Power over Ethernet (PoE/PoE+)
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Applicable Products
HP ProCurve Switch 2910al-24G-PoE+ (J9146A)
HP ProCurve Switch 2910al-48G-PoE+ (J9148A)
HP ProCurve Switch 2915G (J9562A)
HP ProCurve Switch 5406zl (J8697A)
HP ProCurve Switch 5406zl-48G (J8699A)
HP ProCurve Switch 5412zl (J8698A)
HP ProCurve Switch 5412zl-96G (J8700A)
HP ProCurve Switch 3500-24-PoE (J9471A)
HP ProCurve Switch 3500-48-PoE (J9473A)
HP ProCurve Switch 3500yl-24G-PWR (J8762A)
HP ProCurve Switch 3500yl-48G-PWR (J8933A)
HP ProCurve 3500yl-24G-PoE+ Switch (J9310A)
HP ProCurve 3500yl-48G-PoE+ Switch (J9311A)
HP ProCurve Switch zl Power Supply Shelf (J8714A)
HP ProCurve Switch 8206zl (J9475A)
HP ProCurve Switch 8212zl (J8715A)
HP ProCurve Switch 2626-PWR (J8164A)
HP ProCurve Switch 2650-PWR (J8165A)
HP ProCurve Switch 2600-8-PWR with Gigabit Uplink (J8762A)
HP ProCurve Switch 2610-24/12PWR (J9086A)
HP ProCurve Switch 2610-24-PWR (J9087A)
HP ProCurve Switch 2610-48-PWR (J9089A)
HP ProCurve Switch 2615-8-PoE (J9565A)
HP ProCurve Switch xl PoE Module (J8161A)
HP ProCurve 24-Port 10/100/1000 PoE+ zl Module (J9307A)
HP ProCurve 20-Port 10/100/1000 PoE+/4-Port MiniGBIC Module (J9308A)
HP ProCurve 24-Port 10/100 PoE+ zl Module (J9478A)
HP ProCurve 600 Redundant and External Power Supply (J8168A)
HP ProCurve 610 External Power Supply (J8169A)
HP ProCurve 620 Redundant and External Power Supply (J8996A)

HP ProCurve 630 Redundant and/or External Power Supply (J9443A)
HP ProCurve 1500W PoE+ zl Power Supply (J9306A)
HP ProCurve 2520-8-PoE (J9137A)
HP ProCurve 2520-24-PoE (J9139A)
HP ProCurve 2520G-8-PoE (J9298A)
HP ProCurve 2520G-24-PoE (J9299A)

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Introduction

This chapter provides an overview of:
- Power over Ethernet (PoE/PoE+).
- A list of reasons why you might want to implement PoE in your network environment.
- How PoE supplies power over twisted pair cable.
- 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.
Since the original introduction of PoE, the IEEE has initiated a new project called 802.3at which is commonly referred to as PoE+. This project enhances PoE in a couple of very important ways. First, it provides up to 30W of power to a Powered Device (PD), 25.5 watts to the device and 4.5 for line loss, and allows this power to also run on cabling designed for 1000BASE-T. Secondly, it provides a new mechanism for communicating power capability and requirements using the 802.1ab Link Layer Discovery Protocol (LLDP). This protocol addition allows PoE+ switches to deliver power more efficiently and thereby provide power to more devices for a given power supply capacity. The new standard is going to be a superset of the 802.3af because it provides all the same functionality, and more. The table below shows the capabilities of 802.3af versus 802.3at.

<table>
<thead>
<tr>
<th>Power to PD</th>
<th>Physical</th>
<th>Logical</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;25.5W</td>
<td>802.3at</td>
<td>802.3at</td>
</tr>
<tr>
<td>&lt;12.95W</td>
<td>802.3af</td>
<td>802.3at</td>
</tr>
</tbody>
</table>

In order for 802.3at to provide higher power, Class D (Cat5e) or better cables are required. 802.3at also increases the minimum output voltage of the Power Source Equipment (PSE) from 44 volts to 50 volts. For this reason, you may note that ProCurve PoE+ devices use a 54 volt power supply.

**Note**

The detection and classification functions ensure that if two PoE sources are attached together, power will not be improperly applied.
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](image)
Introduction

Power Through the Cable

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. Only two of these pairs are used for 10Base-T and 100Base-TX data; 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. HP 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.

Once discovered, a different voltage is applied, and based upon the current drawn, the class of device can be determined. This indicates how much power is to be drawn. The 802.3at standard provides both a physical classification and a logical classification, which is even more precise.

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 HP ProCurve Products

These switches are designed to be used primarily in wiring closets directly connected to computers, printers, and servers to provide dedicated bandwidth to those devices. Additionally, they support the PoE standard IEEE 802.3af, and the PoE+ IEEE 802.3at standard. They can supply power over a twisted-pair cable to power devices such as telephones, wireless access points, IP Gateways, and audio and video remote monitoring.

The HP ProCurve PoE switch devices are multi-port 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 PoE switches are designed to support Redundant Power Supply and Power over Ethernet (PoE and/or PoE+) technologies.
Introduction
PoE Capabilities of the HP ProCurve Products

HP ProCurve 2520 Switches

The 2520 (J9137A), has 8 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports.

The 2520 (J9138A), has 24 Integrated PoE auto-sensing 10/100Base-TX RJ-45 ports and two 10/100/1000Base-TX uplink ports, with two 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 enabled by default.

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.
HP ProCurve 2520G Switches

The 2520G (J9298A), has 8 Integrated PoE auto-sensing 10/100/1000Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports.

The 2520G (J9299A), has 24 Integrated PoE auto-sensing 10/100/1000Base-TX RJ-45 ports including 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 enabled by default.

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.
Introduction
PoE Capabilities of the HP ProCurve Products

HP ProCurve 2600 Switches

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

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

The 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.
HP ProCurve 2610 Switches

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.

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

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

For more information, refer to the Management and Configuration Guide on the ProCurve Web site. To display the list of downloadable manuals, click on the following link: www.hp.com/go/procurve/manuals.

(You may want to bookmark this Web page for easy access in the future.)
Power Redundancy for the 2600 and 2610 Switches

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 (J8168A) device to one of the 2600-PWR Switches or one of the 2610-PWR Switches, you should also connect the RPS as well to provide full redundant power.

The 2600-PWR Switches and 2610-PWR Switches 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.

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.

HP ProCurve 2615 Switch

The HP ProCurve Switch 2615-8-PoE (J9565A), has 8 Integrated PoE auto-sensing 10/100Base-T RJ-45 ports with two dual-personality Gigabit Uplink ports. There is no power redundancy for this switch.

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 enabled by default.

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.
HP ProCurve 2910al Switches

The HP ProCurve Switch 2910al-48G-PoE+ (J9148A), has 44 Integrated PoE+ auto-sensing 10/100/1000Base-T RJ-45 ports with four dual-personality Gigabit Uplink ports.

The HP ProCurve Switch 2910al-24G-PoE+ (J9146A), has 20 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. While HP ProCurve strives to support as many non-standard devices as possible, some devices in the market are designed in ways that are restrictive, or exclusive of the IEEE standard and thus cannot be supported. For a list of these devices, see the FAQs for your switch model, www.hp.com/go/procurve/faqs. This feature is the default and you must disable it if you do not want to use it. For example:

ProCurve 2910al#(config) no power pre-std-detect

For more information, refer to the Management and Configuration Guide which is on the ProCurve Web site. To display the list of downloadable manuals, click on the following link: www.hp.com/go/procurve/manuals.

(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/PoE+ power.
Power Redundancy for the 2910al Switches

The internal power supply in these switches provides both the 12V (RPS) and 54V (EPS) circuits. If the 54V 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 54V circuits. It is recommended that both EPS and RPS be connected to provide full redundancy.

HP ProCurve Redundant/External Power Supplies (RPS/EPS) can be connected to the 2910al Switches for redundant 12 V system power (RPS) and to provide for additional PoE+ provisioning. For RPS power, the 2910al Switches can be connected to either an HP ProCurve 620 RPS/EPS (J8696A) or HP ProCurve 630 RPS/EPS (J9443A). For additional PoE+ EPS power, only the 630 can be used. The 620 does not provide 54 V for PoE+, only 50 V for PoE, and the 2910al Switches do not support connections to the 620 for EPS.

The 2910al switch provides up to 30W from each port (25.5W for PD, 4.5W for cable dissipation); the number of ports that can be operated at full power is limited to 12 ports at full power, and/or 24 ports at 15.4W. To increase the capacity of the switch, an external power supply can be attached to double the total system capacity to 24 ports at 30W, or 48 ports at 15.4W.

The power supplies for these switches are optimized to provide the most efficient and cost effective solution.

HP ProCurve 2915G Switch

The HP ProCurve Switch 2915-8G-PoE (J9562A), has 8 Integrated PoE auto-sensing 10/100/1000Base-TX RJ-45 ports with two dual-personality Gigabit Uplink ports. There is no power redundancy for this switch.

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 enabled by default.

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.
HP ProCurve 3500-PoE Switches

The HP ProCurve Switch 3500-48G-PoE (J9473A), has 44 Integrated PoE auto-sensing 10/100 Base-T RJ-45 ports and four ports of Gigabit dual-personality Uplink ports, either RJ-45 or SFP.

The HP ProCurve Switch 3500-24G-PoE (J9471A), has 20 Integrated PoE auto-sensing 10/100 Base-T RJ-45 ports with four ports of Gigabit dual-personality Uplink ports, either RJ-45 or SFP.

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(config)# no power pre-std-detect
```

For more information, refer to the Management and Configuration Guide which is on the ProCurve Web site. To display the list of downloadable manuals, click on the following link: [www.hp.com/go/procurve/manuals](http://www.hp.com/go/procurve/manuals).

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

The dual-personality ports have either auto-sensing 10/100 Base-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 3500 Switches

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. It is recommended that both EPS and RPS be connected to provide full redundancy.

The HP ProCurve 3500-PoE Switches can be connected to a 620 RPS/EPS (J8696A) 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, you must connect an HP ProCurve 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.

HP ProCurve 3500yl-PWR Switches

The HP ProCurve Switch 3500yl-48G-PWR (J8693A), has 44 Integrated PoE auto-sensing 10/100/1000Base-T RJ-45 ports with four dual-personality Gigabit Uplink ports.

The HP ProCurve Switch 3500yl-24G-PWR (J8692A), has 20 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(config)# no power pre-std-detect
```
For more information, refer to the *Management and Configuration Guide* which is on the ProCurve Web site. To display the list of downloadable manuals, click on the following link: [www.hp.com/go/procurve/manuals](http://www.hp.com/go/procurve/manuals).

(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 3500yl PWR Switches**

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. It is recommended that both EPS and RPS be connected to provide full redundancy.

The 3500yl-PWR Switches can be connected to a 620 RPS/EPS (J8696A) 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.

**HP ProCurve 3500yl-PoE+ Switches**

The HP ProCurve Switch 3500yl-48G-PoE+ (J9311A), has 44 Integrated PoE auto-sensing 10/100/1000Base-T RJ-45 ports with four dual-personality Gigabit Uplink ports.
The HP ProCurve Switch 3500yl-24G-PoE+ (J9310A), has 20 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(config)# no power pre-std-detect
```

For more information, refer to the Management and Configuration Guide which is on the ProCurve Web site. To display the list of downloadable manuals, click on the following link: [www.hp.com/go/procurve/manuals](http://www.hp.com/go/procurve/manuals).

(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 3500yl PoE+ Switches

The internal power supply in these switches provides both the 12V (RPS) and 54V (EPS) circuits. If the 54V 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 54V circuits. It is recommended that both EPS and RPS be connected to provide full redundancy.

The 3500yl-PoE+ Switches can be connected to an HP ProCurve 630 RPS/EPS (J9443A) and receive full redundant power from the RPS part of the unit for switch operation if the internal power supply in the switch fails. The HP ProCurve 630 RPS/EPS unit can provide all the power necessary to keep only one switch running.

If maximum PoE+ power is to be used on all 48 ports, it becomes necessary to connect a HP ProCurve 630 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.
HP ProCurve 5400zl/8200zl Switches

The HP 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/PoE+ power.

The HP 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/PoE+ power.
Introduction
PoE Capabilities of the HP ProCurve Products

The HP ProCurve Switch 8206zl 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/PoE+ power.
The HP ProCurve 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/PoE+ power.

**Note**

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

**Power Redundancy for the 5400zl/8200zl Switches**

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

- 12V power or system power
- 50V power for PoE power
- 54V power for PoE/PoE+ power
The 12V system power is used to operate the internal components of the switch. The 50V PoE or 54V PoE/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 or 54V circuits. The internal power supply in these switches provides both the 12V (system) and 50V (PoE) or 54V (PoE+) circuits. If the 12V (system) power fails the switch will shut down. If the 50V or 54V 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/8206zl chassis can hold two internal power supplies and the 5412zl/8212zl chassis can hold four internal power supplies.

PoE/PoE+ Chassis Power Supplies

Why Mixing Power Supplies in chassis is NOT Supported

Using a combination of zl PoE power supplies J8712A and J8713A and a J9306A zl power supply in PoE/PoE+ systems is NOT supported. Use the J9306A zl power supply for systems providing PoE and PoE+ power.

The reason the power supplies should not be mixed is because the J8712A and J8713A power supplies provide PoE power at 50 volts (273 watts for J8712A and 900 watts for J8713A). The J9306A zl power supply provides PoE/PoE+ power at 54 volts (300 watts at 110 volts and 900 watts at 220 volts). If you install a J8712A or J8713A with a J9306A power supply, they do voltage sharing. This means that the 54 volts of the J9306A zl power supply will supersede the 50 volts of the J8712A or J8713A power supplies. Only the J9306A will provide PoE/PoE+ power.

For example, if an HP ProCurve 5406zl switch on a 110 volt circuit has a J8712A installed, and then a J9306A is inserted, the switch only provides 300 watts of power, not 573 watts (273 watts + 300 watts). Only the J9306A provides PoE/PoE+ power, which is 300 watts.

In another example, if an HP ProCurve 8212zl switch on a 220 volt circuit has three J8713A power supplies installed, and then a J9306A is inserted, the switch only provides 900 watts of PoE/PoE+ power, not 3600 watts (2700 watts from the three J8713A power supplies and 900 watts from the J9306A power supply). Only the J9306A will provide PoE/PoE+ power.
PoE Chassis Power Supplies

HP ProCurve Networking highly recommends that the two types of power supplies are not mixed in the same chassis.

For PoE only, the following power supplies can be used:

- 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 11-7 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 HP 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 HP 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.

PoE/PoE+ Chassis Power Supply

For PoE or PoE+, the J9306A power supply can be used. This power supply operates at 110-127V providing 300 watts of PoE/PoE+ power, or 200-240V providing 900 watts of PoE/PoE+ power. See the HP ProCurve Switch zl Internal Power Supplies Installation Guide for more information and specifications on this power supply.

There is also an external power supply, the HP ProCurve Switch zl Power Supply Shelf (J8714A), that can be connected to either the 5400zl switches or the 8200zl switches to add extra or backup 54V (PoE/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 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.

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 lose PoE power.

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.
HP ProCurve PoE and PoE+ Modules

HP ProCurve Switch xl PoE Module

The HP ProCurve Switch xl PoE Module (J8161A) is a module for the HP 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 HP ProCurve 600 Redundant and External Power Supply (J8168A), or the HP ProCurve 610 External Power Supply (J8169A), hereafter referred to as the 600 RPS/EPS or the 610 EPS, respectively.

ProCurve Switch zl 24 port Gig-T PoE Module (J8702A)

The ProCurve Switch zl 24 port PoE Module (J8702A) is for the HP ProCurve 5400/8200zl switches and has 24 PoE auto-sensing 10/100/1000-TX RJ-45 ports. All 24 ports are capable of supplying PoE power.
Introduction
HP ProCurve PoE and PoE+ Modules

ProCurve Switch zl 20 port Gig-T + 4 port mGBIC Module (J8705A)

The ProCurve Switch zl 20 port Gig-T + 4 port mGBIC Module (J8705A) is for the HP ProCurve 5400/8200zl switches and has 20 PoE auto-sensing 10/100/1000-TX RJ-45 ports. All 20 ports are capable of supplying PoE power. Additionally there are four mini-GBIC/SFP ports, which do not supply PoE power.

HP ProCurve 24-Port 10/100/1000 PoE+ zl Module

The HP ProCurve Switch zl PoE/PoE+ Module (J9307A) is for the HP ProCurve 5400/8200zl switches and has 24 PoE/PoE+ auto-sensing 10/100/1000-TX RJ-45 ports. All 24 ports are capable of supplying PoE/PoE+ power.
Introduction

HP ProCurve 20-Port 10/100/1000 PoE+/4 Port MiniGBIC zl Module

The HP ProCurve Switch zl PoE/PoE+ 20-port module (J9308A) is a module for the HP ProCurve 5400/8200zl switches and has 20 PoE/PoE+ auto-sensing 10/100/1000-TX RJ-45 ports capable of supplying PoE/PoE+ power. Additionally there are four mini-GBIC/SFP ports, which do not supply PoE/PoE+ power.

HP ProCurve 24-Port 10/100 PoE+ zl Module

The HP ProCurve Switch zl PoE/PoE+ 24-port module (J9478A) is for the HP ProCurve 5400/8200zl switches and has 24 PoE/PoE+ auto-sensing 10/100-TX RJ-45 ports capable of providing PoE/PoE+ power.
## Quick Reference Table

<table>
<thead>
<tr>
<th>Model/Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port¹</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stackable Switches:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2520-8-PoE</td>
<td>10/100</td>
<td>8</td>
<td>2²</td>
<td>N/A</td>
<td>67 watts available to ports 1-8 (provided by the internal source).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 @ 7.5 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2520-24-PoE</td>
<td>10/100</td>
<td>24</td>
<td>4</td>
<td>N/A</td>
<td>195 watts available to ports 1-24 (provided by the internal source).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ 7.5 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2520G-8-PoE</td>
<td>10/100/1000</td>
<td>8</td>
<td>2²</td>
<td>N/A</td>
<td>67 watts available to ports 1-8 (provided by the internal source).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 @ 7.5 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2520G-24-PoE</td>
<td>10/100/1000</td>
<td>24</td>
<td>4²</td>
<td>N/A</td>
<td>195 watts available to ports 1-24 (provided by the internal source).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ 7.5 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2600-8-PWR</td>
<td>10/100</td>
<td>8</td>
<td>1²</td>
<td>J8168A J8169A</td>
<td>126 watts available to ports 1-8 (provided by the internal source). 408/204 watts available, provided by the EPS source.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2626-PWR</td>
<td>10/100</td>
<td>24</td>
<td>2²</td>
<td>J8168A J8169A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ 15.4 watts</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Port Count/ PoE watts per port
² Gig Uplink Ports
## Introduction

### Quick Reference Table

<table>
<thead>
<tr>
<th>Model/Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>2650-PWR</td>
<td>10/100</td>
<td>48</td>
<td>2^2</td>
<td>J8168A</td>
<td>406 watts available to ports 1-24 (provided by the internal source). 408/2044 watts available to ports 25-48 (provided by the EPS source).</td>
</tr>
<tr>
<td>2610-24/12-PWR</td>
<td>10/100</td>
<td>8 @ 15.4 watts, 12 @ 10.5 watts</td>
<td>4</td>
<td>J8168A</td>
<td>126 watts available to ports 1-12 (provided by the internal source). 408/2044 watts available, provided by the EPS source.</td>
</tr>
<tr>
<td>2610-24-PWR</td>
<td>10/100</td>
<td>24</td>
<td>4</td>
<td>J8168A</td>
<td>406 watts available to ports 1-24 (provided by the internal source). 408/2044 watts available, provided by the EPS source.</td>
</tr>
<tr>
<td>2610-48-PWR</td>
<td>10/100</td>
<td>48</td>
<td>4</td>
<td>J8168A</td>
<td>406 watts available to ports 1-24 (provided by the internal source). 408/2044 watts available to ports 25-48 (provided by the EPS source).</td>
</tr>
<tr>
<td>2615-8-PoE</td>
<td>10/100</td>
<td>4 @ 15.4 watts, 8 @ 7.5 watts</td>
<td>2^2</td>
<td>J9565A</td>
<td>67 watts available to ports 1-8 (provided by the internal source).</td>
</tr>
<tr>
<td>2910al-24G-PoE</td>
<td>10/100/1000</td>
<td>24</td>
<td>4^2</td>
<td>J9146A</td>
<td>382 watts available to ports 1-24 (provided by the internal source).</td>
</tr>
</tbody>
</table>
# Introduction

## Quick Reference Table

<table>
<thead>
<tr>
<th>Model/Device</th>
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<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>2910al-48G-PoE</td>
<td>10/100/1000</td>
<td>48</td>
<td>24 @ 30 watts&lt;sup&gt;5&lt;/sup&gt; 48 @ 15 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J9148A</td>
</tr>
<tr>
<td>2915-8G-PoE</td>
<td>10/100/1000</td>
<td>4</td>
<td>4 @ 15.4 watts 8 @ 7.5 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J9562A</td>
</tr>
<tr>
<td>3500-24-PoE</td>
<td>10/100</td>
<td>24</td>
<td>24 @ 15.4 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J8696A</td>
</tr>
<tr>
<td>3500-48-PoE</td>
<td>10/100</td>
<td>48</td>
<td>48 @ 15.4 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J8696A</td>
</tr>
<tr>
<td>3500yl-24G-PWR</td>
<td>10/100/1000</td>
<td>24</td>
<td>24 @ 15.4 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J8696A</td>
</tr>
<tr>
<td>3500yl-48G-PWR</td>
<td>10/100/1000</td>
<td>48</td>
<td>24 @ 15.4 watts 48 @ 7.5 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J8696A</td>
</tr>
<tr>
<td>3500yl-24G-PoE+</td>
<td>10/100/1000</td>
<td>24</td>
<td>24 @ 15.4 watts 24 @ 30 watts</td>
<td>4&lt;sup&gt;2&lt;/sup&gt;</td>
<td>J9310A</td>
</tr>
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### Quick Reference Table

<table>
<thead>
<tr>
<th>Model/ Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500yl-48G-PoE+</td>
<td>10/100/1000</td>
<td>48 @ 15.4 watts 26 @ 30 watts</td>
<td>4²</td>
<td>J9311A</td>
<td>786 watts available to ports 1-48 (provided by both the internal and external sources).</td>
</tr>
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</table>

#### Chassis Switches:

<table>
<thead>
<tr>
<th>Model/ Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>5406zl</td>
<td>10/100/1000</td>
<td>Depends on which modules and how many modules. Range of 24-144</td>
<td>Depends on which modules and how many modules. Range of 4-24</td>
<td>J8714A</td>
<td>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.</td>
</tr>
<tr>
<td>8206zl</td>
<td>10/100/1000</td>
<td>Depends on which modules and how many modules. Range of 24-144</td>
<td>Depends on which modules and how many modules. Range of 4-24</td>
<td>J9306A</td>
<td>A maximum of 2 internal power supplies up to 1800 watts and the external source can provide up to 1800 watts.</td>
</tr>
<tr>
<td>5412zl</td>
<td>10/100/1000</td>
<td>Depends on which modules and how many modules. Range of 24-288</td>
<td>Depends on which modules and how many modules. Range of 4-48</td>
<td>J8714A</td>
<td>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.</td>
</tr>
</tbody>
</table>
### Introduction

Quick Reference Table

<table>
<thead>
<tr>
<th>Model/Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>8212zl</td>
<td>10/100/1000</td>
<td>Depends on which modules and how many modules. Range of 24-288</td>
<td>Depends on which modules and how many modules. Range of 4-48</td>
<td>J8714A</td>
<td>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.</td>
</tr>
</tbody>
</table>

#### Modules:

<table>
<thead>
<tr>
<th>Model/Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>x PoE Module</td>
<td>10/100</td>
<td>24 @ 15.4 watts</td>
<td>0</td>
<td>J8168A</td>
<td>408/204 watts available to ports 1-24.</td>
</tr>
<tr>
<td>zl 24 port Gig-T PoE Module (J8702A)</td>
<td>10/100/1000</td>
<td>24 @ 15.4 watts</td>
<td>0</td>
<td>J8169A</td>
<td>Depends on voltage (100-127 or 200-240)</td>
</tr>
<tr>
<td>zl 20 port Gig-T + 4 port mGBIC Module (J8705A)</td>
<td>10/100/1000</td>
<td>20 @ 15.4 watts</td>
<td>0-4</td>
<td>J9306A</td>
<td>Depends on voltage (100-127 or 200-240)</td>
</tr>
<tr>
<td>zl PoE+ 24-Port Module (J9307A)</td>
<td>10/100/1000</td>
<td>24 up to 30 watts @ 200-240v</td>
<td>0</td>
<td>J9306A</td>
<td>Depends on voltage (100-127 or 200-240) and if using PoE or PoE+</td>
</tr>
<tr>
<td>zl PoE+ 20-Port Module (J9308A)</td>
<td>10/100/1000</td>
<td>20 up to 30 watts @ 200-240v</td>
<td>0-4</td>
<td>J9306A</td>
<td>Depends on voltage (100-127 or 200-240) and if using PoE or PoE+</td>
</tr>
</tbody>
</table>
**Introduction**

**Quick Reference Table**

<table>
<thead>
<tr>
<th>Model/Device</th>
<th>Port Type</th>
<th>Port Count/ PoE watts per port[^1]</th>
<th>Gig Uplink Ports</th>
<th>RPS/EPS</th>
<th>Maximum Power Internal and External</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE/PoE+ 24-Port Module (J9478A)</td>
<td>10/100</td>
<td>24 up to 30 watts@ 200-240v</td>
<td>0</td>
<td>J9306A</td>
<td>Depends on voltage (100-127 or 200-240) and if using PoE or PoE+</td>
</tr>
</tbody>
</table>

[^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.

[^5]: An EPS is required for extra PoE+ power to get 24 ports at 30 watts or 48 ports at 15.4 watts.
Operating Rules

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

- The HP ProCurve 2520-PoE Switches
- The HP ProCurve 2520G-PoE Switches
- The HP ProCurve 2600-PWR Switches
- The HP ProCurve 2610-PWR Switches
- The HP ProCurve 2615-8-PoE Switch
- The HP ProCurve Redundant and External Power Supplies: 600 RPS/EPS and 610 EPS
- The HP ProCurve 1500 W zl PoE+ Power Supply
- The HP ProCurve 2910al-PoE+ Switches
- The HP ProCurve 2915-8G-PoE Switch
- The HP ProCurve 3500-PoE Switches
- The HP ProCurve 3500yl-PWR Switches
- The HP ProCurve 3500yl-PoE+ Switches
- The HP ProCurve External and Redundant Power Supply, 620 RPS/EPS
- The HP ProCurve 5400/8200zl Switches
- The HP ProCurve Power Supply Shelf
- The HP ProCurve Redundant and/or External Power Supply, 630 RPS/EPS
Overview of Switch PoE Operation

- The Switch 2520-8-PoE provisions (allocates power to) ports 1-8 with 67 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2520-24-PoE provisions ports 1-24 with 195 watts of power for PoE applications compatible with the IEEE 802.3af standard.

- The Switch 2520G-8-PoE provisions ports 1-8 with 67 watts of power for PoE applications compatible with the IEEE 802.3af standard. The Switch 2520G-24-PoE provisions ports 1-24 with 195 watts of power for PoE applications compatible with the IEEE 802.3af standard.

- 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. This reduces the per port wattage by half as compared to the Switch 2626-PWR.

- The Switch 2610-24/12PWR provisions 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 2615-8-PoE provisions (allocates power to) ports 1-8 with 67 watts of power for PoE applications compatible with the IEEE 802.3af standard.

- The Switch 2910al-24G-PoE+ can supply up to 382 watts of PoE+ power across the 24 ports. The Switch 2910al-48G-PoE+ can supply up to 382 watts of PoE+ power across the 48 ports for PoE+ applications compatible with the IEEE 802.3at standard.

- The Switch 2915-8G-PoE provisions ports 1-8 with 67 watts of power for PoE applications compatible with the IEEE 802.3af standard.

- The Switch 3500-24-PoE can supply up to 398 watts of PoE power across the 24 ports. The Switch 3500-48-PoE can supply up to 398 watts of PoE power across the 48 ports.

- 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 3500yl-24G-PoE+ can supply up to 398 watts of PoE power across the 24 ports. The Switch 3500yl-48G-PoE+ can supply up to 398 watts of PoE power across the 48 ports for PoE+ applications compatible with the IEEE 802.3at standard.

- The 5406zl/8206zl switches can supply up to 1800 watts of PoE power plus an additional 1800 watts with the addition of two external J9306A power supplies.
The 5412zl/8212zl switches can supply up to 3600 watts of PoE power, depending 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.

The J9306A power supply provides up to 300 watts of PoE/PoE+ power at 110-127V and 900 watts of PoE/PoE+ power at 200-240V. Mixing this power supply with any other type of power supply is NOT supported.

**Note**

HP ProCurve Networking highly recommends that power supplies are not mixed in the same 5400zl/8200zl chassis or Power Supply Shelf.
Configuring PoE/PoE+ Power Using the CLI

Allocating PoE Power by Class or User-defined Power Level

The 2910al, 3500, 3500yl and the 5400zl/8200zl switches provide maximum flexibility by allowing the switch to detect and display 802.3af or 802.3at device class, but does not enforce the power level specified in each device class. In addition to this, the switch can allocate PoE/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/PoE+ power:

- By device usage (default). The switch does not enforce the power limit.
- By power level specified in 802.3af or 802.3at. 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 or 1-33 watts for the 2910al and 3500yl-PoE+ Switches. Incorrectly setting the PoE/PoE+ maximum value to be less than the device requires will result in a PoE/PoE+ fault.

For more information, see the Management and Configuration Guide on the ProCurve Web site at:

www.hp.com/go/procurve/manuals

Switch Port Priority

Using a port-number priority method, a lower-numbered port has priority over a higher-numbered port within the same configured priority class, for example, port A1 has priority over port A5 if both are configured with High priority.

A port can be assigned a power priority that alters the assignment of power to it by the switch. For more information, see the Management and Configuration Guide on the ProCurve Web site at:

www.hp.com/go/procurve/manuals
Switch Priority Class

Using a priority class method, a power priority of **Low** (the default), **High**, or **Critical** is assigned to each enabled PoE port. This assignment is done through the command line interface 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.

For more information, see the Management and Configuration Guide on the ProCurve Web site at:

[www.hp.com/go/procurve/manuals](http://www.hp.com/go/procurve/manuals)
Threshold

You can configure one of the following thresholds:

- A global power threshold that applies to all modules on the switch. This setting acts as a trigger for sending a notice when the PoE power consumption on any PoE module installed in the switch crosses the configured global threshold level. (Crossing the threshold level in either direction—PoE power usage either increasing or decreasing—triggers the notice.) The default setting is 80%.

- A per-slot power threshold that applies to an individual PoE module installed in the designated slot. This setting acts as a trigger for sending a notice when the module in the specified slot exceeds or goes below a specific level of PoE power consumption.

For example if the threshold is set at 50%, the switch informs you that the switch has exceeded the threshold when 51% of available PoE power is being used.

For more information, see the Management and Configuration Guide on the ProCurve Web site at:

www.hp.com/go/procurve/manuals
PoE Power Characteristics

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 0-4) 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 2-1.

Table 2-1. Power Usage

<table>
<thead>
<tr>
<th>Class</th>
<th>Usage</th>
<th>Minimum Power Levels at Output of PSE</th>
<th>Range of Maximum Power required by the PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Default</td>
<td>15.4 watts</td>
<td>0.44 to 12.95 watts</td>
</tr>
<tr>
<td>1</td>
<td>Optional</td>
<td>4.0 watts</td>
<td>0.44 to 3.84 watts</td>
</tr>
<tr>
<td>2</td>
<td>Optional</td>
<td>7.0 watts</td>
<td>3.84 to 6.49 watts</td>
</tr>
<tr>
<td>3</td>
<td>Optional</td>
<td>15.4 watts</td>
<td>6.49 to 12.95 watts</td>
</tr>
<tr>
<td>4</td>
<td>Optional</td>
<td>30 watts</td>
<td>0.05 to 24.00 watts</td>
</tr>
</tbody>
</table>

As you can see in the table for classifications 0-3, 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. For classification 4, the switch provides 30 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 2-7). 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 2-5 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.
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/8206zl 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). To supply the necessary PoE wattage a J8713A power supply is installed in one of the power supply slots.

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.
HP ProCurve 2520-PoE Switches

Maximum PoE Power

The Switch 2520-8-PoE and the Switch 2520G-8-PoE provision 8 ports with its PoE power supply of 67 watts for PoE applications compatible with the IEEE 802.3af standard and some pre-standard PoE devices. The Switch 2520-24-PoE and the Switch 2520G-24-PoE provision ports 1-24 with 195 watts of power for PoE applications compatible with the IEEE 802.3af standard.

Note

There is no external power supply available for these switches.

Table 2-2. Maximum Power Allocations

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switches 2520-8-PoE and 2520G-8-PoE</td>
<td>67 watts available to ports 1-8.</td>
</tr>
</tbody>
</table>

PoE Power Requirements

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.

Since there is no external power supply available for these switches it is very important to understand that the 67 watts for the 8-port switches and the 195 watts for the 24-port switches are all there is for PoE power. Therefore, proper provisioning is very important.
Operating Rules
Provisioning Power for PoE

HP ProCurve 2600-PWR Switches

Maximum PoE Power

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 HP ProCurve PoE device. In this case you cannot provision the full 408 watts to the Switch 2650-PWR, only half, or 204 watts.

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and EPS</th>
<th>EPS Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 2600-8-PWR</td>
<td>126 watts available to ports 1-8.</td>
<td>126 watts available to ports 1-8 (provided by the internal source). 408/204* watts available, provided by the EPS source.</td>
<td>The internal power supply has failed, and the EPS provides 408/204* watts to ports 1-8.</td>
</tr>
<tr>
<td>PoE for Switch 2626-PWR</td>
<td>406 watts available to ports 1-24.</td>
<td>Redundant 408/204* watts available to ports 1-24. Only if the internal power supply fails.</td>
<td>408/204* watts available to ports 1-24. (The EPS provides PoE power to ports 1-24 only if the internal power supply fails.)</td>
</tr>
<tr>
<td>PoE for Switch 2650-PWR</td>
<td>406 watts available to ports 1-48.</td>
<td>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).</td>
<td>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.)</td>
</tr>
</tbody>
</table>

* 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.
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.

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.
HP ProCurve 2610-PWR Switches

Maximum PoE Power

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 HP 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>
<thead>
<tr>
<th>Table 2-4. Maximum Power Allocations</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE Devices</td>
</tr>
<tr>
<td>PoE for Switch 2610-24/12PWR</td>
</tr>
<tr>
<td>PoE for Switch 2610-24-PWR</td>
</tr>
<tr>
<td>PoE for Switch 2610-48-PWR</td>
</tr>
</tbody>
</table>

* 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.
PoE Power Requirements

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 5-7.
HP ProCurve 2615-8-PoE Switch

Maximum PoE Power

The Switch 2615-8-PoE provisions 8 ports with its PoE power supply of 67 watts for PoE applications compatible with the IEEE 802.3af standard and some pre-standard PoE devices.

Note

There is no external power supply available for these switches.

Table 2-5. Maximum Power Allocations

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 2615-8-PoE</td>
<td>67 watts available to ports 1-8.</td>
</tr>
</tbody>
</table>

PoE Power Requirements

It is important to understand the PoE power requirements of this switch 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.

Since there is no external power supply available for this switch, PoE power is limited to 67 watts provisioned across all 8 ports. Therefore, proper provisioning is very important.
Operating Rules
Provisioning Power for PoE

HP ProCurve 2910al PoE+ Switches

Maximum PoE Power

The Switch 2910al-24G-PoE+ provisions (allocates power to) ports 1-24 with 382 watts of power for PoE and PoE+ applications compatible with the IEEE 802.3af and the 802.3at standard and some pre-standard devices. The Switch 2910al-48G-PoE+ provisions ports 1-48 with 382 watts. This reduces the average per port wattage by half as compared to the Switch 2910al-24G-PoE+.

An external power supply, the HP ProCurve 630 Redundant and/or External (HP ProCurve 630 RPS/EPS) power supply (J9443A) can be connected to either of the 2910al PoE+ switches to provide redundant or extra PoE+ power.

Table 2-6. Maximum Power Allocations for the 2910al Switches

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and External</th>
<th>External Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PoE for Switch 2910al-24G-PoE</strong></td>
<td>382 watts available to ports 1-24.</td>
<td>764 watts available to ports 1-24 (provided by the internal and external source). 382 watts available as backup in case of failure, provided by the external source.</td>
<td>The internal power supply has failed, 382 watts available to ports 1-24 from the external source.</td>
</tr>
<tr>
<td><strong>PoE for Switch 2910al-48G-PoE</strong></td>
<td>382 watts available to ports 1-48.</td>
<td>764 watts available to ports 1-48 (provided by the internal and external source).</td>
<td>The internal power supply has failed, 382 watts available to ports 1-48 from the external source.</td>
</tr>
</tbody>
</table>

PoE Power Requirements

The Switch 2910al-24G-PoE+ has 24 ports with an internal PoE power supply that provides 382 watts of power across all 24 ports. The Switch 2910al-48G-PoE+ has 48 ports with 382 watts of power across all 48 ports. The HP ProCurve 630 RPS/EPS can provide an extra 388 watts for a total of 770 watts.

PoE/PoE+ Allocation Using LLDP Information

A PoE port can automatically configure certain PoE+ link partner devices if the device supports advertising of its PoE needs.

By enabling PoE LLDP detection, available information about the power requirements of the PD may be used by the switch to configure the power allocation. The initial configuration for PoE ports may change if more accurate configuration information is provided by way of LLDP.

For more information, see the Management and Configuration Guide on the ProCurve Web site at www.hp.com/go/procurve/manuals.
HP ProCurve 2915-8G-PoE Switch

Maximum PoE Power

The Switch 2915-8G-PoE provisions 8 ports with its PoE power supply of 67 watts for PoE applications compatible with the IEEE 802.3af standard and some pre-standard PoE devices.

Note

There is no external power supply available for these switches.

Table 2-7. Maximum Power Allocations

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 2915-8G-PoE</td>
<td>67 watts available to ports 1-8.</td>
</tr>
</tbody>
</table>

PoE Power Requirements

It is important to understand the PoE power requirements of this switch 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.

Since there is no external power supply available for this switch, PoE power is limited to 67 watts provisioned across all 8 ports. Therefore, proper provisioning is very important.

HP ProCurve 3500-PoE Switches

Maximum PoE Power

The HP ProCurve 3500-24-PoE switch 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 HP ProCurve 3500-48-PoE switch provisions ports 1-48 with 398 watts. This only allows half the per-port wattage as is available on the 3500-24-PoE switch.

An external power supply, the HP ProCurve 620 RPS/EPS (J8696A), can be connected to either of the HP ProCurve 3500-PoE 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.
### Maximum Power Allocations for the 3500-PoE Switches

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and External</th>
<th>External Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 3500-24-PoE</td>
<td>398 watts available to ports 1-24.</td>
<td>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.</td>
<td>The internal power supply has failed, and the external source provides 388 watts to ports 1-24.</td>
</tr>
<tr>
<td>PoE for Switch 3500-48-PoE</td>
<td>398 watts available to ports 1-48.</td>
<td>786 watts available to ports 1-48 (provided by both the internal and external sources).</td>
<td>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).</td>
</tr>
</tbody>
</table>

### PoE Power Requirements

The HP ProCurve 3500-24-PoE switch has 24 ports with an internal PoE power supply that provides 398 watts of 50V power across all 24 ports. The HP ProCurve 3500-48-PoE switch has 48 ports with 398 watts of 50V power across all 48 ports. There is a special power provision on the 3500-48-PoE switch 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.

### PoE Allocation Using LLDP Information

You can have the port automatically configure certain PoE link partner devices if the devices support 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.

HP ProCurve 3500yl PWR Switches

Maximum PoE Power

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 2-9. Maximum Power Allocations for the 3500yl Switches

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and External</th>
<th>External Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch</td>
<td>398 watts available to ports 1-24.</td>
<td>398 watts available to ports 1-24</td>
<td>The internal power supply has failed, and the external</td>
</tr>
<tr>
<td>3500yl-24G-PWR</td>
<td></td>
<td>(provided by the internal source).</td>
<td>source provides 388 watts to ports 1-24.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>388 watts available as backup in case</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>of failure, provided by the</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>external source.</td>
<td></td>
</tr>
<tr>
<td>PoE for Switch</td>
<td>398 watts available to ports 1-48.</td>
<td>786 watts available to ports 1-48</td>
<td>The internal power supply has failed, and the external</td>
</tr>
<tr>
<td>3500yl-48G-PWR</td>
<td></td>
<td>(provided by both the internal and</td>
<td>source provides 388 watts to ports 1-48. Note that a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>external sources).</td>
<td>minimum of 22 watts will always be allocated to both</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>port groups (ports 1-24 and ports 25-48).</td>
</tr>
</tbody>
</table>
PoE Power Requirements

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.

PoE/PoE+ Allocation Using LLDP Information

You can have the port automatically configure certain PoE link partner devices if the devices support 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, see the Management and Configuration Guide on the ProCurve Web site at www.hp.com/go/procurve/manuals.

HP ProCurve 3500yl PoE+ Switches

Maximum PoE Power

The Switch 3500yl-24G-PoE+ provisions (allocates power to) ports 1-24 with 398 watts of power for PoE and PoE+ applications compatible with the IEEE 802.3af and the 802.3at standard and some pre-standard devices. The Switch 3500yl-48G-PoE+ provisions ports 1-48 with 398 watts. This reduces the average per port wattage by half as compared to the Switch 3500yl-24G-PoE+. 
An external power supply, the HP ProCurve 630 Redundant and/or External (HP ProCurve 630 RPS/EPS) power supply (J9443A) can be connected to either of the 3500yl PoE+ switches to provide redundant or extra PoE+ power. The HP ProCurve 630 RPS/EPS provides up to 388 watts of PoE+ power at 54 volts. The 630 RPS/EPS power supply is rated at 398 watts, however, 388 watts are supplied to the switch due to line loss on the EPS cable.

Table 2-10. Maximum Power Allocations for the 3500yl-PoE+ Switches

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and External</th>
<th>External Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 3500yl-24G-PoE+</td>
<td>398 watts available to ports 1-24.</td>
<td>786 watts available to ports 1-24 (provided by the internal and external source). 388 watts available as backup in case of failure, provided by the external source.</td>
<td>The internal power supply has failed, 388 watts available to ports 1-24 from the external source.</td>
</tr>
<tr>
<td>PoE for Switch 3500yl-48G-PoE+</td>
<td>398 watts available to ports 1-48.</td>
<td>786 watts available to ports 1-48 (provided by the internal and external source).</td>
<td>The internal power supply has failed, 388 watts available to ports 1-48 from the external source.</td>
</tr>
</tbody>
</table>

PoE Power Requirements

The Switch 3500yl-24G-PoE+ has 24 ports with an internal PoE power supply that provides 398 watts of power across all 24 ports. The Switch 3500yl-48G-PoE+ has 48 ports with 398 watts of power across all 48 ports. The HP ProCurve 630 RPS/EPS can provide an extra 388 watts for a total of 786 watts.

PoE/PoE+ Allocation Using LLDP Information

A PoE port can automatically configure certain PoE+ link partner devices if the device supports advertising of its PoE needs.

By enabling PoE LLDP detection, available information about the power requirements of the PD may be used by the switch to configure the power allocation. The initial configuration for PoE ports may change if more accurate configuration information is provided by way of LLDP.

For more information, see the Management and Configuration Guide on the ProCurve Web site at www.hp.com/go/procurve/manuals.
Operating Rules
Provisioning Power for PoE

HP ProCurve 5400zl/8200zl Switches

Maximum PoE Power

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 HP 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 2-11. Maximum Power Allocations for the 5400zl/8200zl Switches for PoE

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only (J8712A, J8713A)</th>
<th>Internal and External (J8712A, J8713A)</th>
<th>External Only (J8712A, J8713A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE for Switch 5400zl</td>
<td>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</td>
<td>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.</td>
<td>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.</td>
</tr>
<tr>
<td>PoE for Switch 5412zl/8212zl</td>
<td>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 4 power supplies J8712A, 1092 watts 4 power supplies J8713A, 3600 watts 4 power supplies, two J8712A and two J8713A (not recommended), 2346 watts</td>
<td>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.</td>
<td>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.</td>
</tr>
</tbody>
</table>
Table 2-12. Maximum Power Allocations for the 5400zl/8200zl Switches for PoE/PoE+

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only (J9306A)</th>
<th>Internal and External (J9306A)</th>
<th>External Only (J9306A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>110-127V</td>
<td>200-240V</td>
<td>110-127V</td>
</tr>
<tr>
<td>PoE/PoE+ for Switch 5400zl/8200zl</td>
<td>1 - 300 watts</td>
<td>2 - 600 watts</td>
<td>1 - 900 watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PoE/PoE+ for Switch 5412zl/8212zl</td>
<td>1 - 300 watts</td>
<td>2 - 600 watts</td>
<td>3 - 900 watts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PoE Allocation Using LLDP Information

See page 2-16.

PoE Power Requirements

PoE Only Modules.

There are two PoE modules for the 5400zl/8200zl 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.

- HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A)
- HP ProCurve Switch zl 20-Port 10/100/1000 + 4-port Mini-GBIC Module (J8705A)
Each group of 24 ports is its own management group and needs to have a minimum allocation associated with it in order to properly detect PDs and bring them online.

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.

**PoE/PoE+ Modules.**

There are three zl modules that can provide PoE/PoE+ power to the 5400zl/8200zl switches. A minimum of 17 watts is required to power up a port used for PoE; a minimum of 33 watts is required to power up a port used for PoE+. There is a maximum limit of 370 watts of PoE/PoE+ power available per slot.

- HP ProCurve 24-Port 10/100/1000 PoE+ zl Module (J9307A)
- HP ProCurve 20-Port 10/100/1000 PoE+/4 Port mini-GBIC zl Module (J9308A)
- HP ProCurve 24-Port 10/100 PoE+ Module (J9478A)

**HP ProCurve Switch xl PoE Module for the 5300xl Switch**

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

<table>
<thead>
<tr>
<th>PoE Devices</th>
<th>Internal Only</th>
<th>Internal and EPS</th>
<th>EPS Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP ProCurve Switch xl PoE Module</td>
<td>No internal PoE power.</td>
<td>No internal PoE power. (See EPS only.)</td>
<td>408/204* watts available to ports 1-24 on the module.</td>
</tr>
</tbody>
</table>

* 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.
Planning and Implementation for the 2520 and 2520G Switches

This chapter discusses the planning process a user should follow to successfully implement PoE using a 2520 or 2520G Switch. After understanding what PoE is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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 four configurations:

- HP ProCurve 2520-8-PoE Switch with Gigabit Uplink
- HP ProCurve 2520-24-PoE Switch with Gigabit Uplink
- HP ProCurve 2520G-8-PoE Switch
- HP ProCurve 2520G-24-PoE Switch

Each example shows a complete configuration. 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.

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.
Planning and Implementation for the 2520 and 2520G Switches
Planning the PoE Configuration

HP ProCurve 2520-8-PoE and 2520G-8-PoE Configurations

The table in the example configuration contain entries that show the PoE power available when the 2520-8-PoE or 2520G-8-PoE is used to supply PoE power.

**Figure 3-1. Example of a 2520-8-PoE or 2520G-8-PoE Switch**

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Power Adapter</td>
<td>67</td>
<td>8 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 @ average 15.4 W each</td>
</tr>
</tbody>
</table>
HP ProCurve 2520-24-PoE and 2520G-24-PoE Configurations

The table in the example configuration contain entries that show the PoE power available when the 2520-24-PoE or 2520G-24-PoE is used to supply PoE power.

![ProCurve Switch 2520-24-PoE](image1)

- 12 ports can receive up to 15.4 watts of PoE power
- 24 ports can receive up to 7.5 watts of PoE power

![ProCurve Switch 2520G-24-PoE](image2)

- 12 ports can receive up to 15.4 watts of PoE power
- 24 ports can receive up to 7.5 watts of PoE power

**Figure 3-2. Example of a 2520-24-PoE or 2520G-24-PoE Switch**

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>195</td>
<td>12 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 7.5 W each</td>
</tr>
</tbody>
</table>
Planning and Implementation for the 2600-PWR Switches

This chapter discusses the planning process a user should follow to successfully implement PoE using a 2600-PWR Switches. After understanding what PoE is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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 2600-8-PWR Switch with Gigabit Uplink
- ProCurve 2626-PWR Switch
- ProCurve 2650-PWR Switch

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.

![Figure 4-1. Example of a 600 RPS/EPS Powering One 2600-8-PWR Switch](image-url)
Planning and Implementation for the 2600-PWR Switches
Planning the PoE Configuration

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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>126</td>
<td>8 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>126 + 408</td>
<td>8 @ average 15.4 W each</td>
<td>8 @ average 15.4 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>408</td>
<td>8 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 4-2. Example of an 600 RPS/EPS Powering One 2626-PWR Switch
Planning the PoE Configuration

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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 408 1 - 24</td>
<td>24 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>408</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 4-3. Example of an 600 RPS/EPS Powering Two 2626-PWR Switches
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 7.5 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 204</td>
<td>24 @ average 15.4 W each</td>
<td>24 @ 7.5 W each</td>
</tr>
<tr>
<td></td>
<td>1 - 24</td>
<td></td>
<td>12 @ 15.4 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>204</td>
<td>24 @ 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 @ 15.4 W each</td>
<td></td>
</tr>
</tbody>
</table>
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 2650-PWR Switch 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.
Planning and Implementation for the 2600-PWR Switches
Planning the PoE Configuration

![Image of a ProCurve Switch 2650-PWR](image)

**Figure 4-4. Example of a 600 RPS/EPS Power One Switch**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td>Internal plus External PoE Power</td>
<td>406 + 408</td>
<td>48 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each</td>
</tr>
<tr>
<td>Power Supply</td>
<td>1-24</td>
<td></td>
<td>48 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td>25-48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External PoE Power Supply</td>
<td>408</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>(Failed Internal PoE Power</td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td>Supply)</td>
<td>(38 W is reserved for either ports 1-24 or 25-48)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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).
### Planning and Implementation for the 2600-PWR Switches

Planning the PoE Configuration

---

**Figure 4-5. Example of an 600 RPS/EPS Powering Two Switches**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each&lt;br&gt;48 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 204&lt;br&gt;1 - 24&lt;br&gt;25 - 48</td>
<td>24 @ average 15.4 W each&lt;br&gt;and 24 @ 7.5 W each&lt;br&gt;or&lt;br&gt;36 @ average 15.4 W each</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each&lt;br&gt;19 (bank 1) and 4 (bank 2) @ average 7.5 W each&lt;br&gt;48 @ average 4.2 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>204&lt;br&gt;(38 W is reserved for either ports 1-24 or 25-48)</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each&lt;br&gt;19 (bank 1) and 4 (bank 2) @ average 7.5 W each&lt;br&gt;48 @ average 4.2 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

The lowest loaded bank of ports (1-24 or 25-48) has 38 W reserved and is 'bank 2' in the table above.
Planning and Implementation for the 2600-PWR Switches

Planning the PoE Configuration

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each 48 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 204</td>
<td>24 @ average 15.4 W each 48 @ 7.5 W each or 36 @ average 15.4 W each</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>204 (38 W is reserved for either 1-24 or 25-48)</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

With all four EPS ports in use, each switch only receives 204 watts.
Planning and Implementation for the 2610-PWR Switches

This chapter discusses the planning process a user should follow to successfully implement a PoE 2610-PWR Switches. The 2610-PWR switches and the 2600-PWR switches utilize a 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 “General Considerations” page A-1, 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 2610-24/12PWR Switch
- ProCurve 2610-24-PWR Switch
- ProCurve 2610-48-PWR Switch

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.
Planning and Implementation for the 2610-PWR Switches
Planning Your PoE Configuration

Figure 5-1. Example of a 600 RPS/EPS Powering One 2610-24/12PWR Switch

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>126</td>
<td>12 @ average 7.5 W each 8 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>126 + 408</td>
<td>12 @ average 15.4 W each</td>
<td>12 @ average 7.5 W each 12 @ average 15.4 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>408</td>
<td>12 @ average 7.5 W each 12 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

- 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 have 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.

![Example of an 600 RPS/EPS Powering One 2610-24-PWR Switch](image)

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 408</td>
<td>24 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>408</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

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.
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 7.5 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 2610-48-PWR Switch 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.
Planning and Implementation for the 2610-PWR Switches
Planning Your PoE Configuration

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 408</td>
<td>48 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td>1 - 24</td>
<td>25 - 48</td>
<td>48 @ average 7.5 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>408</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>(22 W is reserved for either ports 1-24 or 25-48)</td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
</tbody>
</table>

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 2610-PWR Switches

Planning Your PoE Configuration

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each 48 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 204 1-24 25-48</td>
<td>24 @ average 15.4 W each and 24 @ 7.5 W each or 36 @ average 15.4 W each</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>204 (22 W is reserved for either ports 1-24 or 25-48)</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

The lowest loaded bank of ports (1-24 or 25-48) has 22 W reserved and is ‘bank 2’ in the table above.
### Figure 5-6. Example of an 610 EPS Powering Four 2610-48-PWR Switches

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>406</td>
<td>24 @ average 15.4 W each 48 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>406 + 204 (1 - 24 and 25 - 48)</td>
<td>24 @ average 15.4 W each and 24 @ 7.5 W each or 36 @ average 15.4 W each</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (Failed Internal PoE Power Supply)</td>
<td>204 (22 W is reserved for either 1-24 or 25-48)</td>
<td>10 (bank 1) and 2 (bank 2) @ average 15.4 W each 19 (bank 1) and 4 (bank 2) @ average 7.5 W each 48 @ average 4.2 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

With all four EPS ports in use, each switch only receives 204 watts.
Planning and Implementation for the 2615 and 2915G Switches

This chapter discusses the planning process a user should follow to successfully implement PoE using a 2615 or 2915G Switch. After understanding what PoE is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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 two configurations:
- HP ProCurve 2615-8-PoE Switch with Gigabit Uplink
- HP ProCurve 2915-8G-PoE Switch

Each example shows a complete configuration. 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.
HP ProCurve 2615-8-PoE and 2915-8G-PoE Configurations

The table in the example configuration contains entries that show the PoE power available when the 2615-8-PoE or 2915-8G-PoE is used to supply PoE power.

![Image of a 2615-8-PoE or 2915-8G-PoE Switch]

8 ports can receive up to 7.5 watts of PoE power

The mini-GBIC ports and the corresponding RJ-45 port do not supply PoE power.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Power Adapter</td>
<td>67</td>
<td>8 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 @ average 15.4 W each</td>
</tr>
</tbody>
</table>
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 “General Considerations” page A-1, 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 7-1. 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External PoE Power Supply</td>
<td>408</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

7-2
Planning and Implementation for the Switch xl PoE module
Planning Your PoE Configuration

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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External PoE Power Supply</td>
<td>204/each module</td>
<td>24 @ average 7.5 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Planning and Implementation for the Switch xl PoE module
Planning Your PoE Configuration

ProCurve Switch PoE xl Module Configurations with a 610 EPS

![Diagram of ProCurve Switch 5300xl and ProCurve Switch xl PoE modules]

Figure 7-3. 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External PoE Power Supply</td>
<td>408/each module</td>
<td>24 @ average 15.4 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Planning and Implementation for the Switch xl PoE module
Planning Your PoE Configuration

Figure 7-4. 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 7.5 watts per port, because both modules are connected to the same pair of ports, pair A.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External PoE Power Supply</td>
<td>204/each module</td>
<td>24 @ average 7.5 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Planning and Implementation for the Switch xl PoE module
Planning Your PoE Configuration

Figure 7-5. 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 7.5 watts per port.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>External PoE Power Supply</td>
<td>204/each module</td>
<td>24 @ average 7.5 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Planning and Implementation for the 2910al PoE+ Switches

This chapter discusses the planning process a user should follow to successfully implement PoE+ using a Series 2910al Switch. After understanding what PoE+ is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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:

■ HP ProCurve 2910al-24G-PoE+ Switch
■ HP ProCurve 2910al-24G-PoE+ Switch connecting an external power supply
■ HP ProCurve 2910al-48G-PoE+ Switch
■ HP ProCurve 2910al-48G-PoE+ Switch 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 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 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 2910al-24G-PoE+ Configuration

The table in this example configuration contains entries that show the PoE+ power available for the 2910al-24G-PoE+.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE+ Power Supply</td>
<td>382</td>
<td>12 @ average 30W each for a total of 360 W</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 15.4 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

Figure 8-1. Example of a 2910al-24G-PoE+ 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.
The table in this example configuration contains entries that show the PoE+ power available for the 2910al-24G-PoE+ when connecting to an external power supply.

**Figure 8-2. Example of a 2910al-24G-PoE+ Switch connecting to a 630 RPS/EPS**

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

One 2910al-24G-PoE switch can be supported by one 630 RPS/EPS. This is a full redundant configuration. The switch can be supplied with power should either of their internal power supplies fail. The 630 RPS/EPS can supply system power to keep the switch powered on and PoE+ power to supply the attached PoE+ devices with power.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port from internal supply</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE+ Power Supply</td>
<td>382</td>
<td>12 @ average 30W each for a total of 360 W 24 @ average 15.4 W each 24 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE+ Power Supply</td>
<td>382 + 388(^1)</td>
<td>24 @ average 30.0 W each for a total of 720 24 @ average 15.4 W each 24 @ average 7.5 W each</td>
<td>12 @ average 30.0 W each for a total of 360 W 24 @ average 15.4 W each 24 @ average 7.5 W each</td>
</tr>
<tr>
<td>External PoE+ Power Supply (failed Internal PoE Power Supply)</td>
<td>388(^1)</td>
<td>12 @ average 30W each for a total of 360 W 24 @ average 15.4 W each 24 @ average 7.5 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

\(^1\) The 630 RPS/EPS power supply is rated at 398 watts, however, 388 watts are supplied to the switch due to line loss on the EPS cable.
ProCurve 2910al-48G-PoE+ Configuration

PoE+ power requirements are figured differently for the 2910al-48G-PoE+ switch, see PoE+ Power on page 2-16. The table in this example configuration contains entries that show the PoE+ power available for the 2910al-48G-PoE+ 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.

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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE+ Power Supply</td>
<td>382</td>
<td>12 @ average 30 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 15.4 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

For example, the switch starts with 382 watts. It takes 360.0 watts to fully provision 12 ports at 30 watts per port (plus 6 watts to account for load fluctuations), leaving 22 watts to be returned to the pool of available watts.

Since a port requires 33 watts to power up a PoE+ device, there is not enough available power to power another device.
The table in this example configuration contains entries that show the PoE+ power available for the 2910al-48G-PoE+ when connecting to an external power supply.

![2910al 48 port switches](image)

**Figure 8-4. Example of a 2910al-48G-PoE+ Switch connecting to a 630 RPS/EPS**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE+ Power Supply</td>
<td>382</td>
<td>25 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE+ power Supply</td>
<td>382 + 388(^1)</td>
<td>24 @ average 30.0 W each for a total of 720, 48 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
<td>24 @ average 30.0 W each for a total of 720, 48 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
</tr>
<tr>
<td>External PoE+ Power Supply (failed Internal Power Supply)</td>
<td>388(^1)</td>
<td>12 @ average 30W each for a total of 360 W, 25 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

\(^1\) The 630 RPS/EPS power supply is rated at 398 watts, however, 388 watts are supplied to the switch due to line loss on the EPS cable.

The switch can receive redundant power from the 630 RPS/EPS should the switch's internal power supply fail.
Planning and Implementation for the 3500 Switches

This chapter discusses the planning process to follow to successfully implement PoE on a 3500 switch. After understanding PoE and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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 for the HP ProCurve 3500:

- HP ProCurve 3500-24-PoE Switch
- HP ProCurve 3500-24-PoE Switch connecting an external power supply
- HP ProCurve 3500-48-PoE Switch
- HP ProCurve 3500-48-PoE Switch connecting an external power supply

Each example shows a complete configuration. A table below the configuration 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.
HP ProCurve 3500-24-PoE Switch Configuration

The table in this example configuration shows the PoE power available for the HP ProCurve 3500-24-PoE switch using the internal power supply.

All 24 ports can receive up to 15.4 watts of PoE power

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

For example, if port 24 is used for a mini-GBIC, then J45-port 24 is disabled. The PoE power that was supplied to RJ45-port 24 is returned to the total available pool of PoE power.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 9-1. Example of an HP ProCurve 3500-24-PoE Switch Using the Internal Power Supply
The table in this example configuration shows the PoE power available for the HP ProCurve 3500-24-PoE switch when configured with an external power supply.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port from internal supply</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>398 + 388</td>
<td>24 @ 15.4 W each for a total of 369.6 W</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
</tr>
<tr>
<td>External PoE Power Supply (failed Internal PoE Power Supply)</td>
<td>388</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 9-2. Example of two HP ProCurve 3500-24-PoE Switches connecting to an HP ProCurve 620 External and Redundant Power Supply (J8696A)

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

Two HP ProCurve 3500-24-PoE 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.
HP ProCurve 3500-48-PoE Switch Configuration

PoE power requirements are determined differently for the HP ProCurve 3500-48-PoE 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**

The ports configured with the highest priority of either bank (1-24 or 25-48) 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 9-3. Example of an HP ProCurve 3500-48-PoE Switch**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power</td>
<td>398</td>
<td>25 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td>Power Supply</td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

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 ports 25-48, providing 25 powered ports.

You could also load balance or split the number of devices and wattage between the two banks of ports. The 398 watts would be divided in half; 199 watts would be allocated to ports 1-24, and 199 watts would be allocated to ports 25-48. There could be 12 devices on the bank with ports 1-24, and 13 devices 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.

Configuring the CLI threshold command sets a threshold which informs you when the switch is using more than the configured percentage of PoE power. For example, if the threshold is set at 50%, the switch informs you that it has exceeded the threshold when 51% of available PoE power is being used. See page 11-12 for an example. For more information on the threshold command, see the Management and Configuration Guide on the ProCurve Web site at www.hp.com/go/procurve/manuals. (See page 1-15 for details.)
The table in this example configuration shows the PoE power available for the HP ProCurve 3500-48-PoE switch.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>25 @ average 15.4 W each 48 @ average 7.5 W each 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE power Supply</td>
<td>398 + 388</td>
<td>48 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each 48 @ average 7.5 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (failed Internal Power Supply)</td>
<td>388 (22 W is reserved for either ports 1-24 or 25-48)</td>
<td>25 @ average 15.4 W each 48 @ average 7.5 W each 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

Each of the switches can receive full redundant power from the HP ProCurve 620 RPS/EPS should one of the 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 3500yl Switches

This chapter discusses the planning process a user should follow to successfully implement PoE and PoE+ using a 3500yl switch. After understanding what PoE is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, for an example list of considerations during the planning phase.

Planning Your PoE or PoE+ Configuration

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

There are eight configurations for the HP ProCurve 3500yl. Four configurations are for standard PoE and four configurations are for PoE+:

- HP ProCurve 3500yl-24G-PWR Switch
- HP ProCurve 3500yl-24G-PWR Switch connecting an external power supply
- HP ProCurve 3500yl-48G-PWR Switch
- HP ProCurve 3500yl-48G-PWR Switch connecting an external power supply
- HP ProCurve 3500yl-24G-PoE+ Switch
- HP ProCurve 3500yl-24G-PoE+ Switch connecting an external power supply
- HP ProCurve 3500yl-48G-PoE+ Switch
- HP ProCurve 3500yl-48G-PoE+ Switch connecting an external power supply
Planning and Implementation for the 3500yl Switches
Planning Your PoE or PoE+ Configuration

Each example shows a complete configuration. A table shows the PoE or PoE+ power available to connected PoE or PoE+ devices when using just the switch or when connecting to an external power supply.

Once you have selected your specific configuration and the PoE or 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.

HP ProCurve 3500yl-24G-PWR Configuration

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

All 24 ports can receive up to 15.4 watts of PoE power

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 10-1. 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.
The table in this example configuration contains entries that show the PoE power available for the 3500yl-24G-PWR when connected to an external power supply.

### Planning Your PoE or PoE+ Configuration

#### Figure 10-2. Example of two 3500yl-24G-PWR Switches connecting to a HP ProCurve 620 External and Redundant Power Supply (J8696A)

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

Two 3500yl-24G-PWR switches or two 3500-24-PoE 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port from internal supply</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE Power Supply</td>
<td>398 + 388</td>
<td>24 @ average 15.4 W each and 24 @ 7.5 W each or 36 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
</tr>
<tr>
<td>External PoE Power Supply (failed Internal PoE Power Supply)</td>
<td>388</td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
</tbody>
</table>
HP ProCurve 3500yl-48G-PWR Configuration

PoE power requirements are figured differently 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 10-3. Example of a 3500yl-48G-PWR Switch**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>25 @ average 15.4 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

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 11-12 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.hp.com/go/procurve/manuals. (See page 1-15 for details.)
The table in this example configuration contains entries that show the PoE power available for the 3500yl-48G-PWR.

![3500yl 48 port switches](image)

![620 RPS/EPS](image)

**Figure 10-4. Example of two 3500yl-48G-PWR Switches connecting to a HP ProCurve 620 External and Redundant Power Supply (J8696A)**

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>25 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE power Supply</td>
<td>398 + 388</td>
<td>48 @ average 15.4 W each</td>
<td>24 @ average 15.4 W each, 48 @ average 7.5 W each</td>
</tr>
<tr>
<td>External PoE Power Supply (failed Internal Power Supply)</td>
<td>388 (22 W is reserved for either ports 1-24 or 25-48)</td>
<td>25 @ average 15.4 W each, 48 @ average 7.5 W each, 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

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).
HP ProCurve 3500yl-24G-PoE+ Configuration

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>13 @ average 30 W each for a total of 390 W. 24 @ average 15.4 W each for a total of 369.6 W</td>
<td>None</td>
</tr>
</tbody>
</table>

Figure 10-5. Example of a 3500yl-24G-PoE+ 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.
The table in this example configuration contains entries that show the PoE+ power available for the 3500yl-24G-PoE+.

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

One 3500yl-24G-PoE+ switch can be supported by one 630 RPS/EPS. This is a full redundant configuration. The switch can be supplied with power should either part of the internal power supply fail. The 630 RPS/EPS can supply system power to keep the switch powered on and PoE+ power to supply the attached PoE+ devices with power.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port from internal supply</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>13 @ average 30 W each for a total of 360 W</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td></td>
</tr>
<tr>
<td>Internal plus External PoE+ Power Supply</td>
<td>398 + 382</td>
<td>26 @ average 30 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 15.4 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ 7.5 W each</td>
<td></td>
</tr>
<tr>
<td>External PoE+ Power Supply (failed Internal PoE Power Supply)</td>
<td>382</td>
<td>13 @ average 30 W each for a total of 360 W</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24 @ average 15.4 W each for a total of 369.6 W</td>
<td></td>
</tr>
</tbody>
</table>

1 The 630 RPS/EPS power supply is rated at 398 watts, however, 382 watts are supplied to the switch due to line loss on the EPS cable.
HP ProCurve 3500yl-48G-PoE+ Configuration

PoE+ power requirements are figured differently for the 3500yl-48G-PoE+ 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>12 @ average 30 W each, 25 @ average 15.4 W each, 48 @ average 7.5 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

- 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 330 watts to fully provision 11 ports (plus 5 watts to account for load fluctuations), leaving 19 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 41 watts.

Since a port requires 33 watts to power up a PoE+ device, there is not enough available power to power another device.

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 6 devices on one bank of ports, say 1-24, and 6 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 11-12 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.hp.com/go/procurve/manuals. (See page 1-15 for details.)
The table in this example configuration contains entries that show the PoE+ power available for the 3500yl-48G-PoE+.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal PoE Power Supply</td>
<td>398</td>
<td>12 @ average 30 W each 25 @ average 15.4 W each 48 @ average 7.5 W each 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
<tr>
<td>Internal plus External PoE+ Power Supply¹</td>
<td>398 + 382</td>
<td>24 @ average 30 W each 48 @ average 15.4 W each</td>
<td>12 @ average 30 W each 24 @ average 15.4 W each 48 @ average 7.5 W each</td>
</tr>
<tr>
<td>External PoE+ Power Supply (failed Internal Power Supply)¹</td>
<td>382</td>
<td>12 @ average 30 W each 25 @ average 15.4 W each 48 @ average 7.5 W each 48 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

¹ The 630 RPS/EPS power supply is rated at 398 watts, however, 382 watts are supplied to the switch due to line loss on the EPS cable.

The switch can be supplied with power should either part of the internal power supply fail. The 630 RPS/EPS can supply system power to keep the switch powered on and PoE+ power to supply the attached PoE+ devices with power. 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 5400zl/8200zl Switches

This chapter discusses the planning process a user should follow to successfully implement PoE or PoE+ on 5400zl/8200zl switches. The 5412zl chassis and the 8212zl chassis share a common PoE/PoE+ implementation, and the 5406zl chassis and the 8206zl chassis share a common PoE/PoE+ implementation. Port counts, power supply wattages, specifications, and functionality for these two platforms are the same with respect to PoE and PoE+.

After understanding what PoE is and its operating rules, the next step to implementation is planning. See “General Considerations” page A-1, 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.

Power Configuration for HP ProCurve 5406zl/8206zl PoE Switch

Tables 11-1 and 11-2 show the maximum system power available for various power configurations. The configurations can be for full redundancy or for N+1 redundancy, as illustrated in figure 11-1.

![Figure 11-1. Example of Full and N+1 Redundancy Configuration](image-url)
### Table 11-1. 5406zl/8206zl System Power Configurations

<table>
<thead>
<tr>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Redundant System Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>J8712A</td>
<td>J8713A</td>
<td>N + 1 or Full</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>Full</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>Full</td>
</tr>
</tbody>
</table>

### Table 11-2. 5406zl/8206zl System Power Configurations (J9306A)

<table>
<thead>
<tr>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Redundant System Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>J9306A</td>
<td>@ 110-127 V</td>
<td>@ 200-240 V</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 11-3. 5406zl/8206zl Power Configurations for PoE Only (not PoE+)

<table>
<thead>
<tr>
<th>Switch Model 5406zl/8206zl</th>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Non-Redundant Power Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>J8712A</td>
<td>J8713A</td>
<td>N + 1 or Full</td>
</tr>
<tr>
<td></td>
<td>(110 or 220 volts)</td>
<td>(220 volts only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
<td>Full</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
<td>Full</td>
</tr>
</tbody>
</table>

Table 11-3 shows the maximum PoE power available for various power configurations.
Planning and Implementation for the 5400zl/8200zl Switches
Planning Your PoE Configuration

Power Configuration for HP ProCurve 5406zl/8206zl PoE/PoE+ Switches

**Note**

Using PoE power supplies J8712A and J8713A with J9306A in PoE/PoE+ systems is NOT supported. Use the J9306A zl power supply for systems providing both PoE and PoE+ power.

Table 11-4 shows the maximum PoE/PoE+ power available for various power configurations.

<table>
<thead>
<tr>
<th>Switch Model 5406zl/8206zl</th>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Non-Redundant Power Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>J8712A (110 or 220 volts)</td>
<td>J8713A (220 volts only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed PoE Power (NOT Recommended)</td>
<td>1</td>
<td>N+1</td>
<td>System and Redundancy - up to 273 W, see page 11-13</td>
</tr>
<tr>
<td>(With External Power Supplies Added)</td>
<td>3</td>
<td>N+1</td>
<td>Up to 546 W</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Full</td>
<td>Up to 546 W</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>Up to 1800 W</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>4</td>
<td>Up to 1800 W</td>
</tr>
</tbody>
</table>

---

### Table 11-4. 5406zl/8206zl Power Configurations for PoE/PoE+

<table>
<thead>
<tr>
<th>Switch Model 5406zl/8206zl</th>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Non-Redundant Power Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>54v Internal</td>
<td>@ 110 - 127 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>@ 200-240 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N + 1 or Full</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Redundant PoE/PoE+ Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Redundant PoE/PoE+ Power</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>Full</td>
<td>Up to 300 W</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>Full</td>
<td>Up to 900 W</td>
</tr>
</tbody>
</table>
### Table 11-5. 5412zl/8212zl System Power Configurations

<table>
<thead>
<tr>
<th>Switch Model 5406zl/8206zl</th>
<th>Number of Power Supplies&lt;br&gt; J9306A</th>
<th>Redundancy Model&lt;br&gt; @ 110 - 127 V</th>
<th>@ 200-240 V</th>
<th>Non-Redundant&lt;br&gt; @ 110 - 127 V</th>
<th>@ 200-240 V</th>
<th>Power Available</th>
<th>Non-Redundant&lt;br&gt; Power Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N+1 or Full</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J8712A (110 or 220 V)</td>
<td>3</td>
<td>0</td>
<td>N+1</td>
<td>Up to 600 W</td>
<td>900 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0</td>
<td>Full</td>
<td>Up to 600 W</td>
<td>1200 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>3</td>
<td>N+1</td>
<td>Up to 1800 W</td>
<td>2700 W</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>4</td>
<td>Full</td>
<td>Up to 1800 W</td>
<td>3600 W</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Power Configuration for HP ProCurve 5412zl/8212zl PoE Switches

The HP ProCurve 5412zl and 8212zl switches require a minimum of two power supplies to function. Tables 11-5 and 11-6 show the maximum system power available for various power configurations.
Planning and Implementation for the 5400zl/8200zl Switches
Planning Your PoE Configuration

Table 11-6. 5412zl/8212zl System Power Configurations (J9306A)

<table>
<thead>
<tr>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>J9306A @ 110-127 V</th>
<th>@ 200-240 V</th>
<th>N+1 or Full</th>
<th>Redundant System Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>N+1</td>
<td>Up to 1200 W system power</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>Full</td>
<td>Up to 1200 W system power</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>2</td>
<td>-</td>
<td>None</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>3</td>
<td>N+1</td>
<td>Up to 1200 W system power</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>4</td>
<td>Full</td>
<td>Up to 1200 W system power</td>
</tr>
</tbody>
</table>

Table 11-7 shows the maximum PoE power available for various power configurations.

Table 11-7. 5412zl/8212zl Power Configurations for PoE Only (not PoE+)

<table>
<thead>
<tr>
<th>Switch Model 5412zl/8212zl</th>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Non-Redundant Power Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>J8712A (110 or 220 volts)</td>
<td>2</td>
<td>N+1</td>
<td>546 W</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Up to 546 W</td>
<td>819 W</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Up to 546 W</td>
<td>1092 W</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>None</td>
<td>1800 W</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>N+1</td>
<td>3600 W</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Full</td>
<td>3600 W</td>
</tr>
<tr>
<td>J8713A (220 volts only)</td>
<td>2</td>
<td>N+1</td>
<td>1446 W</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Up to 273 W</td>
<td>2073 W</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Up to 1173 W</td>
<td>2346 W</td>
</tr>
</tbody>
</table>
Power Configuration for HP ProCurve 5412zl/8212zl PoE/PoE+ Switches

Table 11-8 shows the maximum PoE/PoE+ power available for various power configurations.

**Note**

Using PoE power supplies J8712A and J8713A with the J9306A in PoE/PoE+ switches is NOT supported. Use the J9306A zl power supply for switches providing both PoE and PoE+ power.
## Table 11-8. 5412zl/8212zl Power Configurations for PoE/PoE+

<table>
<thead>
<tr>
<th>Switch Model 5406zl/8206zl</th>
<th>Number of Power Supplies</th>
<th>Redundancy Model</th>
<th>Power Available @ 110 - 127 V</th>
<th>Power Available @ 200-240 V</th>
<th>Non-Redundant PoE/PoE+ Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>PoE/PoE+ Power (54v) Internal</td>
<td>@ 110 - 127 V</td>
<td>@ 200-240 V</td>
<td>N + 1 or Full</td>
<td>Redundant PoE/PoE+ Power</td>
<td>Non-Redundant PoE/PoE+ Power</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>-</td>
<td>None</td>
<td>600 W</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>N+1</td>
<td>Up to 300 W</td>
<td>900 W</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>Full</td>
<td>Up to 600 W</td>
<td>1200 W</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2</td>
<td>-</td>
<td>None</td>
<td>1800 W</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>3</td>
<td>N+1</td>
<td>Up to 900 W</td>
<td>2700 W</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4</td>
<td>Full</td>
<td>Up to 1800 W</td>
<td>3600 W</td>
<td></td>
</tr>
<tr>
<td>PoE/PoE+ Power (With External Power Supplies Added)</td>
<td>5</td>
<td>0</td>
<td>N+1</td>
<td>Up to 1200 W</td>
<td>1500 W</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>Full</td>
<td>Up to 900 W</td>
<td>1800 W</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>5</td>
<td>N+1</td>
<td>Up to 3600 W</td>
<td>4500 W</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>6</td>
<td>Full</td>
<td>Up to 2700 W</td>
<td>5400 W</td>
<td></td>
</tr>
</tbody>
</table>
Configuration Examples

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 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.

HP ProCurve 5406zl Configurations

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

![Figure 11-2. Example of a 5406zl with one power supply, J8712A](image)

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Internal Power Supply (J8712A)</td>
<td>273</td>
<td>16 @ average 15.4 W</td>
<td>None</td>
</tr>
</tbody>
</table>
Planning and Implementation for the 5400zl/8200zl Switches

Configuration Examples

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 are 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 (Figure 11-3) there are three modules in the chassis; 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 11-3. Example of a 5406zl with two power supplies, J8712A

There are two power supplies supplying 273 watts each for a maximum of 546 watts.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/ Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
</table>
| Two Internal Power Supplies     | 546 (without redundancy) | 35 @ average 15.4 W each  
72 @ average 7.5 W each  
136 @ average 4.0 W each | 17 @ average 15.4 W  
34 @ average 7.5 W each  
68 @ average 4.0 W each |
| (J8712A)                        |                 |                                          |                                                     |
| Two External Power Supplies     | Additional 546  | 70 @ average 15.4 W each  
144 @ average 7.5 W each  
144 @ average 4.0 W each | 35 @ average 15.4 W  
72 @ average 7.5 W each  
136 @ average 4.0 W each |
| (J8712A)                        |                 |                                          |                                                     |
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.

Alternatively, 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 11-14.

**Figure 11-4. Example of a 5406zl with one power supply, J8713A**

In this example (Figure 11-4) 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 7.5 watts each, and offers fiber optic gigabit connectivity.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Internal PoE Power Supply (J8713A)</td>
<td>900</td>
<td>58 @ average 15.4 W each 116 @ average 7.5 W each 144 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

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.
Planning and Implementation for the 5400zl/8200zl Switches
Configuration Examples

Figure 11-5. Example of a 5406zl with two power supplies, J8713A

This configuration (Figure 11-5) 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Internal PoE Power Supplies (J8713A)</td>
<td>1800 (without redundancy)</td>
<td>116 @ average 15.4 W each 144 @ average 7.5 W each 144 @ average 4.0 W each</td>
<td>58 @ average 15.4 W each 116 @ average 7.5 W each 144 @ average 4.0 W each</td>
</tr>
<tr>
<td>Two External Power Supplies (J8713A)</td>
<td>Additional 1800</td>
<td>144 @ average 15.4 W each 144 @ average 7.5 W each 144 @ average 4.0 W each</td>
<td>116 @ average 15.4 W each 144 @ average 7.5 W each 144 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

Alternatively, 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, 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 11-14.
In this example (Figure 11-6) 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.

**Note**

HP ProCurve Networking highly recommends that the two types of power supplies are not mixed in the same 5406zl chassis.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Internal PoE Power Supplies: one J8712A one J8713A</td>
<td>1173 (without redundancy)</td>
<td>76 @ average 15.4 W each 136 @ average 7.5 W each 136 @ average 4.0 W each</td>
<td>17 @ average 15.4 W 39 @ average 7.5 W each 68 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

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.
Planning and Implementation for the 5400zl/8200zl Switches

Configuration Examples

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 and 8206zl Configurations using the Power Supply Shelf

The following example configurations are the same for the 5406zl and 8206zl switches. As shown in Figures 11-7 and 11-8, the Power Supply Shelf can be connected to the 5406zl or the 8206zl to supply extra or redundant PoE/PoE+ power to the PoE modules.

Figure 11-7. Connecting the EPS to one 5406zl or 8206zl switch

Figure 11-8. Connecting the EPS to two 5406zl or 8206zl switches
Example Configuration for HP ProCurve 5406zl With One PoE/PoE+ Power Supply

In this example there is one J9306A power supply operating at 110-127 volts, providing 300 watts for PoE/PoE+ usage.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available (110-127 V)</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Internal PoE+ Power Supply (J9306A)</td>
<td>300 W</td>
<td>10 @ average 30 W each 19 @ average 15.4 W each 40 @ average 7.5 W each 75 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Example Configuration for HP ProCurve 8206zl with One PoE/PoE+ Power Supply

In this example there is one J9306A power supply operating at 200-240 volts, providing 900 watts for PoE/PoE+ usage.

![Figure 11-10. HP ProCurve 8206zl Switch](image)

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available (200-240 V)</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Internal PoE+ Power Supply (J9306A)</td>
<td>900 W</td>
<td>30 @ average 30 W each</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td></td>
<td>58 @ average 15.4 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>116 @ average 7.5 W each</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>144 @ average 4.0 W each</td>
<td></td>
</tr>
</tbody>
</table>

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 that could be powered by a single J9306A power supply.
Example Configuration for HP ProCurve 8206zl with Two PoE/PoE+ Power Supplies

This configuration is an example of two PoE+ power supplies supplying 900 watts each for a maximum of 1800 watts to a fully loaded chassis of 144 ports.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
</table>
| Two Internal PoE/ PoE+ Power Supplies (J9306A) | 1800 (without redundancy) | 60 @ average 30 W each  
116 @ average 15.4 W each  
144 @ average 7.5 W each  
144 @ average 4.0 W each | 30 @ average 30 W each  
58 @ average 15.4 W each  
120 @ average 7.5 W each  
144 @ average 4.0 W each |
| Two External PoE/PoE+ Power Supplies (J9306A) | Additional 1800 | 120 @ average 30 W each  
144 @ average 15.4 W each  
144 @ average 7.5 W each  
144 @ average 4.0 W each | 60 @ average 30 W each  
116 @ average 15.4 W each  
144 @ average 7.5 W each  
144 @ average 4.0 W each |

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

HP ProCurve 8206zl Configurations using the Power Supply Shelf

The Power Supply Shelf can be connected to the 8206zl to supply extra or redundant PoE power to the PoE modules. See Figures 11-7 and 11-8 for representative examples of using the Power Supply Shelf.
Planning and Implementation for the 5400zl/8200zl Switches
Configuration Examples

HP ProCurve 5412zl/8212zl Configurations

The 5412zl chassis and the 8212zl chassis share a completely common PoE/ 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 sub-sections:

- Standard J8712A Configurations
- Standard J8713A Configurations
- Mixed J8712A and J8713A Configurations
- Using the J9306A Power Supply
- HP ProCurve 5412zl/8212zl Configurations using the Power Supply Shelf

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 11-11. Example of a 5412zl with two power supplies, J8712A

In this example (Figure 11-11) 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.

There is no redundant power with this configuration. If a power supply fails, the remaining power supply can keep the switch running, but cannot supply all the PoE power needed by the modules.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Internal Power Supplies (J8712A)</td>
<td>546 (without redundancy)</td>
<td>35 @ average 15.4 W each 72 @ average 7.5 W each 136 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>
Configuration Examples

Figure 11-12. Example of a 5412zl with three power supplies, J8712A

In this example (Figure 11-12) 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Internal Power Supplies</td>
<td>819 (without redundancy)</td>
<td>53 @ average 15.4 W each</td>
<td>17 @ average 15.4 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>109 @ average 7.5 W each</td>
<td>36 @ average 7.5 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>204 @ average 4.0 W each</td>
<td>68 @ average 4.0 W</td>
</tr>
</tbody>
</table>

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 11-13. Example of a 5412zl with four power supplies, J8712A

In this example (Figure 11-13) 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 (145 ports) at 7.5 watts per port.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Internal Power Supplies (J8712A)</td>
<td>1092 (without redundancy)</td>
<td>71 @ average 15.4 W each 145 @ average 7.0 W each 273 @ average 4.0 W each</td>
<td>35 @ average 15.4 W 72 @ average 7.5 W each 136 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

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

This configuration (Figure 11-14) 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.

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.
This configuration (Figure 11-15) 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 7.5 watts.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Internal PoE Power Supplies</td>
<td>2700 (without redundancy)</td>
<td>175 @ average 15.4 W each</td>
<td>58 @ average 15.4 W each</td>
</tr>
<tr>
<td>(J8713A)</td>
<td></td>
<td>288 @ average 7.5 W each</td>
<td>120 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 4.0 W each</td>
<td>225 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

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.
This configuration (Figure 11-16) 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Internal PoE Power Supplies (J8713A)</td>
<td>3600 (without redundancy)</td>
<td>233 @ average 15.4 W each</td>
<td>116 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 7.5 W each</td>
<td>240 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 4.0 W each</td>
<td>288 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

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.
Mixed J8712A and J8713A Configurations

**Note**

HP Procurve highly recommends that the two types of power supplies are not mixed in the same 5412zl or 8212zl chassis.

Although mixing power supplies is not recommended, the following examples demonstrate the most common usages. Refer to page 11-13 for the discussion on failover in a mixed power supply environment.

![Figure 11-17. Example of a 5412zl with three power supplies (two J8712A and one J8713A)](image)

This configuration (Figure 11-17) 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.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Internal PoE Power Supplies: two J8712As one J8713A</td>
<td>1446 (without redundancy)</td>
<td>93 @ average 15.4 W each 192 @ average 7.5 W each 288 @ average 4.0 W each</td>
<td>None</td>
</tr>
</tbody>
</table>

Redundancy now becomes an issue. You can use the one J8713A (900 watts) to backup the two J8712As if either one of them fails, but you cannot use the two J8712As to backup the J8713A as they don’t have enough PoE power.
The J8713A is only able to power 6 module slots should both of the J8712As fail. You may not be able to supply all ports with PoE power depending on which modules and which ports are configured to supply PoE power.

This configuration (Figure 11-18) is an example of using three power supplies—one J8712A supplying 273 watts and two J8713As supplying 1800 watts—supplying a maximum of 2073 watts. A total of 134 ports can be powered at 15.4 watts each.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Internal PoE Power Supplies: one J8712A two J8713As</td>
<td>2073 (without redundancy)</td>
<td>134 @ average 15.4 W each&lt;br&gt;276 @ average 7.5 W each&lt;br&gt;288 @ average 4.0 W each</td>
<td>58 @ average 15.4 W each with a J8713A in reserve&lt;br&gt;120 @ average 7.5 W each with a J8713A in reserve&lt;br&gt;225 @ average 4.0 W each with a J8713A in reserve</td>
</tr>
</tbody>
</table>

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 borrow power from the reserve J8713A. If you do that and the primary J8713A fails, there will not be enough power to fully backup the failed J8713A.
Planning and Implementation for the 5400zl/8200zl Switches

Configuration Examples

Figure 11-19. Example of a 5412zl with four power supplies (two J8712A and two J8713A)

In this example (Figure 11-19) 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 288 ports can be powered at 7.0 watts each.

**Note**

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

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four Internal PoE Power Supplies: two J8712As and two J8713As</td>
<td>2892 (without redundancy)</td>
<td>187 @ average 15.4 W each 288 @ average 7.5 W each 288 @ average 4.0 W each</td>
<td>35 @ average 15.4 W 72 @ average 7.5 W each 136 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

The reason the redundant # of ports in this table is so low is 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.
Using the HP ProCurve 1500W PoE+ zl Power Supply (J9306A)

The J9306A power supply provides PoE/PoE+ power for zl switches. The physical configurations are like those seen for the 5400zl/8200zl switches with the other power supplies. The J9306A operates at 110-127V supplying 300 watts of PoE/PoE+ power, and 200-240V supplying 900 watts of PoE/PoE+ power.

**Note on Mixing Power Supplies**

Using a combination of the PoE power supplies J8712A and/or J8713A and a J9306A in PoE/PoE+ systems is NOT supported.

The following example shows how many PoE/PoE+ ports can be powered at various wattages for the J9306A power supply operating at 110-127 volts.

<table>
<thead>
<tr>
<th>Source of Power</th>
<th>Watts Available at 110-127V</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Internal PoE/ PoE+ Power Supplies (J9306A)</td>
<td>600 (without redundancy)</td>
<td>20 @ average 30 W each 38 @ average 15.4 W each 80 @ average 7.5 W each 144 @ average 4.0 W each</td>
<td>10 @ average 30 W each 19 @ average 15.4 W each 40 @ average 7.5 W each 75 @ average 4.0 W each</td>
</tr>
<tr>
<td>Four Internal PoE/PoE+ Power Supplies (J9306A)</td>
<td>1200 (without redundancy)</td>
<td>40 @ average 30 W each 77 @ average 15.4 W each 160 @ average 7.5 W each 288 @ average 4.0 W each</td>
<td>20 @ average 30 W each 38 @ average 15.4 W each 80 @ average 7.5 W each 150 @ average 4.0 W each</td>
</tr>
<tr>
<td>Four Internal plus Two External PoE/PoE+ Power Supplies (J9306A)</td>
<td>Additional 600 for a total of 1800 (without redundancy)</td>
<td>60 @ average 30 W each 116 @ average 15.4 W each 240 @ average 7.5 W each 288 @ average 4.0 W each</td>
<td>30 @ average 30 W each 58 @ average 15.4 W each 120 @ average 7.5 W each 225 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

The next example shows how many PoE/PoE+ ports can be powered at various wattages for the J9306A power supply operating at 200-240 volts.
### Configuration Examples

#### Source of Power

<table>
<thead>
<tr>
<th>Watts Available at 200-240V</th>
<th># of Ports Powered and Average watts/Port</th>
<th>Redundant # of Ports Powered and Average watts/Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two Internal PoE/ PoE+ Power Supplies (J9306A)</td>
<td>1800 (without redundancy)</td>
<td>60 @ average 30 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>116 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>144 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>144 @ average 4.0 W each</td>
</tr>
<tr>
<td>Four Internal PoE/PoE+ Power Supplies (J9306A)</td>
<td>3600 (without redundancy)</td>
<td>120 @ average 30 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>232 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 4.0 W each</td>
</tr>
<tr>
<td>Four Internal plus Two External PoE/PoE+ Power Supplies (J9306A)</td>
<td>Additional 1800 for a total of 5400 (without redundancy)</td>
<td>180 @ average 30 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 15.4 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 7.5 W each</td>
</tr>
<tr>
<td></td>
<td></td>
<td>288 @ average 4.0 W each</td>
</tr>
</tbody>
</table>

- **Figure 11-20.** Example of a 5412zl with four power supplies (J9306A) operating at 200-240 volts.
ProCurve 5412zl/8212zl Configurations using the Power Supply Shelf

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.

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 11-21. Connecting the EPS to one 5412zl switch
In this configuration, EPS 2 of the Power Supply Shelf can be connected to either EPS 1 or EPS 2 of either switch.

Figure 11-22. Connecting the EPS to two switches, one 5412zl and one 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 45°C (32°F to 113°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.
Infrastructure Requirements

Physical Space

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.
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; the method by which PDs receive power from a PoE module (operates according to the IEEE 802.3af standard). Some pre-standard PoE devices are also supported.

PoE+ - Power-over-Ethernet Plus; the method by which PDs receive power according to the 802.3at standard. It is backward compatible with devices using the 803.3af standard.

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 or 802.3at-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.

RPS - Redundant Power Supply
Planning Considerations

This appendix is divided into five sections:

- General Considerations
- Specific Considerations for the 2910al-PoE Switches
- Specific Considerations for the 3500-PoE Switches
- Specific Considerations for the 3500yl-PWR Switches
- Specific Considerations for the 5400zl/8200zl 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 2910al, 3500yl, 5400 or to a 8200zl 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 802.3at standard and 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.hp.com/go/procurve/FAQs](http://www.hp.com/go/procurve/FAQs).
- 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 2910al-PoE Switches

The following is an example list of considerations during the planning phase specific to the 2910al 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
  - Total watts available (382)
- 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 630 RPS/EPS be plugged into a different power source than the switch it is going to backup.
Specific Considerations for the 3500-PoE Switches

The following is an example list of considerations during the planning phase specific to the 3500-PoE 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 3500yl-PWR Switches

The following is an example list of considerations during the planning phase specific to the 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 3500yl-PoE+ Switches

The following is an example list of considerations during the planning phase specific to the 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 630 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 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?
Analyzing the provided index, one can extract a structured overview of the document contents. The primary objects of interest are numerics, cables, power supplies, and PoE considerations. Here's a structured representation of the index:

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