



Power over Ethernet (PoE) Support

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Note

- For information about switching modules that support PoE, see the *Release Notes for Cisco IOS Release 15.0SY* publication at this URL:
http://www.cisco.com/en/US/docs/switches/lan/catalyst6500/ios/15.0SY/release_notes.html
- For complete syntax and usage information for the commands used in this chapter, see these publications:
http://www.cisco.com/en/US/products/ps11845/prod_command_reference_list.html



Tip

For additional information about Cisco Catalyst 6500 Series Switches (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/switches/ps708/tsd_products_support_series_home.html

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Prerequisites for PoE

None.

Restrictions for PoE

PoE is supported only on Layer 2 switchports.

Information About PoE

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Device Roles

- Power sourcing equipment (PSE)—A device that provides power through a twisted-pair Ethernet connection. The switch, through switching modules equipped with Power over Ethernet (PoE) daughtercards, functions in the PSE role.
- Powered device (PD)—A device powered by a PSE (for example, IP phones, IP cameras, and wireless access points).



Note

Not all PoE-capable devices are powered from the switch. There are two sources of local power for PoE-capable devices:

- A power supply connected to the device.
- A power supply through a patch panel over the Ethernet connection to the device.

When a locally powered PoE-capable device is present on a switching module port, the switching module itself cannot detect its presence. If the device supports CDP, the supervisor engine can discover a locally powered PoE-capable device through CDP messaging with the device. If a locally powered PoE-capable device loses local power, the switching module can discover and supply power to the IP phone if the inline power mode is set to **auto**.

PoE Overview

Cisco PoE daughtercards support one or more PoE implementation:

- IEEE 802.3af standard.
 - Supported with the WS-F6K-48-AF PoE daughtercard and the PoE daughtercard on the WS-X6148E-GE-45AT switching module.
 - Maximum 16.80 W at the PSE.
 - The IEEE 802.3af PoE standard defines a method to sense a PD and to immediately classify the power requirement of the PD into these per port power ranges at the PSE:
 - Class 0: Up to 15.4 W (0.44–12.95 W at the PD; default classification)
 - Class 1: Up to 4 W (0.44–3.84 W at the PD)
 - Class 2: Up to 7 W (3.84–6.49 W at the PD)
 - Class 3: Up to 15.4 W (6.49–12.95 W at the PD)
- Cisco prestandard inline power—10 W at the PSE.

With a PoE daughtercard installed, a switching module can automatically detect and provision a PoE-capable device that adheres to a PoE implementation supported by the PoE daughtercard. The switching module can supply power to devices supporting other PoE implementations only through manual configuration.

Only a PD connected directly to the switch port can be powered from the switch. If a second PD is daisy-chained from the PD that is connected to the switch port, the second PD cannot be powered by the switch.

Each PD requires power to be allocated from the chassis power budget. Because each PD can have unique power requirements, more devices can be supported if the system's power management software can intelligently allocate the necessary power on a per-port basis.

You can configure ports to allocate power at a level based on the following:

- If a PD is detected, with auto mode configured:
 - Information sensed from the device
 - A default level
 - A configured maximum level
- Whether or not a PD is present on the port, with static mode configured:
 - A default level
 - A configured level

CPD-Based PoE Management

When a switching module port detects an unpowered PD, the default-allocated power is provided to the port. When the correct amount of power is determined through CDP messaging with the PD, the supervisor engine reduces or increases the allocated power, up to the hardware limit of the installed PoE daughtercard.



Caution

When a PD cable is plugged into a port and the power is turned on, the supervisor engine has a 4-second timeout waiting for the link to go up on the line. During those 4 seconds, if the IP phone cable is unplugged and a network device is plugged in, the network device could be damaged. We recommend that you wait at least 10 seconds between unplugging a network device and plugging in another network device.

Inline Power IEEE Power Classification Override

The IEEE 802.3af standard contains no provision for adjustment of the power allocation. 802.3af-compliant PDs that support CDP can use CDP to override the IEEE 802.3af power classification.

The WS-F6K-48-AF PoE daughtercard or the PoE daughtercard on the WS-X6148E-GE-45AT switching module support these inline power IEEE 802.3af power classification override features:

- Power use measurement—The ability to accurately measure the power provided by the port to the powered device.
- Power policing—The ability to monitor power usage on a port.

With power measurement and policing, you can safely override the IEEE 802.3af power classification of a device that requires a power level at the lower end of its IEEE power classification range.

PoE monitoring and policing compares the power consumption on ports with the administrative maximum value (either a configured maximum value or the port's default value). If the power consumption on a monitored port exceeds the administrative maximum value, the following actions occur:

- A syslog message is issued.
- The monitored port is shut down and error-disabled.
- The allocated power is freed.

How to Configure PoE Support

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- [Configuring Per-Port PoE Support, page 18-4](#)
- [Configuring PoE Monitoring and Policing, page 18-5](#)

Displaying PoE Status

This example shows how to display the PoE status on switch:

```
Router# show power auxiliary
system auxiliary power mode = on
system auxiliary power redundancy operationally = redundant
system primary connector power limit = 7266.00 Watts (173.00 Amps @ 42V)
system auxiliary connector power limit = 10500.00 Watts (250.00 Amps @ 42V)
system primary power used = 1407.00 Watts (33.50 Amps @ 42V)
system auxiliary power used = 22.68 Watts ( 0.54 Amps @ 42V)

      Inline      Inline-Pwr      Inline-Pwr      VDB
      Pwr-Limit   Used-Thru-Pri   Used-Thru-Aux   Aux-Pwr
Slot Card-Type   Watts   A @42V Watts   A @42V Watts   A @42V Capable
-----
2   WS-F6K-48-AT   1600.20 38.10   23.10 0.55   11.34 0.27   Yes
4   WS-F6K-48-AT   1600.20 38.10   23.10 0.55   11.34 0.27   Yes
-----
Totals:                               46.20 1.10   22.68 0.54
```

Configuring Per-Port PoE Support

To configure per-port PoE support, perform this task:

	Command	Purpose
Step 1	Router(config-if)# power inline { auto static never } [max <i>milliwatts</i>]	Configures per-port PoE support and optionally specifies a maximum inline power level in milliwatts for the port.
Step 2	Router# show power inline { <i>type slot/port</i> <i>module slot</i> } [detail]	Verifies the configuration.

When configuring inline power support with the **power inline** command, note the following information:

- To configure auto-detection of a PD and PoE auto-allocation, enter the **auto** keyword.
- To configure auto-detection of a PD but reserve a fixed PoE allocation, enter the **static** keyword.

- To specify the maximum power to allocate to a port, enter either the **auto** or **static** keyword followed by the **max** keyword and the power level in milliwatts.
- When the **auto** keyword is entered and CDP is enabled on the port, a PD that supports CDP can negotiate a different power level.
- To disable auto-detection of a PD, enter the **never** keyword.
- With a WS-F6K-GE48-AF, WS-F6K-48-AF, or the PoE daughtercard on the WS-X6148E-GE-45AT switching module:
 - The configurable range of maximum power using the **max** keyword is 4000 to 16800 milliwatts. If no maximum power level is configured, the default maximum power is 15400 milliwatts.



Note To support a large number of inline-powered ports using power levels above 15400 milliwatts on an inline power card, we recommend using the **static** keyword so that the power budget is deterministic.

- When the **auto** keyword is entered and CDP is enabled on the port, an inline-powered device that supports CDP can negotiate a power level up to 16800 milliwatts unless a lower maximum power level is configured.

This example shows how to disable inline power on GigabitEthernet port 2/10:

```
Router# configure terminal
Router(config)# interface gigabitethernet 2/10
Router(config-if)# power inline never
```

This example shows how to enable inline power on GigabitEthernet port 2/10:

```
Router# configure terminal
Router(config)# interface gigabitethernet 2/10
Router(config-if)# power inline auto
```

This example shows how to verify the inline power configuration on GigabitEthernet port 2/10:

```
Router# show power inline gigabitethernet 2/10
Interface Admin Oper Power Device
          (Watts)
-----
Fa5/1     auto on      6.3  cisco phone device
Router#
```

Configuring PoE Monitoring and Policing

With the WS-F6K-48-AF PoE daughtercard or the PoE daughtercard on the WS-X6148E-GE-45AT switching module, to configure PoE monitoring and policing, perform this task:

	Command	Purpose
Step 1	Router(config-if)# power inline police	Enables PoE monitoring and policing.
Step 2	Router# show power inline {type slot/port module slot}[detail]	Verifies the configuration.

This example shows how to enable monitoring and policing on GigabitEthernet port 1/9:

```
Router# configure terminal
Router(config)# interface gigabitethernet 2/10
```

```
Router(config-if)# power inline police
```

These examples show how to verify the power monitoring and policing configuration on GigabitEthernet port 2/10:

```
Router# show power inline gigabitethernet 2/10 detail | include Police
Police: on
Router#
Router# show power inline gigabitethernet 2/10
Interface Admin Oper Power (Watts) Device Class
          -----
          Gi2/10 auto on 17.3 15.4 Ieee PD 3

Interface AdminPowerMax (Watts) Police ActualConsumption
-----
Gi2/10 15.4 on 5.7
Router#
```

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