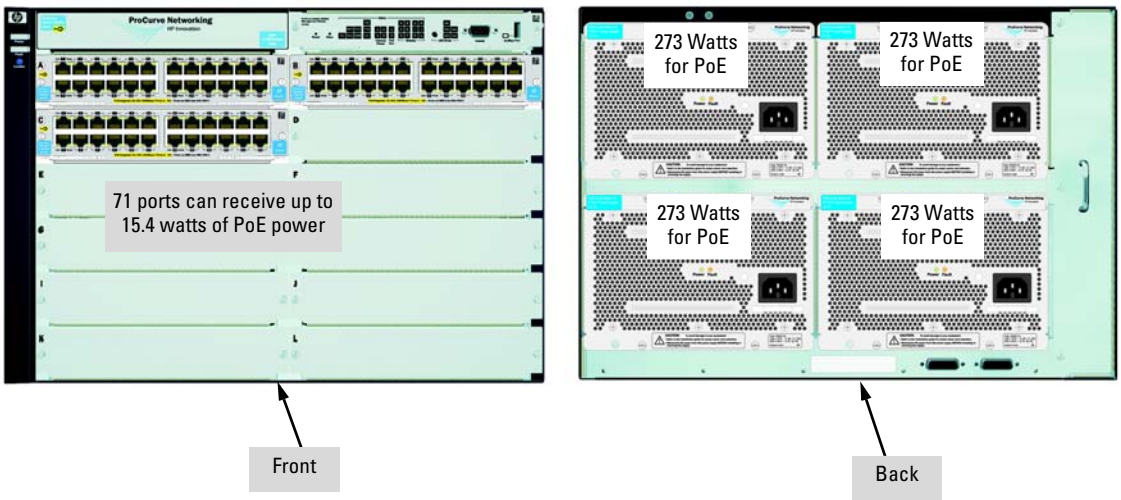


Figure 7-10. Example of a 5412zl with four power supplies, J8712A

In this example there are four power supplies supplying 273 watts each for a maximum of 1092 watts.

All three modules can be used or six and a half modules (156 ports) at 7.0 watts per port.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Four Internal Power Supplies (J8712A)	1092 (without redundancy)	71 @ average 15.4 W each 156 @ average 7.0 W each 273 @ average 4.0 W each	35 @ average 15.4 W 78 @ average 7.0 W each 136 @ average 4.0 W each

Two power supplies could be used to supply PoE power at 546 watts and the other two power supplies could be held in reserve as redundant power supplies if the primary power supplies fail. If two power supplies are connected to different power sources, they could backup the other two in case of failure. With this option the user must manage the PoE usage in order to maintain redundancy.

Standard J8713A Configurations

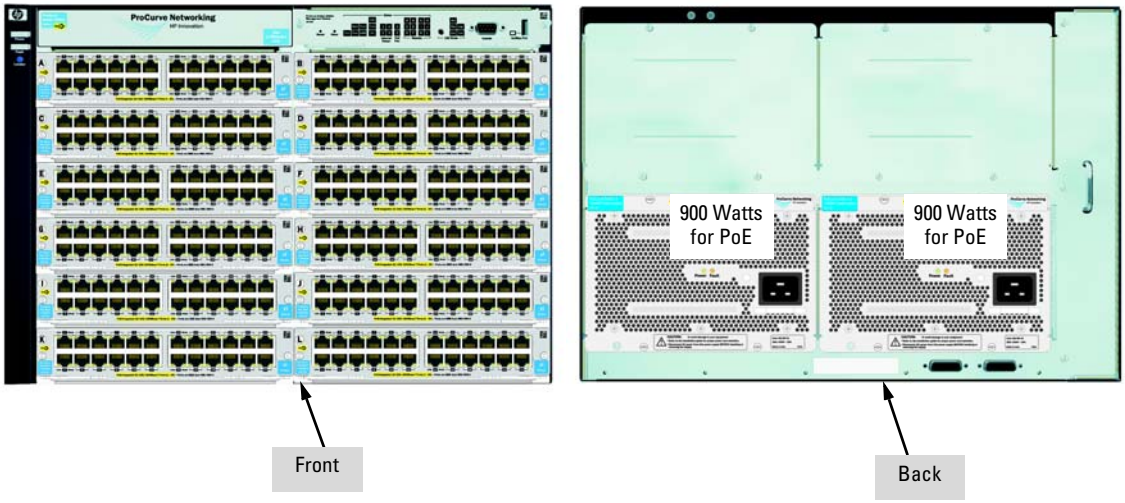


Figure 7-11. Example of a 5412zl with two power supplies, J8713A

This configuration is an example of two power supplies supplying 900 watts each for a maximum of 1800 watts to a fully loaded chassis of 288 ports. Therefore out of the total 288 available ports, 116 can be powered at 15.4 watts each. That's equal to a little over 4 modules, or all ports could be used at 4.0 watts.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Two Internal PoE Power Supplies (J8713A)	1800 (without redundancy)	116 @ average 15.4 W each 257 @ average 7.0 W each 288 @ average 4.0 W each	None

55 ports could be provisioned at 15.4 watts using 847 watts of the total 1800 leaving 953 watts. Then provision the other 238 ports at 4 watts using 952 watts of the remaining 953 watts. Finally leaving 1 watt.

This configuration could be redundant for PoE power up to 900 W. The upper 6 slots would stay up if they were the ports suppling the PoE power and the lower 6 slots were used for other than PoE power. One power supply has enough power to supply system power to the upper 6 slots and keep the switch up and running. And as long as the 900 watts of PoE power is not exceeded, then the top 6 modules would remain powered.

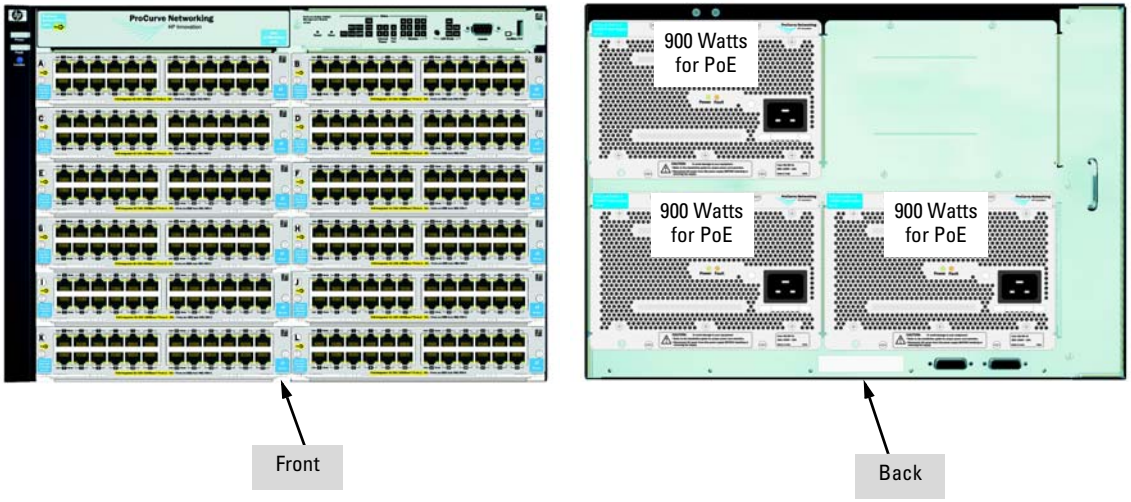


Figure 7-12. Example of a 5412zl with three power supplies, J8713A

This configuration is an example of three power supplies supplying 900 watts each for a maximum of 2700 watts to a fully loaded chassis of 288 ports. Therefore out of the total 288 available ports, 175 can be powered at 15.4 watts each. That's equal to a little over 6 and a half modules. Or all ports could be used at 7.0 watts.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Three Internal PoE Power Supplies (J8713A)	2700 (without redundancy)	175 @ average 15.4 W each 288 @ average 7.0 W each 288 @ average 4.0 W each	58 @ average 15.4 W each 128 @ average 7.0 W each 225 @ average 4.0 W each

Two power supplies could be used to supply PoE power at 1800 watts and the other one power supply could be held in reserve as redundant power supply if one of the primary power supplies fail. However this configuration cannot be fully redundant.

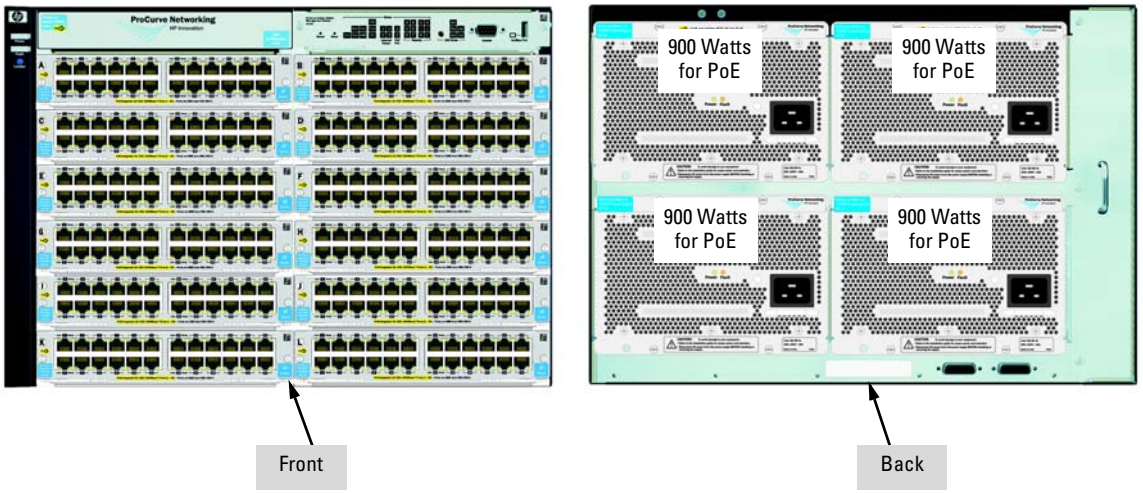


Figure 7-13. Example of a 5412zl with four power supplies, J8713A

This configuration is an example of four power supplies supplying 900 watts each for a maximum of 3600 watts to a fully loaded chassis of 288 ports. Therefore out of the total 288 available ports, 233 can be powered at 15.4 watts each.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Four Internal PoE Power Supplies (J8713A)	3600 (without redundancy)	233 @ average 15.4 W each 288 @ average 7.0 W each 288 @ average 4.0 W each	116 @ average 15.4 W each 257 @ average 7.0 W each 288 @ average 4.0 W each

Two power supplies could be used to supply PoE power at 1800 watts and the other two power supplies could be used as secondary power supplies. If the two sets of power supplies are connected to different power sources, one set of two could backup the other two in case of failure. With this option the user must manage the PoE usage in order to maintain redundancy.

In this example the threshold command could be set at 50%, and if the switch begins to use more than 1800 watts an event message would be logged. Thereby allowing you to adjust the PoE load as required to obtain the best power balance for your operation.

Mixed J8712A and J8713A Configurations

Although mixing power supplies is not recommended the following demonstrates the most common usages. Refer to page 7-8 for the discussion on failover in a mixed power supply environment.

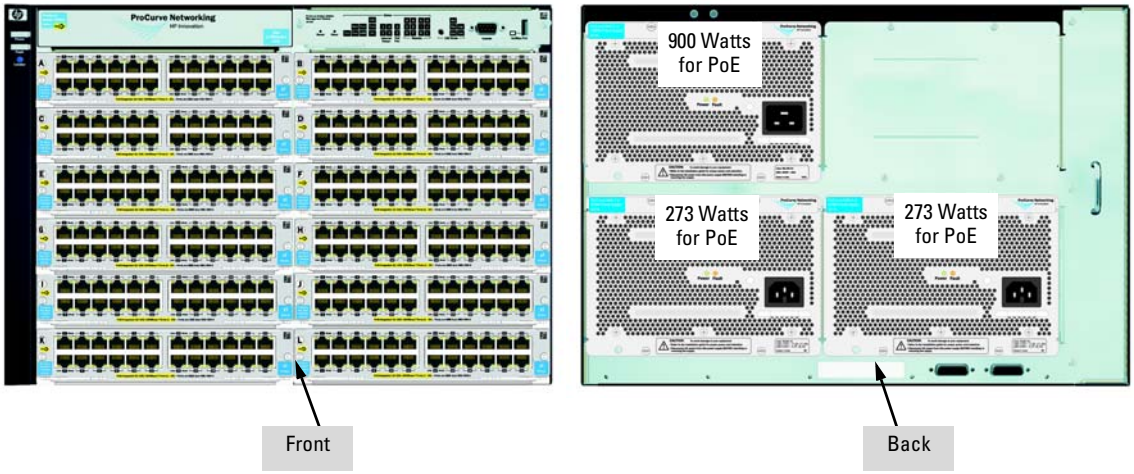


Figure 7-14. Example of a 5412zl with three power supplies (two J8712A and one J8713A)

This configuration is an example of three power supplies two J8712As supplying 546 watts and one J8713A supplying 900 watts for a maximum of 1446 watts. Therefore out of the total 288 available ports, 93 can be powered at 15.4 watts each.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Three Internal PoE Power Supplies: two J8712As one J8713A	1446 (without redundancy)	93 @ average 15.4 W each 206 @ average 7.0 W each 288 @ average 4.0 W each	None

Redundancy now becomes and issue. You can use the one J8713A (900 watts) to backup the two J8712As if either one of them fail, but you cannot use the two J8712As to backup the J8713A. They don't have enough PoE power.

By only using one power supply for redundancy, the J8713A, it will only be able to power 6 module slots should both of the J8712As fail. Thereby, possibly not being able to supply all ports with PoE power depending on which modules and which ports were configured to supply PoE power.

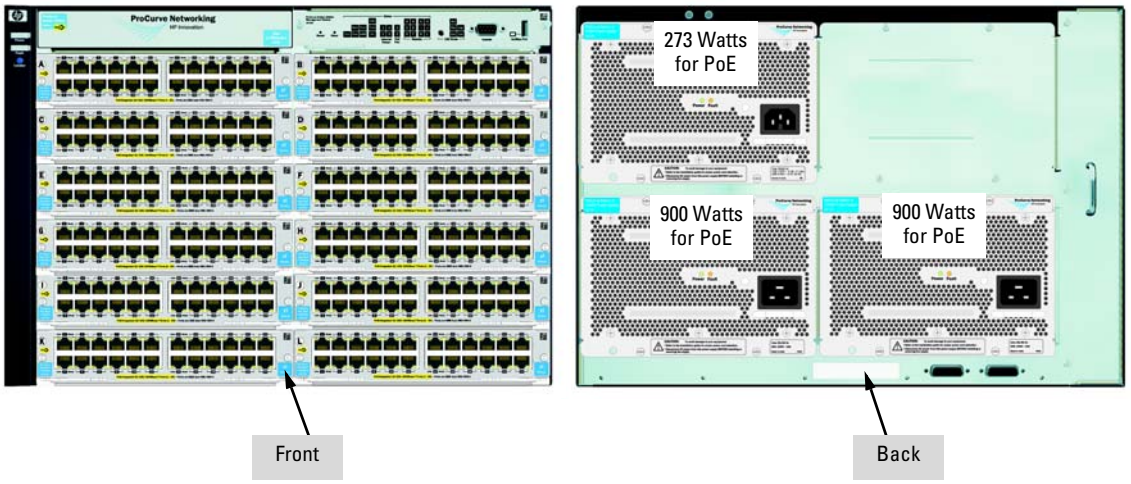


Figure 7-15. Example of a 5412zl with three power supplies (one J8712A and two J8713A)

This configuration is an example of three power supplies one J8712A supplying 273 watts and two J8713As supplying 1800 watts for a maximum of 2073 watts. Therefore a total of 134 ports can be powered at 15.4 watts each.

Source of Power	Watts Available	# of Ports Powered and Average Watts/Port	Redundant # of Ports Powered and Average Watts/Port
Three Internal PoE Power Supplies: one J8712A two J8713As	2073 (without redundancy)	134 @ average 15.4 W each 288 @ average 7.0 W each 288 @ average 4.0 W each	58 @ average 15.4 W each with a J8713A in reserve 128 @ average 7.0 W each with a J8713A in reserve 225 @ average 4.0 W each with a J8713A in reserve

In this example, one J8713A could be held in reserve to provide redundant power for the other J8713A since they are equal in power. However if the J8712A should fail there would be no redundancy for that power supply. Unless you wanted to borrow power from the reserve J8713A. If this is done though and the primary J8713A fails, there will not be enough power left over to fully backup the failed J8713A.

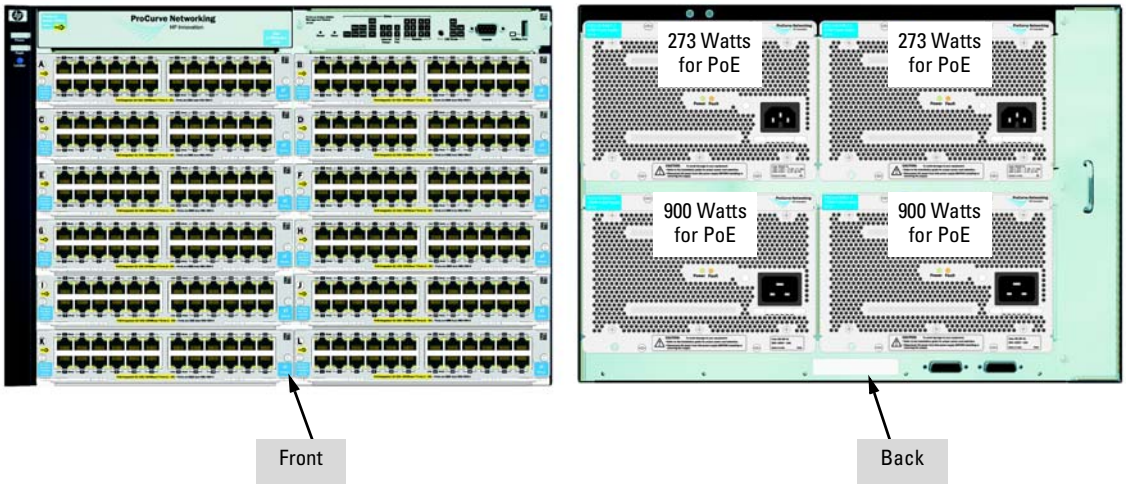


Figure 7-16. Example of a 5412zl with four power supplies (two J8712A and two J8713A)

In this example there are two J8712A and two J8713A power supplies supplying 2892 watts for PoE usage. With this configuration 187 ports (or more than 7 modules) can be provisioned at 15.4 watts. Or all ports, 288 can be powered at 7.0 watts each.

ProCurve Networking highly recommends that the two types of power supplies are not mixed in the same 5412zl/8212zl chassis.

Source of Power	Watts Available	# of Ports Powered and Average Watts/ Port	Redundant # of Ports Powered and Average Watts/Port
Four Internal PoE Power Supplies: two J8712As and two J8713As	2892 (without redundancy)	187 @ average 15.4 W each 288 @ average 7.0 W each 288 @ average 4.0 W each	35 @ average 15.4 W 78 @ average 7.0 W each 136 @ average 4.0 W each

The reason the redundant # of Ports in this table is so low if because redundant PoE power should always be based on the smallest power supply. In this case the smallest power supply is the 8712A providing 546 watts.

ProCurve 5412zl/8212zl Configurations using the Power Supply Shelf

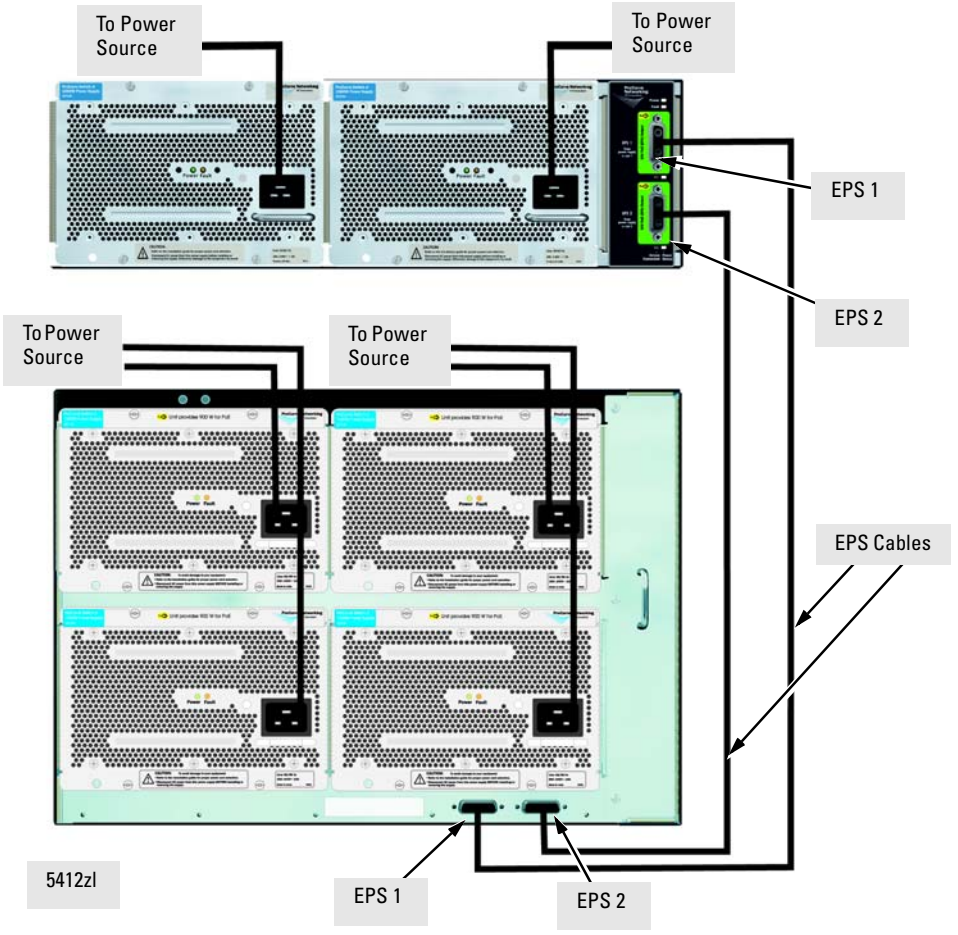


Figure 7-17. Connecting the EPS to one 5412zl switch

Either EPS port on the Power Supply Shelf can be connected to either EPS port on the switch, to avoid confusion, it is recommended that EPS 1 of the Power Supply Shelf be connected to EPS 1 of the switch.

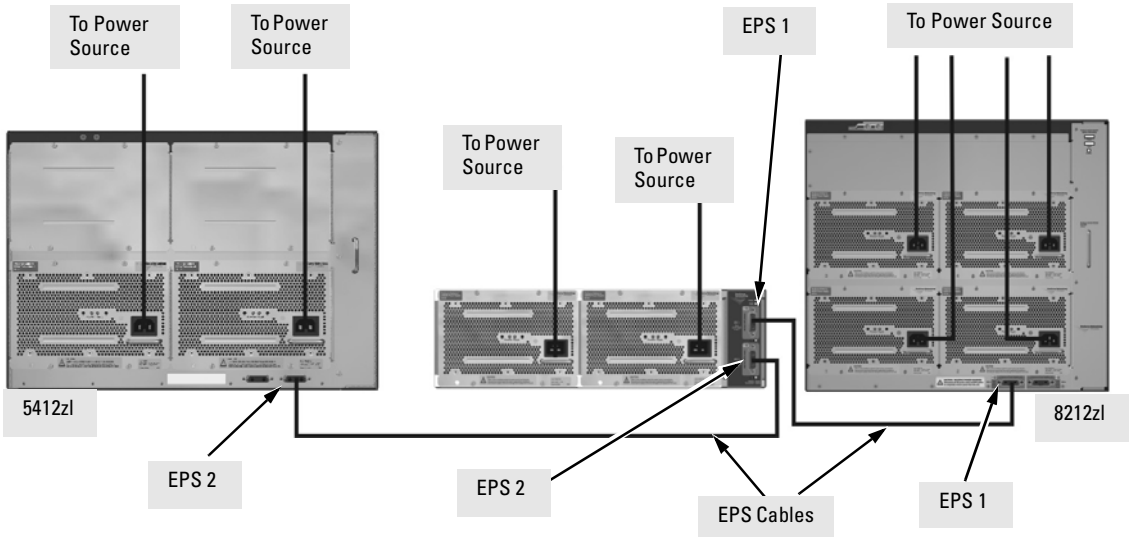


Figure 7-18. Connecting the EPS to two switches, one 5412zl and one 8212zl

In this configuration EPS 2 of the Power Supply Shelf can be connected to either EPS 1 or EPS 2 of either switch.

As shown in figures 4-16 and 4-17 the Power Supply Shelf can be connected to the 5412zl/8212zl to supply extra or redundant PoE power to the PoE modules installed in the 5412zl/8212zl.

Infrastructure Requirements

Air conditioning

Power supplies create a great amount of heat. Ensure you have enough cool air to maintain an ambient temperature between 0°C to 50°C (32°F to 131°F) around the switch devices inside the rack or equipment closet. If you are installing any of the X2 transceivers the operating ambient temperature should not exceed 40°C (104°F). See transceiver specifications in the installation guide for your switch.

A typical 48 port PoE switch BTU rating is approximately 920. Adding in a maximum number of PoE powered devices (PD) connected to the switch at 15.4 watts, the BTU rating can jump to approximately 2280. Although typically the PDs are outside of the data closet area, the total BTU needs of the air conditioning system (for the whole building for example) needs to take this additional cooling requirement into consideration.

When adding a Redundant Power Supply (RPS), the BTU rating can grow to approximately 3500 and more. This example only takes into consideration one PoE switch with redundant power. As more switches, PoE PDs, and redundant power supplies are added the BTU rating increases requiring more cooling.

Ensure wiring closets and other areas where PoE switches and power supplies are congregated have proper cooling. Even though most PDs do not draw the maximum 15.4 watts, it is still good to plan for the maximum.

Power requirements

Ensure you have enough power supplied to the area where the switches will be mounted. Some units have dual power supplies in them that you may want to consider connecting each power supply to different circuits in order to provide redundant power to the switch.

Many switches come with dual power ratings (110 or 220 volt operation). Therefore planning for power requirements is critical. If a wiring closet currently only supplies 110 volts it must be determined whether or not to operate the switch at 110 volts or 220 volts.

You not only need to plan for voltage requirements but amperage requirements. PoE switches can be double or triple the amperage draw compared to a non-PoE switch.

Physical Space

These devices may be deeper (longer) than other equipment in your network due to the added PoE power supplies. Also if RPS units have been added to the rack or wiring closet, ensure enough space has been planned for all devices.

Space around the switch and around the other units must be available to allow:

- access by service personnel
- space for power cords and other wiring
- cool air circulation

Racks

PoE switch devices and RPS units may be heavier than other non-PoE switch devices in your network. Therefore you should rack heavy devices at the bottom of the rack, followed by lighter devices as you move up the rack. This will help to keep the rack from tipping over.

Secure racks as specified by your rack's manufacturer. Ensure your racks are compliant with any earthquake structural rules and regulations.

Glossary

active PoE port - PoE-enabled port connected to a PD and currently delivering power.

priority class - Refers to the type of power prioritization where the switch uses Low (the default), High, and Critical priority assignments to determine which groups of ports will receive power. Note that power priority rules apply only if PoE provisioning on the switch becomes oversubscribed.

EPS - External Power Supply

MPS - Maintenance Power Signature; the signal a PD sends to the switch to indicate that the PD is connected and requires power.

Oversubscribed - The state where there are more PDs requesting PoE power than can be accommodated.

PD - Powered Device. This is an IEEE 802.3af-compliant device that receives its power through a direct connection to a 10/100Base-TX PoE RJ-45 port on the switch. Examples of PDs include Voice-over-IP (VoIP) telephones, wireless access points, and remote video cameras.

port-number priority - Refers to the type of power prioritization where, within a priority class, the switch assigns the highest priority to the lowest-numbered port, the second-highest priority to the second lowest-numbered port, and so-on. Note that power priority rules apply only if PoE provisioning on the switch becomes oversubscribed.

PoE - Power-Over-Ethernet

PSE - Power-Sourcing Equipment. A PSE, such as the Series 3500yl Switches, or the modules in a 5400zl chassis, provides power to IEEE 802.3af-compliant PDs directly connected to 10/100/1000Base-T PoE RJ-45 ports on the switch. The Series 3500yl Switches and the Switch zl PoE Modules are *endpoint* PSEs.

Planning Considerations

This appendix is divided into three sections:

- General Considerations
- Specific Considerations for the 3500yl Switches
- Specific Considerations for the 5400zl Switches

These lists are in no way exhaustive, however answers to these and other questions will help define how many and what types of switches are needed to implement a PoE configuration.

General Considerations

The following is an example list of considerations during the planning phase no matter which series of switches are being installed:

- How many devices need PoE power?
- What devices will need PoE power?
- How much power will each device require, in watts?
- What is the total of all their wattages?
- Will the devices be connected to a 3500yl or to a 5406zl switch?
- How many ports are needed?
- How many ports are available?
- Are the devices to be powered by PoE power supported?
  - The ProCurve Switches covered in this manual support any products that meet the IEEE 802.3af PoE standard and some pre-standard PoE devices. For a current list see the FAQ page for your switch, which can be found on the ProCurve Web site, **www.procurve.com**, Technical Support, FAQs (all).
- How many PDs per Switch?
  - The number of PDs supported per switch depends on the power allocation and how much power each PD uses and how much power is left. The examples in the following section show the power consumption in some typical configurations.

Specific Considerations for the 3500yl Switches

The following is an example list of considerations during the planning phase specific to the Series 3500yl Switches:

- What if power is lost to the switch?
  - Power for the switch to operate (system power)
  - Power for PoE devices
- Which devices to plug into which ports and with what priorities?
  - Port prioritization
  - Port priority class
  - Reserve watts
  - Total watts available (398)
- Which bank of 24 ports will be used?
- Will load balancing be used?
- Will any mini-GBICs be used and in what ports?
- Should the 620 RPS/EPS be plugged into a different power source than the switch it is going to back up.

Specific Considerations for the 5400zl/ 8200zl Switches

The following is an example list of considerations during the planning phase specific to the Series 5400zl/8200zl switches:

- What if power is lost to the switch?
  - Power for the switch to operate (system power)
  - Power for PoE devices
- Which devices to plug into which ports, modules, and with what priorities?
  - Slot prioritization
  - Port prioritization
  - Port priority class
  - Reserve watts
  - Total watts available
- Which modules will be used for PoE and which will not?
- Will load balancing be used?

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