11

Power Over Ethernet (PoE) Operation

Contents

PoE Devices

The ProCurve switches covered in this guide are used as Power Sourcing Equipment (PSE) devices providing PoE power to the Powered Devices (PDs) through the 24 port Gig-T PoE module (J8702A) or the 20 port Gig-T plus 4 mini-GBIC PoE module (J8705A). The switch must have at least one of the following power supplies installed:

- ProCurve J8712A Power Supply providing 273 watts of PoE power
- ProCurve J8713A Power Supply providing 900 watts of PoE power

For information about the power supply specifications refer to the *ProCurve Switch zl Internal Power Supplies Installation Guide* provided with your power supply.

Introduction to PoE

PoE technology allows IP telephones, wireless LAN access points, and other appliances to receive power and transfer data over existing ethernet LAN cabling. For more information about PoE technology, refer to the *PoE Planning and Implementation Guide*, which is available on the ProCurve Networking web site at **www.procurve.com**. (Click on **technical support**, then **Product manuals (all)**).

PoE Terminology

Term	Use in this Manual
active PoE port	A PoE-enabled port connected to a PD requesting power.
priority class	Refers to the type of power prioritization that 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 becomes oversubscribed.
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 Gig-T PoE port in a PoE device. 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, a PoE module assigns the highest priority to the lowest-numbered port in the module, the second-highest priority to the second lowest-numbered port in the module, and so on. Note that power priority rules apply only if PoE provisioning on the module becomes oversubscribed.
PoE	Power-Over-Ethernet; the method by which PDs receive power from a PoE module (in compliance with the IEEE 802.3af standard). Some pre-standard PoE devices are also supported; refer to the FAQs for your switch model.
PSE	Power-Sourcing Equipment. A PSE, such as a J8702A or J8705A PoE module installed in a ProCurve switch covered in this guide, provides power to IEEE 802.3af-compliant PDs directly connected to the ports on the module. The PoE module is an *endpoint* PSE.
PoE Module	Refers to a PoE Module (J8702A or J8705A) for the switches covered in this guide.

Overview of Operation

A 24-port Gig-T PoE module (J8702A) or a 20-port Gig-T plus 4 mini-GBIC PoE module (J8705A) is a PSE device that receives PoE power from either a ProCurve J8712A Power Supply or a ProCurve J8713A Power Supply and distributes this power to the PDs connected to the PoE module's Gig-T ports.

Note

ProCurve recommends using like power supplies in order to guarantee remaining power if one power supply should fail. For example, use two J8712A power supplies or two J8713A power supplies in your ProCurve switch.

Note

You can connect either a PoE device (PD) or a non-PoE device to a port configured for PoE operation on a J8702A PoE module.

Using the commands described in this chapter, you can:

- Configure a non-default power threshold for SNMP and Event Log reporting of PoE consumption on either all PoE ports on the switch or on all PoE ports in one or more PoE modules.
- Specify the port priority you want to use for provisioning PoE power in the event that the PoE resources become oversubscribed.
- Enable or disable PoE operation on individual ports. (In the default configuration, each PoE module installed in the switch enables PoE power on all Gig-T ports in the module, subject to PoE priority if the PoE resources are oversubscribed.)
- Monitor PoE status and performance per module.

Related Publications

This chapter introduces general PoE operation, PoE configuration and monitoring commands, and Event Log messages related to PoE operation. The following two manuals provide further information:

- For information on installing a ProCurve Switch PoE Module (J8702A or J8705A), refer to the *ProCurve Switch Modules Installation Guide* provided with the module.

- To help you plan and implement a PoE system in your network, refer to the *PoE Planning and Implementation Guide*, which is available on the ProCurve Networking web site at **www.procurve.com**. (Click on **technical support**, then **Product manuals (all)**.)

The latest version of any ProCurve product guide is always on the ProCurve Networking web site. Refer to “Getting Documentation From the Web” on page 1-6.

General PoE Operation

For additional PoE configuration information for the switches covered in this guide, refer to the *PoE Planning and Implementation Guide*, which is available from the ProCurve Networking web site at **www.procurve.com**. (Click on **technical support**, then **Product manuals (all)**).

Configuration Options

In the default configuration, all Gig-T ports on the PoE module in a ProCurve switch covered in this guide are configured to support PoE operation. You can:

- Disable or re-enable per-port PoE operation on individual ports to help control power usage and avoid oversubscribing PoE resources.
- Configure per-port priority for allocating power in case a PoE module becomes oversubscribed and must drop power for some lower-priority ports to support the demand on other, higher-priority ports.
- Configure one of the following:
  - 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.

Note The ports on a PoE module support standard networking links and PoE links. Thus, you can connect either a non-PoE device or a PD to a PoE-enabled port without reconfiguring the port.

PD Support

When you connect the first PD to a PoE port, the PoE module must have a minimum of 17 watts of PoE power available in order to detect and supply power to the device. Power is allocated dynamically among PoE modules, with each PoE module allocated a minimum of 22 watts of PoE power—17 watts for detection and an additional 5 watts for variations in any applied power loads. To best utilize the allocated PoE power, spread your connected PoE devices as evenly as possible across modules.

Depending on the amount of power the power supply device delivers to a PoE module, there may or may not always be enough power available to connect and support PoE operation on all 24 Gig-T ports in the module. When a new PD connects to a PoE module and the module does not have enough power left for that port:

- If the new PD connects to a port "X" having a *higher* PoE priority than another port "Y" that is already supporting another PD, then the power is removed from port "Y" and delivered to port "X". In this case the PD on port "Y" loses power and the PD on port "X" receives power.
- If the new PD connects to a port "X" having a *lower* priority than all other PoE ports currently providing power to PDs, then power is not supplied to port "X" until one or more PDs using higher priority ports are removed.

Note that once a PD connects to a PoE port and begins operating, the port retains only enough PoE power to support the PD's operation. Unused power becomes available for supporting other PD connections. Thus, while 17 watts must be available for a PoE module on the switch to begin supplying power to a port with a PD connected, 17 watts per port is not continually required if the connected PD requires less power. For example, with 20 watts of PoE power remaining available on a module, you can connect one new PD without losing power to any currently connected PDs on that module. If that PD draws only 3 watts, then 17 watts remain available and you can connect at least one more PD to that module without interrupting power to any other PoE devices connected to the same module. If the next PD you connect draws 5 watts, then only 12 watts remain unused. With only 12 unused watts available, if you then connect yet another PD to a higher-priority PoE port, then the lowest-priority

port on the module loses PoE power and remains unpowered until the module once again has 17 or more watts available. (For information on power priority, refer to “Power Priority Operation” on page 11-10.)

Disconnecting a PD from a PoE port causes the module to stop providing PoE power to that port and makes the power available to any other PoE ports that have PDs connected and waiting for power. If the PD demand for power becomes greater than the PoE power available, then power is transferred from the lower-priority ports to the higher-priority ports. (Ports not currently providing power to PDs are not affected.)

Determining the Amount of PoE Power Available

Table 11-1 shows the amount of PoE power available for powering PDs depending on the power supplies used.

Table 11-1. PoE Power Available

Source of Power	PoE Power Available	PoE Power Available for the PoE (J8702A) Module
One power supply	J8712A Power Supply=273 watts J8713A Power Supply=900 watts	Depending on the power demand from the PDs, lower priority ports may not be provisioned. Refer to "Calculating the Maximum Load for a PoE Module" on page 11-34.
Two power supplies of the same type (recommended)	Two J8712A Power Supplies=546 watts or Two J8713A Power Supplies=1800 watts	
Two power supplies of different types (not recommended)	One J8712A power supply + one J8713 power supply=1173 watts	
Three power supplies	Three J8712A power supplies=819 watts Three J8713A power supplies=2700 watts One J8712A and two J8713A=1446 watts	
Four power supplies	Four J8712A power supplies=1092 watts Four J8713A power supplies=3600 watts Two J8712A and two J8713A power supplies=2346 watts	

Power Priority Operation

When Is Power Allocation Prioritized?

If a PSE can provide power for all connected PD demand, it does not use its power priority settings to allocate power. However, if the PD power demand oversubscribes the available power, then the power allocation is prioritized to the ports that present a PD power demand. This causes the loss of power from one or more lower-priority ports to meet the power demand on other,

higher-priority ports. This operation occurs regardless of the order in which PDs connect to the module's PoE-enabled ports.

How Is Power Allocation Prioritized?

There are two ways that PoE power is prioritized:

- Using a *priority class* method, a power priority of **Low** (the default), **High**, or **Critical** is assigned to each enabled PoE port.
- 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.

Suppose, for example, that you configure the PoE priority for a module in slot C as shown in table 11-2.

Table 11-2. Example of PoE Priority Operation on a PoE Module

Port	Priority Setting	Configuration Command[1] and Resulting Operation with PDs connected to Ports C3 Through C24
C3 - C17	**Critical**	In this example, the following CLI command sets ports C3-C17 to **Critical**: `ProCurve(config)# interface c3-c17 power-over-ethernet critical` The **Critical** priority class always receives power. If there is not enough power to provision PDs on all of the ports configured for this class, then no power goes to ports configured for **High** and **Low** priority. If there is enough power to provision PDs on only some of the critical-priority ports, then power is allocated to these ports in ascending order, beginning with the lowest-numbered port in the class, which, in this case, is port 3.
C18 - C21	**High**	In this example, the following CLI command sets ports C19-C22 to **High**: `ProCurve(config)# interface c19-c22 power-over-ethernet high` The **High** priority class receives power only if all PDs on ports with a **Critical** priority setting are receiving power. If there is not enough power to provision PDs on all ports with a high priority, then no power goes to ports with a low priority. If there is enough power to provision PDs on only some of the high-priority ports, then power is allocated to these ports in ascending order, beginning, in this example, with port 18, until all available power is in use.

Port	Priority Setting	Configuration Command[1] and Resulting Operation with PDs connected to Ports C3 Through C24
C22 - C24	**Low**	In this example, the CLI command sets ports C23-C24 to **Low**[2]: `ProCurve(config)# interface c23-c24 power-over-ethernet low` This priority class receives power only if all PDs on ports with **High** and **Critical** priority settings are receiving power. If there is enough power to provision PDs on only some low-priority ports, then power is allocated to the ports in ascending order, beginning with the lowest-numbered port in the class (port 22, in this case), until all available power is in use.
C1 - C2	*- n/a -*	In this example, the CLI command disables PoE power on ports C1-C2: `ProCurve(config)# no interface c1-c2 power-over-ethernet` There is no priority setting for the ports in this example.

[1] For a listing of PoE configuration commands, with descriptions, refer to "Configuring PoE Operation" on page 11-14.
[2] In the default PoE configuration, the ports are already set to the **low** priority. In this case, the command is not necessary.

PoE Priority With Two or More Modules

Ports across two or more modules can be assigned a class priority of either **Low** (the default), **High**, or **Critical**, for example, A5, B7, and C10 could all be assigned a priority class of **Critical**. When power is allocated to the ports on a priority basis, the **Critical** priority power requests are allocated to module A first, then Module B, C, and so on. Next, the **High** priority power requests are allocated starting with module A, then B, C, and the remaining modules in order. Any remaining power is allocated in the same manner for the **Low** priority ports, beginning with module A though the remaining modules. If there is not enough PoE power for all the PDs connected to PoE modules in the switch, power is allocated according to priority class across modules. For example:

All ports on module C are prioritized as **Critical.**

```
ProCurve(config)# interface c1-c24 power-over-ethernet
                  critical
```

All ports on module A are prioritized as **Low.**

```
ProCurve(config)# interface a1-a24 power-over-ethernet
                  low
```

There are 48 PDs attached to all ports of modules A and C (24 ports each module).

There is only enough PoE power for 32 ports (8.5 watts x 32 ports = 273 watts).

The result is that all the **Critical** priority ports on module C would receive power, but only 8 ports on module A would receive power.

On module A, the port A1 has the highest priority of the ports in that module if all ports are in the same priority class, which is the case for this example. Since a minimum 17 + 5 watts of power is allocated per PoE module, port A1 will always receive PoE power. If another port on module A had a higher priority class than port A1, that port would be allocated the power before port A1.

Configuring PoE Operation

In the default configuration, PoE support is enabled on the Gig-T ports in a PoE module installed on the switch. The default priority for all ports is **Low** and the default power notification threshold is **80** (%). Using the CLI, you can:

- Change the PoE priority level on individual PoE ports
- Disable or re-enable PoE operation on individual PoE ports
- Change the threshold for generating a power level notice

Changing the PoE Port Priority Level

Syntax: interface < *port-list* > power-over-ethernet [critical | high | low]

Reconfigures the PoE priority level on <port-list>. For a given level, ports are prioritized by port number in ascending order. For example, if ports A1-A24 have a priority level of critical, port A1 has priority over ports A2-A24.

If there is not enough power available to provision all active PoE ports at a given priority level, then the lowest-numbered port at that level will be provisioned first, starting with module A, then B, C, and so on. PoE priorities are invoked only when all active PoE ports cannot be provisioned (supplied with PoE power).

- **Critical:** *Specifies the highest-priority PoE support for <port-list>. The active PoE ports at this level are provisioned before the PoE ports at any other level are provisioned.*
- **High**: *Specifies the second priority PoE support for <port-list>. The active PoE ports at this level are provisioned before the Low priority PoE ports are provisioned.*
- **Low:** *(the default): Specifies the third priority PoE support for <port-list>. The active PoE ports at this level are provisioned only if there is power available after provisioning any active PoE ports at the higher priority levels.*

You can use one command to set the same priority level on PoE ports in multiple modules. For example, to configure the priority to **High** *for ports c5-c10, C23-C24, D1-D10, and D12, you could use this command:*

```
ProCurve(config)# interface c5-c10,c23-c24,
d1-d10,d12 power-over-ethernet high
```

Disabling or Re-Enabling PoE Port Operation

Syntax: [no] interface <*port-list*> power-over-ethernet

Re-enables PoE operation on <*port-list*> *and restores the priority setting in effect when PoE was disabled on* <*port-list*>. *The* **no** *form of the command disables PoE operation on* <*port-list*>. *(Default: All PoE ports on the module are initially enabled for PoE operation at* **Low** *priority. If you configure a higher priority, this priority is retained until you change it.)*

Note*: Disabling all ports on a module allows the 22W of minimum PoE power allocated for the module to be recovered and used elsewhere. You must disable ALL ports in the module for this to occur.*

Enabling Support for Pre-Standard Devices

The ProCurve switches covered in this guide also support some pre-802.3af devices. For a list of the devices supported, refer to the FAQs for your switch model.

Syntax: [no] power-over-ethernet pre-std-detect

Detects and powers pre-802.3af standard devices.

Note*: This is enabled by default.*

Configuring PoE Redundancy

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

Syntax: [no] power-over-ethernet redundancy [n+1 | full]

Allows you to set the amount of power held in reserve for redundancy.
The **no** *option means that all available power can be allocated to PDs.*
Default: *No PoE redundancy enforced.*

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.

full: *Half of the available power supply 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.*

Changing the Threshold for Generating a Power Notice

Syntax: power-over-ethernet [slot < *slot-id-range* >] threshold < 1 - 99 >

This command specifies the PoE usage level (as a percentage of the PoE power available on a module) at which the switch generates a power usage notice. This notice appears as an SNMP trap and a corresponding Event Log message, and occurs when a PoE module's power consumption crosses the configured threshold value. That is, the switch generates a notice whenever the power consumption on a module either exceeds or drops below the specified percentage of the total PoE power available on the module.

This command configures the notification threshold for PoE power usage on either a global or per-module (slot) basis.

Without the **[slot <*slot-id-range*>]** *option, the switch applies one power threshold setting on all PoE modules installed in the switch. For example, suppose slots A, B, and C each have a PoE module installed. In this case, executing the following command sets the global notification threshold to 70% of available PoE power.*

```
ProCurve(config)# power-over-ethernet threshold
                        70
```

With this setting, if module B is allocated 100 watts of PoE power and is using 68 watts, and then another PD is connected to the module in slot B that uses 8 watts, the 70% threshold of 70 watts is exceeded. The switch sends an SNMP trap and generates this Event Log message:

```
Slot B POE usage has exceeded threshold of 70 %.
```

If the switch is configured for debug logging, it also sends the Event Log message to the configured debug destination(s).

On any PoE module, if an increasing PoE power load (1) exceeds the configured power threshold (which triggers the log message and SNMP trap), and then (2) later decreases and drops below the threshold again, the switch generates another SNMP trap, plus a message to the Event Log and any configured Debug destinations.

Syntax: power-over-ethernet [slot <*slot-id-range*>] threshold <1 - 99 >
(Continued)

To continue the preceding example, if the PoE power usage on the PoE module in slot B drops below 70%, another SNMP trap is generated and you will see this message in the Event Log:

```
Slot B POE usage is below threshold of 70 %.
```

For a message listing, refer to "PoE Event Log Messages" on page 11-37. (Default Global PoE Power Threshold: **80***). By using the* **[slot <*slot-id-range*>]** *option, you can specify different notification thresholds for different PoE modules installed in the switch. For example, you could set the power threshold for a PoE module in slot "A" to 75% and the threshold for the module in slot "B" to 68% by executing the following two commands:*

```
ProCurve(config)# power-over-ethernet slot a
                    threshold 75
ProCurve(config)# power-over-ethernet slot b
                    threshold 68
```

Note that the last **threshold** *command affecting a given slot supersedes the previous threshold command affecting the same slot. Thus, executing the following two commands in the order shown sets the threshold for the PoE module in slot "D" to 75%, but leaves the thresholds for any PoE modules in the other slots at 90%.*

```
ProCurve(config)# power-over-ethernet
                    threshold 90
ProCurve(config)# power-over-ethernet slot d
                    threshold 75
```

(If you reverse the order of the above two commands, all PoE modules in the switch will have a threshold of 90%.)

PoE Allocation Using LLDP Information

You can have the port automatically configure power if the link partner is able to support PoE. When LLDP is enabled, the information about the power usage of the PD is available and the switch can then comply with or ignore this information. You can configure PoE on each port according to the PD (IP phone, wireless device, etc.) specified in the LLDP field. The default configuration is for PoE information to be ignored if detected through LLDP.

Syntax: int <*port-list*> poe-lldp-detect [enabled | disabled]

Enables or disables port(s) for allocating PoE power based on the link-partner's capabilities via LLDP. By default, PoE information detected through LLDP is ignored.
Default: Disabled

For example, you can enter this command to enable LLDP detection:

```
ProCurve(config)# int A7 poe-lldp-detect enabled
```

or in interface context:

```
ProCurve(eth-A7)# poe-lldp-detect enabled
```

Note Detecting PoE information via LLDP only affects power delivery; it does not affect normal Ethernet connectivity.

You can view the settings by entering the **show power-over-ethernet brief** command:

```
ProCurve(config)# show power-over-ethernet brief

 Status and Counters - Port Power Status

  PoE    | Power   LLDP     Power     Alloc PoE  Configured  Detection   Power
  Port   | Enable  Detect   Priority  By    Val  Type        Status      Class
  ------ + ------- -------- --------- ----- ---- ----------- ----------- ------
  A1     | Yes     enabled  low       usage  5   Phone-1     Delivering  0
  A2     | Yes     disabled low       usage 17                Searching   1
  A3     | Yes     disabled low       usage 17                Searching   0
  A4     | Yes     disabled low       usage 17                Searching   2
  A5     | Yes     disabled low       usage 17                Searching   0
  A6     | Yes     disabled low       value 17                Searching   0
  A7     | Yes     enabled  low       value  5   Phone-2     Delivering  0
  A8     | Yes     disabled low       value 17                Searching   0
```

Figure 11-1. Example of Port with LLDP Configuration Information Obtained from the Device

Controlling PoE Allocation

The default option for PoE allocation is **usage**, which is what a PD attached to the port is allocated (default is 17W). You can override this value by specifying the amount of power allocated to a port by using the **class** or **value** options.

Syntax: [no] int <port-list> poe-allocate-by [usage | class | value]

Allows you to manually allocate the amount of PoE power for a port by either its class or a defined value.

usage*: The automatic allocation by a PD*

class: *Uses the power ramp-up signature of the PD to identify which power class the device will be in. Classes and their ranges are shown in figure 11-2.*

value: *A user-defined level of PoE power allocated for that port.*

```
Class  Usage      Power Range (W)   Maximum Allowed with extra 15%
0      Default    0.44 to 12.95     12.95 * 1.15 = 14892 mW
1      Optional   0.44 to 3.84      3.84 * 1.15 = 4416 mW
2      Optional   3.84 to 6.49      6.49 * 1.15 = 7463 mW
3      Optional   6.49 to 12.95     12.95 * 1.15 = 14892 mW
4      Reserved

* Due to ramp-up requirements, an extra 15% is added in power allocation by
class.
```

Figure 11-2. Possible PD Class Detected with Ranges

For example, to allocate by class for ports A6 -A8:

```
ProCurve(config)# int A6-A8 poe-allocate-by class
```

Manually Configuring PoE Power Levels

You can specify a power level (in watts) allocated for a port, ranging from 1 to 17 watts in 1 watt increments, by using the **value** option.

To configure a port by value, first set the PoE allocation by entering the **poe-allocate-by value** command:

```
ProCurve(config)# int A6 poe-allocate-by value
```

or in interface context:

```
ProCurve(eth-A6)# poe-allocate-by value
```

Then select a value between 1 and 17:

```
ProCurve(config)# int A6 poe-value 15
```

or in interface context:

```
ProCurve(eth-A6)# poe-value 15
```

To view the settings, enter the **show power-over-ethernet** command:

```
ProCurve(config)# show power-over-ethernet A6

 Status and Counters - Port Power Status for port A6

  Power Enable      : Yes
                                        LLDP Detect       : enabled
  Priority          : low               Configured Type   :
  AllocateBy        : value             Value             : 15
  Detection Status  : Delivering        Power Class       : 0

  Over Current Cnt  : 0                 MPS Absent Cnt    : 0
  Power Denied Cnt  : 0                 Short Cnt         : 0

  Voltage           : 492 dV            Current           : 52 mA
  Power             : 14210 mW
```

Figure 11-3. Example Displaying PoE Allocation by Value

If you set the PoE maximum value to less than the PD requires, a fault occurs.

```
ProCurve(config)# int A7 poe-value 4

ProCurve(config)# show power-over-ethernet A7

 Status and Counters - Port Power Status for port A7

  Power Enable      : Yes
                                        LLDP Detect       : enabled
  Priority          : low               Configured Type   :
  AllocateBy        : value             Value             : 4
  Detection Status  : Other Fault       Power Class       : 0

  Over Current Cnt  : 0                 MPS Absent Cnt    : 0
  Power Denied Cnt  : 2                 Short Cnt         : 0

  Voltage           : 0 dV              Current           : 0 mA
  Power             : 0 mW
```

Figure 11-4. Example Showing PoE Power Value Set Too Low for the PD

Configuring Optional PoE Port Identifiers

The **Configured Type** field in the MIB allows you to configure a unique identifier for a PoE port that indicates the intended use for that port. Such identifiers are useful when viewing PoE status with the following commands:

show power-over-ethernet brief (page 11-26)

show power-over-ethernet *< port-list >* (page 11-28)

To configure a unique identifier for one or more PoE ports, use the switch's **setmib** command to change the identifier setting in the switch's MIB (Management Information Base), as described in the following steps.

1. Use the **walkmib pethPsePortType.< slot-# >** command to determine the MIB-based port number for the port to which you want to assign a Configured Type identifier. On the 8212zl switch the slot numbering is as follows:

Slot	Slot Number Used in the MIB
A	1
B	2
C	3
D	4
E	5
F	6

2. Use the **setmib pethPsePortType.*< slot-# >.< port-# >* -D *< identifier-string >*** command to configure the identifier you want for a specific port.

For example, suppose that you have a PoE Module installed in slot A and want to assign the identifier "Wireless-1" to port 5 in this slot. To do so, you would use the following commands:

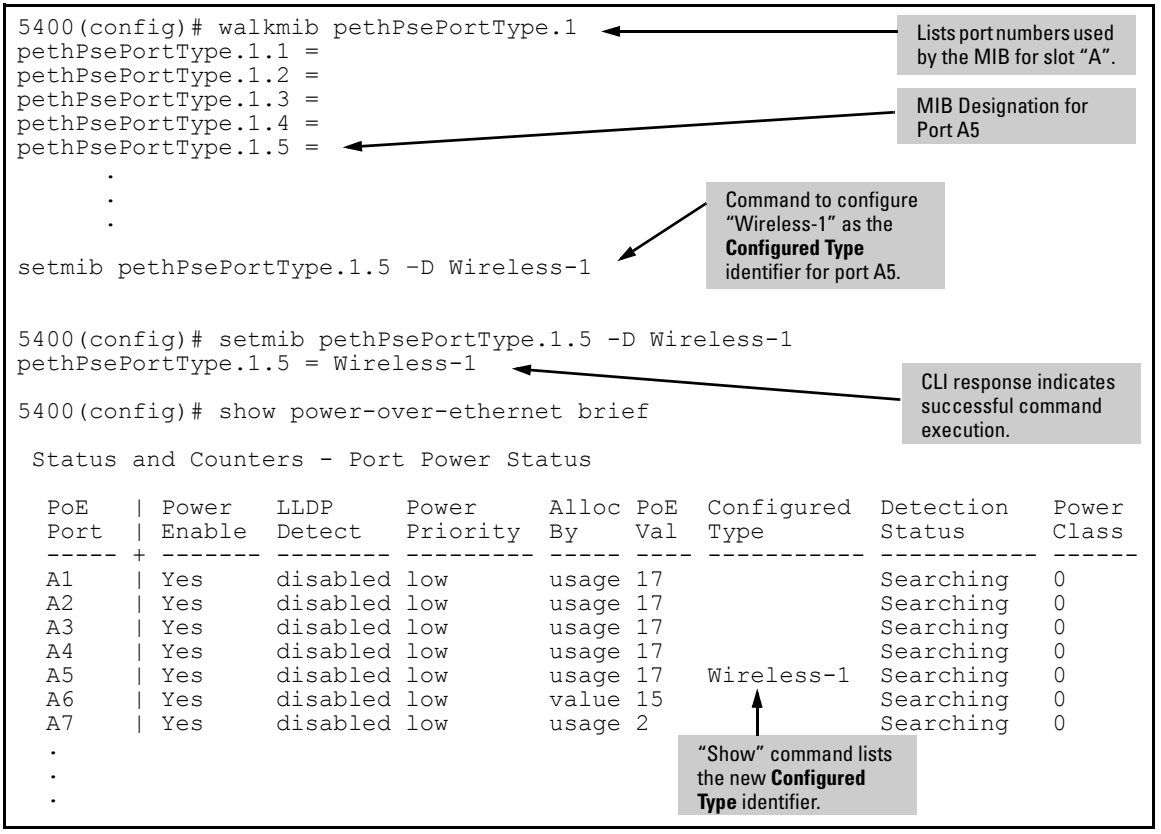

Figure 11-5. Example of Using the MIB to Configure a "Configured Type" Identifier for a Port

To remove a Configured Type identifier, use the setmib command with a blank space enclosed in quotes. For example, to return port A5 in the above figure to a null setting, use this command:

```
ProCurve(config)# setmib pethPsePortType.1.5 -D " "
```

For more on displaying PoE configuration and status, refer to "Viewing PoE Configuration and Status" on page 11-24.

Viewing PoE Configuration and Status

Displaying the Switch's Global PoE Power Status

Syntax: **s**how power-over-ethernet [brief | [ethernet] <port-list> |[slot <slot-id-range> | all>]]

Displays the switch's global PoE power status, including:

- **Total Provided Power:** *Lists the maximum PoE wattage available to provision active PoE ports on the switch. This is the amount of usable power for PDs.*
- **Total Failover Power:** *Lists the amount of PoE power available in the event of a single power supply failure.This is the amount of power the switch can maintain without dropping any PDs.*
- **Total Redundancy Power:** *Indicates the amount of PoE power that is held in reserve for redundancy in case of a power supply failure.*
- **Total Allocated Power***: The amount of power used by PDs.*

brief: *Displays PoE information for each port. See "Displaying PoE Status on All Ports" on page 11-26.*

<port-list>: *Displays PoE information for the ports in <port-list>. See "Displaying the PoE Status on Specific Ports" on page 11-28.*

<slot-id-range>: *Displays PoE information for the selected slots. (See figure 11-8). Enter the* **all** *option to display the PoE information for all slots.*

For example, **show power-over-ethernet** displays data similar to that in figure 11-6.

```
ProCurve(config)# show power-over-ethernet

 Status and Counters - System Power Status

  Pre-standard Detect    : On
  Power Redundancy       : none

 Chassis power-over-ethernet:

  Total Provided Power:    273 W
  Total Failover Power:      0 W
  Total Redundancy Power:    0 W
  Total Allocated Power:     0 W +/- 6W
```

Figure 11-6. Example of Show Power-Over-Ethernet Output

Displaying PoE Status on All Ports

Syntax: show power-over-ethernet brief

Displays the following port power status:

- **Port:** *Lists all PoE-capable ports on the switch.*
- **Power Enable:** *Shows* **Yes** *for ports enabled to support PoE (the default) and* **No** *for ports on which PoE is disabled.*
- **LLDP Detect:** *Displays if the port is enabled or disabled for allocating PoE power based on the link-partner's capabilities via LLDP* (**enabled**, **disabled**). *Not all PoE devices support LLDP, so PoE information is ignored by default.*
- **Priority:** *Lists the power priority (*Low, High, and Critical*) configured on ports enabled for PoE. (For more on this topic, refer to the power command description under "Configuring PoE Operation" on page 11-14.)*
- **Alloc by**: *Displays how PoE is allocated* **(usage, class, value)**
- **PoE Value:** *The maximum amount of PoE power allocated for that port (expressed in watts). Default: 17W*
- **Configured Type:** *If configured, shows the user-specified identifier for the port. If not configured, the field is empty. Refer to "Configuring Optional PoE Port Identifiers" on page 11-22.*
- **Detection Status:**
  - **Searching:** *The port is trying to detect a PD connection.*
  - **Delivering:** *The port is delivering power to a PD.*
  - **Disabled:** *On the indicated port, either PoE support is disabled or PoE power is enabled but the PoE module does not have enough power available to supply the port's power needs.*
  - **Fault:** *The switch detects a problem with the connected PD.*
- **Power Class:** *Shows the 802.3af power class of the PD detected on the indicated port. Classes include:*

  0: *0.44w to 12.95w*
  1: *0.44w to 3.84w*
  2: *3.84w to 6.49w*
  3: *6.49w to 12.95w*
  4: *reserved*

- **Other fault:** *The switch has detected an internal fault that prevents it from supplying power on that port.*

For example, **show power-over-ethernet brief** displays this output:

```
ProCurve(config)# show power-over-ethernet brief

 Status and Counters - Port Power Status

  PoE    | Power   LLDP     Power     Alloc PoE  Configured  Detection   Power
  Port   | Enable  Detect   Priority  By    Val  Type        Status      Class
  ------ + ------- -------- --------- ----- ---- ----------- ----------- ------
  A1     | Yes     enabled  low       usage  5   Phone-1     Delivering  0
  A2     | Yes     disabled low       usage 17                Searching   1
  A3     | Yes     disabled low       usage 17                Searching   0
  A4     | Yes     disabled low       usage 17                Searching   2
  A5     | Yes     disabled low       usage 17                Searching   0
  A6     | Yes     disabled low       value 17                Searching   0
  A7     | Yes     disabled low       value 17                Searching   0
  A8     | Yes     disabled low       value 17                Searching   0
```

Figure 11-7. Example of Show Power-Over-Ethernet Brief Output

You can also show the PoE information by slot:

```
ProCurve(config)# show power-over-ethernet slot A

 Status and Counters - System Power Status for slot A

  Maximum Power       : 273 W          Operational Status  : On
  Power In Use        :   0 W +/- 6 W  Usage Threshold (%) : 80
```

Figure 11-8. Showing the PoE Information by Slot

Displaying the PoE Status on Specific Ports

Syntax: show power-over-ethernet <*port-list*>

Displays the following PoE status and statistics (since the last reboot) for each port in <*port-list*>:

- **Power Enable:** *Shows* **Yes** *for ports enabled to support PoE (the default) and* **No** *for ports on which PoE is disabled. Note that for ports on which power is disabled, this is the only field displayed by* **show power-over-ethernet < *port-list* >**.
- **Priority:** *Lists the power priority (***Low**, **High**, and **Critical***) configured on ports enabled for PoE. (For more on this topic, refer to the power command description under "Configuring PoE Operation" on page 11-14.)*
- **Allocate by:** *How PoE is allocated* (**usage**, **class**, **value**)
- **Detection Status:**
  - **Searching:** *The port is available to support a PD.*
  - **Delivering:** *The port is delivering power to a PD.*
  - **Disabled:** *PoE power is enabled on the port but the PoE module does not have enough power available to supply the port's power needs.*
  - **Fault:** *The switch detects a problem with the connected PD.*
  - **Other Fault:** *The switch has detected an internal fault that prevents it from supplying power on that port.*
- **Over Current Cnt:** *Shows the number of times a connected PD has attempted to draw more than 15.4 watts. Each occurrence generates an Event Log message.*

Syntax: show power-over-ethernet <*port-list*> ***(Continued)***

- **Power Denied Cnt:** *Shows the number of times PDs requesting power on the port have been denied due to insufficient power available. Each occurrence generates an Event Log message.*
- **Voltage:** The total voltage, in dV, being delivered to PDs.
- **Power:** The total power, in mW, being delivered to PDs.
- **LLDP Detect:** *Port is enabled or disabled for allocating PoE power based on the link-partner's capabilities via LLDP*
- **Configured Type:** *If configured, shows the user-specified identifier for the port. If not configured, the field is empty. Refer to "Configuring Optional PoE Port Identifiers" on page 11-22.*
- **Value:** *The maximum amount of PoE power allocated for that port (expressed in watts). Default: 17W*
- **Power Class:** *Shows the power class of the PD detected on the indicated port. Classes include:*

  0: *0.44w to 12.95w* **2**: *3.84w to 6.49w* **4:** *reserved*
  1: *0.44w to 3.84w* **3**: *6.49w to 12.95w*

- **MPS Absent Cnt:** *This value shows the number of times a detected PD has no longer requested power from the port. Each occurrence generates an Event Log message. ("MPS" refers to the "Maintenance Power Signature." Refer to "PoE Terminology" on page 11-4.)*
- **Short Cnt:** *Shows the number of times the switch provided insufficient current to a connected PD.*
- **Current:** *The total current, in mA, being delivered to PDs.*

For example, if you wanted to view the PoE status of ports A6 and A7, you would use **show power-over-ethernet A6-A7** to display the data:

```
ProCurve(config)# show power-over-ethernet A6-A7

 Status and Counters - Port Power Status for port A6

  Power Enable      : Yes
                                      LLDP Detect       : enabled
  Priority          : low             Configured Type   :
  AllocateBy        : value           Value             : 17
  Detection  Status : Delivering      Power Class       : 0

  Over Current Cnt  : 0               MPS Absent Cnt    : 0
  Power Denied Cnt  : 0               Short Cnt         : 0

  Voltage           : 492 dV          Current           : 52 mA
  Power             : 14210 mW

 Status and Counters - Port Power Status for port A7

  Power Enable      : yes
                                      LLDP Detect       : disabled
  Priority          : low             Configured Type   :
  AllocateBy        : value           Value             : 17
  Detection  Status : Searching       Power Class       : 0

  Over Current Cnt  : 0               MPS Absent Cnt    : 0
  Power Denied Cnt  : 0               Short Cnt         : 0

  Voltage           : 0 dV            Current           : 0 mA
  Power             : 0 mW
```

Figure 11-9. Example of Show Power-Over-Ethernet < *port-list* > Output

Displaying Information about Power Supplies

If you want to know information about the power supplies, enter this command:

Syntax: show chassis-power-supply

Displays the power information for each power supply in the chassis.

```
ProCurve(config)# show chassis-power-supply

Power Supply Status:
 PS# |   State     | AC/DC  + V | Wattage
 ----+-------------+------------+---------
   1 | Powered     | AC 120VDL  |  875
   2 | Not Present | -- ----    |    0


   1 /  2 supply bays delivering power.
```

Figure 11-10. Displaying Information about the Power Supplies

Planning and Implementing a PoE Configuration

This section provides an overview of some considerations for planning a PoE application. For additional information on this topic, refer to the *ProCurve PoE Planning and Implementation Guide* which is available on the ProCurve Networking web site at **www.procurve.com**. (Click on **technical support**, then **Product manuals (all)**).

Some of the elements you may want to consider for a PoE installation include:

- Port assignments to VLANs
- Use of security features
- Power requirements

This section can help you to plan your PoE installation. If you use multiple VLANs in your network, or if you have concerns about network security, you should read the first two topics. If your PoE installation comes close to (or is likely to exceed) the system's ability to supply power to all devices that may request it, then you should also read the third topic. (If it is unlikely that your installation will even approach a full utilization of the PoE power available, then you may find it unnecessary to spend much time on calculating PoE power scenarios.)

Assigning PoE Ports to VLANs

If your network includes VLANs, you may want to assign various PoE-configured ports to specific VLANs. For example, if you are using PoE telephones in your network, you may want to assign ports used for telephone access to a VLAN reserved for telephone traffic.

Applying Security Features to PoE Configurations

You can utilize security features built into the switch to control device or user access to the network through PoE ports in the same way as non-PoE ports.

- **MAC Address Security:** Using Port Security, you can configure each switch port with a unique list of MAC addresses for devices that are authorized to access the network through that port. For more information, refer to the chapter titled "Configuring and Monitoring Port Security" in the *Access Security Guide* for your switch.
- **Username/Password Security:** If you are connecting a device that allows you to enter a username and password that is forwarded to a networked server for authentication, then you can also configure the following security features:
  - Local username and password
  - TACACS+
  - RADIUS Authentication and Accounting
  - 802.1X Authentication

For more information on security options, refer to the latest edition of the *Access Security Guide* for your switch. (The ProCurve Networking web site offers the latest version of all ProCurve product publications. Refer to "Getting Documentation From the Web" on page 1-6.)

Assigning Priority Policies to PoE Traffic

You can use the configurable QoS (Quality of Service) features in the switch to create prioritization policies for traffic moving through PoE ports. Table 11-3 lists the available classifiers and their order of precedence.

Table 11-3. Classifiers for Prioritizing Outbound Packets

Priority	QoS Classifier
1	UDP/TCP Application Type (port)
2	Device Priority (destination or source IP address)
3	IP Type of Service (ToS) field (IP packets only)
4	VLAN Priority
5	Incoming source-port on the switch
6	Incoming 802.1p priority (present in tagged VLAN environments)

For more on this topic, refer to the chapter titled "Quality of Service: Managing Bandwidth More Effectively" in the *Advanced Traffic Management Guide* for your switch.

Calculating the Maximum Load for a PoE Module

The maximum power available for a PoE module depends on the type of power supplies used. ProCurve recommends that if you use more than one power supply, use the same type of power supplies in your PoE implementation, that is, two J8712A power supplies supplying 273 watts each for a total of 546 watts of PoE power, or two J8713A power supplies supplying 900 watts of PoE power each for a total of 1800 watts of PoE power.

When you connect the first PD to a PoE port, the PoE module must have a minimum of 17 watts of PoE power available in order to detect and supply power to the device. Each PoE module is allocated a minimum of 22 watts of PoE power—17 watts for detection and additional 5 watts for variations in any applied power loads. Depending on the amount of power the power supply device delivers to a specific PoE module, there may or may not always be enough power available to connect and support PoE operation on all 24 Gig-T ports in a PoE module. PoE power is "available" if it is either not currently in use or can be acquired by (automatically) removing PoE power from another, lower-priority port.

After an appliance is connected to a PoE port, the switch reduces the power requirement for that port from the initial 17 watts to the actual power level the appliance requires.

Thus, after you have connected all but the last planned appliance to a PoE module, there must be a minimum of 17 watts of unused PoE power available on the module to support adding the final appliance. If you are using one J8712A power supply powering one PoE module only (all 273 watts are available to that module), the power is calculated as follows:

n= the total number of appliances you want to connect to one PoE module

and

w = the total PoE power required to operate (***n*** - 1) appliances

then, the following must be true:

$$\mathbf{W + 17 \leq 273}$$

or

$$\mathbf{(273 - 17) \geq W}$$

Therefore, you can power 17 ports at full power (273 watts - 17 watts = 256 watts ÷ 15.4 watts per port = 16.6 + 1 ports). In actual practice, the PD will mostly likely use less than 15.4 watts of PoE power, allowing you to attach more than 17 PDs.

For example, suppose you have 24 identical appliances to connect to a PoE module receiving 273 watts of PoE power. For this example, each appliance requires 8.5 watts to operate. In this case, the module would support 24 appliances at any given time because there is enough unused power to meet the minimum of 17 watts required to support the initial power-up of the 24th appliance. That is, 273 - (24 x 8.5) = 69 watts of unused power.

When a Power Supply Fails

You must have two power supplies installed to maintain at least some amount of PoE power or to keep the switch itself operational if one power supply fails. If you have two J812A power supplies installed supplying 273 watts of PoE power each (total = 546 watts), then 273 watts of PoE power will be available to continue supplying PoE power to ports in priority order if one supply fails.

If you have two J8713A power supplies installed supplying 900 watts of PoE power each (total =1800 watts), then 900 watts of PoE power will be available to continue supplying PoE power to ports in priority order if one power supply fails.

If you have a mixed power supply configuration with one J8712A power supply supplying 273 watts of PoE power, and one J8713A power supply supplying 900 watts of PoE power, a total of 1173 watts of PoE power is available. If a power supply fails, the switch will continue to supply 273 watts of PoE power to the ports with the highest priority (if all ports are the same priority level, power is allocated to the lowest port number first) and power down any ports using power above the total of 273 watts. The switch then determines which power supply actually failed, the larger J8713A or the smaller J8712A. If the smaller power supply failed, the switch restores power to the ports in priority order until the available 900 watts is used.

If the larger J8713A power supply fails, then only 273 watts of PoE power is available and the other ports remain shut down in priority order.

For additional information about planning your PoE configuration, refer to the *PoE Planning and Implementation Guide*, which is available from the ProCurve Networking web site at **www.procurve.com**. (Click on **technical support**, then **Product manuals (all)**.)

PoE Operating Notes

- It is important to remember that power is allocated dynamically between PoE modules, with 22 watts of power allocated to each PoE module in each slot. This ensures that 17 watts of PoE power is available for the initial power-up of the last PD connected. The additional 5 watts smooth out any power fluctuations. To best utilize the allocated PoE power, spread your connected PoE devices as evenly as possible across modules.
- To cycle the power on a PD receiving power from a PoE port on the switch, disable, then re-enable the power to that port. For example, to cycle the power on a PoE device connected to port 1 on a PoE module installed in slot D:

  ```
  ProCurve(config)# no interface d1 power-over-ethernet
  ProCurve(config)# interface d1 power-over-ethernet
  ```

- Disabling all PoE ports in a module allows you to recover the 22 watts of PoE power allocated to the module for use in other modules. You must disable ALL ports in the module for this to occur.

PoE Event Log Messages

PoE operation generates these Event Log messages. You can also configure the switch to send these messages to a configured debug destination (terminal device or SyslogD server).

"Informational" PoE Event-Log Messages

Message	Meaning
`I` < *MM/DD/YY* > < *HH:MM:SS* > <chassis | ports>	Message header, with severity, date, system time, and system module type (chassis or ports). For more information on Event Log operation, including severity indicators, refer to "Using the Event Log for Troubleshooting Switch Problems" on page C-27
`Slot` <*slot-id*> `POE usage is below configured threshold of` < 1 - 99 > `%`	Indicates that POE usage on the module in the indicated slot has decreased below the threshold specified by the last execution of the power threshold command affecting that module. This message occurs if, after the last reboot, the PoE demand on the module exceeded the power threshold and then later dropped below the threshold value.
`port` <*port-id*> `applying power to PD`	A PoE device is connected to the indicated port and receiving power.
`port` <*port-id*> `PD detected`	The switch has detected a PoE device connected to the indicated port.
`Slot` <*slot-id*> `software update started on PoE controller` <controller-id>	A module needs to have its PoE firmware updated and the software begins the update process. On ProCurve 8212zl switches the controller-id is always "1"
`Slot` <*slot-id*> `software update completed on PoE controller` <controller-id>	A module has its PoE firmware updated and the software has finished this process.

"Warning" PoE Event-Log Messages

Message	Meaning
`W <MM/DD/YY> <HH:MM:SS> chassis`	Message header, with severity, date, system time, and system module type. For more information on Event Log operation, including severity indicators, refer to "Using the Event Log for Troubleshooting Switch Problems" on page C-27".
`Slot <slot-id> POE usage has exceeded threshold of <1 - 99> %`	Indicates that POE usage in the indicated slot has exceeded the configured threshold for the module, as specified by the last execution of the power threshold or power slot < *slot-id* > threshold command. (Note that the switch also generates an SNMP trap for this event.)
`Port <port-id> PD Denied power due to insufficient power allocation.`	There is insufficient power available to power the PD on the indicated port and the port does not have sufficient PoE priority to take power from another active PoE port.
`Port <port-id> PD Invalid Signature indication`	The switch has detected a non-802.3af-compliant device on the indicated port. This message appears for all non-802.3af devices connected to the port, such as other switches, PC-NICs, etc.
`Port <port-id> PD MPS Absent indication`	The switch no longer detects a device on < port-id >. The device may have been disconnected, powered down, or stopped functioning.
`Port <port-id> PD Other Fault indication`	There is a problem with the PD connected to the port.
`Port <port-id> PD Over Current indication`	The PD connected to < port-id > has requested more than 15.4 watts of power. This may indicate a short-circuit or other problem in the PD.
`50v Power Supply is faulted. Failures:x`	Internal power supply has faulted.
`50v Power Supply is OK. Failures:x`	Internal power supply is now OK.