

Chapter 11

Power over Ethernet (PoE)

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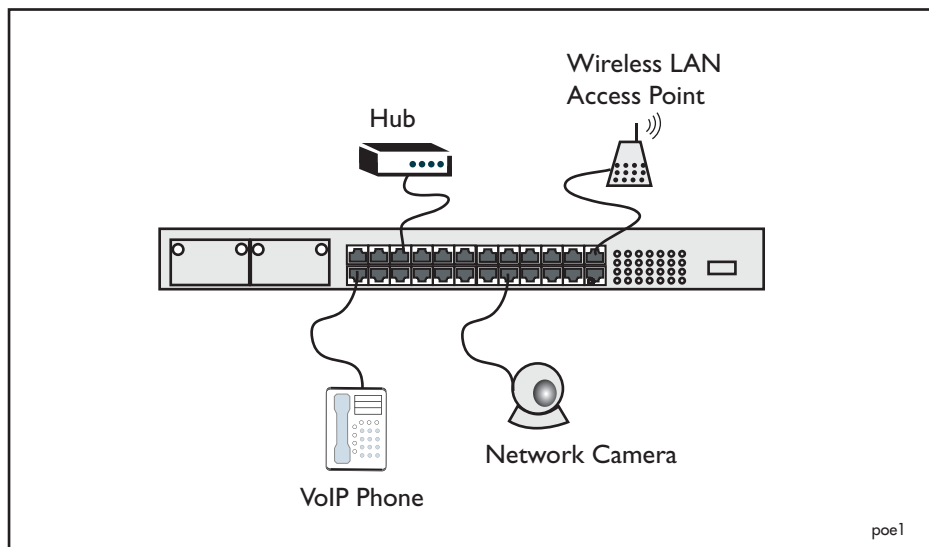
Introduction

Power Over Ethernet (PoE) is a mechanism for supplying power to network devices over the same cabling used to carry network traffic. PoE allows devices that require power, called **Powered Devices (PDs)**, such as IP telephones, wireless LAN Access Points and network cameras, to receive power in addition to data over your existing infrastructure without needing to upgrade it. This feature can simplify network installation and maintenance by allowing you to use the switch as a central power source for other network devices.

A device that can source power such as an Ethernet switch is termed as **Power Sourcing Equipment (PSE)**. Power Sourcing Equipment can provide power along with data over existing LAN cabling as long as the Powered Device is connected and needs power.

PSE and PD functionality is specified in the IEEE 802.3af standard, which is an amendment to the existing IEEE 802.3 standards.

Figure 11-1: Examples of powered devices you can use with your PoE switch



Benefits of PoE There are several benefits that the PoE feature of the switch adds to the installation and maintenance of your network.

- The IEEE 802.3af standard describes two methods for implementing PoE over twisted pair cabling. One method uses the same cables that carry the network traffic and the other the spare strands. The PoE implementation on the AT-8624PoE switch transmits power over the same strands that carry the network traffic (strands 1, 2, 3 and 6). This power transfer does not interfere with the network traffic, and means that power and the network traffic can coexist on the same strands simultaneously.
- PoE can simplify the installation of your network. The selection of a location for a network device is often limited by whether there is a power source nearby. This often limits equipment placement or requires the added time and cost of having additional electrical sources installed. With PoE, you can install PoE-compatible devices wherever they are needed without having to worry about whether there are power sources nearby.

- PoE requires little configuration or management. The switch automatically determines whether a device connected to a port is a powered device or not. A port on the switch connected to a powered device can supply up to 15.4 watts of power to the device, while at the same time providing standard 10/100 Mbps Ethernet functionality. A port connected to a network node that is not a powered device (that is, a device that receives its power from another power source) functions as a regular Ethernet port, without PoE. The PoE feature remains activated on the port but no power is delivered to the device.

Power Capacity

The AT-8624PoE switch can provide a maximum of 15.4 W per port on Ports 1 to 24.

PoE is not supported on expansion modules.

In the default configuration, the switch can provide the maximum of 15.4 W to all 24 ports for a total power capability of 370 W, which is below the maximum available.

The fact that the maximum power requirement falls below the maximum amount of power available means that you can connect powered devices to all the ports on the switch (excluding optional expansion ports) without having to be concerned about exceeding the available power, even if all the powered devices require the maximum of 15.4 W.

You can disable PoE on a per-port basis using the **disable poe port** command. You can also reduce the maximum amount of power a port can source, from the maximum of 15.4 W, using the command:

```
set poe [{port=port-list|ALL}] [priority=low|high|critical]
      [powerlimit=value]
```

However, configuring the power limit on the switch will probably not be necessary. As already mentioned, the power supply in the switch can provide enough power to meet the needs of all 24 base ports, even if all are connected to power devices requiring the maximum of 15.4 W. Additionally, since a switch port can automatically determine whether or not the device connected to it is PoE-compliant, and if it is, how much power is required, there should be little need for you to configure PoE at all.

Port Prioritisation

Port prioritisation is the way in which the switch determines which ports are to receive PoE in the event that the needs of the powered devices exceeds the available power resources of the switch. The AT-8624PoE switch prioritises power to the ports without the need for user intervention.

This discussion does not apply to the AT-8624PoE switch since its power supply can deliver the maximum of 15.4 W to all 24 based ports simultaneously.

This discussion becomes relevant only if, at some later date, Allied Telesis releases an AT-8600 Series switch with PoE capability that has a power supply that cannot service all ports simultaneously.

If the powered devices connected to a switch require more power than the switch is capable of delivering, the switch will deny power to some ports based on a system called port prioritisation. You can use port prioritisation to ensure that powered devices critical to the operations of your network are given preferential treatment by the switch in the distribution of power, should the demands of the devices exceed the available capacity.

There are three priority levels:

- Critical
- High
- Low

You can set the port priority using the command:

```
set poe [{port=port-list|ALL}] [priority=low|high|critical]
      [powerlimit=value]
```

You can see the priority set on a particular port by entering a port number in the command:

```
show poe port=n
```

Critical is the highest priority level. Ports set to this level are guaranteed power before any ports assigned to the other two priority levels. Ports assigned to the other priority levels receive power only if all the Critical ports are receiving power. Your most critical powered devices should be assigned to this level. If there is not enough power to support all the ports set to the Critical priority level, power is provided to the ports based on port number, in ascending order.

High is the second highest level. Ports set to this level receive power only if all the ports set to the Critical level are already receiving power. If there is not enough power to support all of the ports set to the High priority level, power is provided to the ports based on port number, in ascending order.

Low is the lowest priority level. This is the default setting. Ports set to this level only receive power if all the ports assigned to the other two levels are already receiving power. As with the other levels, if there is not enough power to support all of the ports set to the Low priority level, power is provided to the ports based on port number, in ascending order.

Power allocation is dynamic. Ports supplying power to powered devices may cease power transmission if the switch's power capacity has reached maximum usage and new powered devices, connected to ports with a higher priority, become active.

PoE Device Classes

The IEEE 802.3af standard specifies classes for powered devices based on power usage. These are:

Table 11-1: PoE device classes

Class	Power usage
0	0.44 W to 12.95 W
1	0.44 W to 3.84 W
2	3.84 W to 6.49 W
3	6.49 W to 12.95 W
4	Reserved for future use.

You can view the class of a powered device by using the **show poe** command set on a particular port by entering a port number in the command:

```
show poe port=n
```

Although the IEEE standard defines the maximum amount of power supplied by a port to be 15.4 W, in practice, due to power loss in the cable itself, the maximum power available to a powered device is limited to approximately 12.95 W. Some power is likely to be lost in the twisted pair cable as the current travels from the switch to the device. For those devices needing 12.95 W, the extra watts act as compensation for this possible loss.

PoE Threshold

The switch sends an SNMP trap to your management workstation and enters an event in the event log whenever the total power requirements of the powered devices exceeds the specified percentage of the total maximum power available on the switch. At the default setting of 95%, the switch sends an SNMP trap when the PoE devices require more than 95% of the maximum available power on the switch.

You can adjust the threshold using the command:

```
set poe threshold=value
```

For your management workstations to receive traps from the switch, you must configure SNMP on the switch by specifying the IP address of the workstations.

The switch will also enter an event in the event log whenever power consumption of the switch has gone below the power limit threshold.

Upgrading PoE Firmware

You can upgrade the version of PoE firmware that your system uses by entering the **set poe firmware** command. This command downloads PoE firmware to the PoE Controller.

Your switch must already have a valid firmware file with the extension .s19 present in its flash. If it does not, you can download one to the flash using the **load command on page 5-31 of Chapter 5, Managing Configuration Files and Software Versions.**

The switch prompts you for confirmation before it begins upgrading the firmware. The upgrade may take a while to complete, depending on the size of your firmware file.



You must not restart the switch while the firmware upgrade is in progress. If you restart the switch, the firmware upgrade will terminate abruptly, which will corrupt the firmware and cause PoE operations to fail in the subsequent startup.

During the upgrade the following limitations apply:

- PoE commands do not execute.
- You cannot use any PoE ports for powered devices, as Power over Ethernet is temporarily disabled. However, any non-powered devices that are connected to PoE ports will continue to operate normally.
- You should avoid deleting, re-naming, or copying any files.

All PoE configurations are restored once the upgrade has successfully completed. You do not need to reconfigure POE or restart the switch for the new firmware to take effect.

Command Reference

This section describes the commands available for configuring and monitoring PoE on the switch.

See [“Conventions” on page xxxviii of About this Software Reference](#) for additional conventions used to describe command syntax. See [Appendix A, Messages](#) for a complete list of messages and meanings.

disable poe debug

Syntax `DISable POE DEBug [= {ALL | DEBug | TRAcE | ERRor | FATal | TEST}]`

Description This command disables the specified PoE debugging modes.

Parameter	Value	Description
DEBug	Use the debug parameter to specify the debugging modes to disable.	
	ALL	Disables all PoE debugging
	DEBug	
	TRAcE	Disables high-level, essential debugging, for example, information about message types
	ERRor FATal	Disables debugging of any error conditions that may occur during PoE operation.
	TEST	Disables test debugging mode
Default: all		

Examples To disable all PoE debugging, use one of the commands:

```
dis poe deb=all
```

```
dis poe debug=deb
```

To disable high-level, essential debugging, use the command:

```
dis poe deb=tra
```

See Also [enable poe debug](#)
[show poe](#)

disable poe port

Syntax `DISable POE [Port={port-list | ALL}]`

where *port-list* is a port number, a range of port numbers (specified as n-m), or a comma-separated list of port numbers and/or ranges. Port numbers start at 1 and end at 24.

Description This command disables PoE on a port. The port continues to provide standard Ethernet connectivity even when PoE is disabled. PoE is enabled by default.

The **port** parameter specifies a port number, a range of port numbers (specified as n-m), or a comma-separated list of port numbers and/or ranges. Specify **all** to disable PoE on all ports.

Example To disable PoE on ports 5 and 7, use the command:

```
dis poe po=5,7
```

Related Commands [enable poe port](#)

enable poe debug

Syntax `ENable POE DEBug [= {ALL | DEBug | TRAcE | ERRor | FATal | TEST}]`

Description This command enables the specified PoE debugging modes.

Parameter	Value	Description
DEBug	Use the debug parameter to specify the debugging modes to enable.	
	ALL	Enables all PoE debugging
	DEBug	
	TRAcE	Enables high-level, essential debugging, for example, information about message types
	ERRor FATal	Enables debugging of any error conditions that may occur during PoE operation.
	TEST	Enables test debugging mode
Default: No debugging is enabled		

Example To enable error debugging, use one of the commands:

```
ena poe deb=err
```

```
ena poe deb=fat
```

See Also [disable poe debug](#)
[show poe](#)

enable poe port

Syntax `ENABle POE [Port={port-list|ALL}]`

This command enables PoE on a port. PoE is enabled by default.

The **port** parameter specifies a port number, a range of port numbers (specified as n-m), or a comma-separated list of port numbers and/or ranges. Port numbers start at 1 and end at 24. The **all** parameter enables PoE on all ports.

Example To enable PoE on port 2, use the command:

```
ena poe po=2
```

Related Commands [disable poe port](#)

set poe detect

Syntax `SET POE DETect={IEEE|LEGacy}`

Parameter	Value	Description
DETect	The power detection mode.	
	IEEE	IEEE standard detection is enabled according to the IEEE 802.3af standard, in which a valid resistance and capacitance is used for detecting a valid powered device.
	LEGacy	Legacy mode. IEEE mode is implemented first and, if it fails, Legacy detection is used, where a large capacitance value is used to detect a legacy powered device.
	Default: ieee	

Example To set the detection mode to IEEE, use the command:

```
set poe det=ieee
```

Related Commands [set poe port](#)
[set poe threshold](#)
[show poe](#)

set poe firmware

Syntax SET POE FIRMware=*filename*

where *filename* is the name of a valid firmware file that is already present in the flash. A valid firmware file must be either Version 2.9.0 or 5.0.1, and have the extension .s19.

Description This command upgrades the PoE firmware in the PoE Controller, if the switch finds valid PoE firmware in its flash. Firmware is downloaded to the flash using the [load command on page 5-31 of Chapter 5, Managing Configuration Files and Software Versions](#).

The switch prompts you for confirmation before it begins upgrading the firmware. The upgrade may take a while to complete, depending on the size of your firmware file.



You must not restart the switch while the firmware upgrade is in progress. If you restart the switch, the firmware upgrade will terminate abruptly, which will corrupt the firmware and cause PoE operations to fail in the subsequent startup.

During the upgrade the following limitations apply:

- Other PoE commands do not execute.
- You cannot use any PoE ports for powered devices, as Power over Ethernet is temporarily disabled. However, any non-powered devices that are connected to PoE ports will continue to operate normally.
- You should avoid deleting, re-naming, or copying any files.

All PoE configurations are restored once the upgrade has successfully completed. You do not need to reconfigure POE or restart the switch for the new firmware to take effect.

The new firmware version is permanently stored in the PoE hardware. This remains in the PoE hardware even if you delete the .sig file from flash memory.

Example To download the PoE firmware file v2.9.0 to the PoE Controller, use the command:

```
set poe firm=pol30k.s19
```

Related commands [show poe version](#)

set poe port

Syntax SET POE [{Port=*port-list*|ALL}] [POWERlimit=*value*]
[PRIOrity=LOW|HIGH|CRITICAL]

Description This command sets the PoE settings on a port.

Parameter	Description
Port	Sets PoE on a specific port number, a range of port numbers (specified as n-m), or a comma-separated list of port numbers and/or ranges. Port numbers start at 1 and end at 24. Specifying all sets PoE on all ports.
POWERlimit	The maximum amount of power a powered device can draw from the port. Default: 15400mW (15.4W)
PRIOrity	Determines which ports receive PoE when powered device consumption exceeds the available power resources of the switch. One of Low , High , or Critical . Default: Low

When an individual port powerlimit is set, an additional margin of approximately 400mW is provided to allow for line loss.

Examples To set the priority on ports 6 and 11 to high, use the command:

```
set poe po=6,11 prio=high
```

To set the maximum power on port 14 to 12,500 mW, use the command:

```
set poe po=14 pow=12500
```

Related Commands [set poe threshold](#)
[set poe detect](#)
[show poe](#)

set poe threshold

Syntax SET POE THReshold=*value*

where *value* is specified as a percentage of the total amount of PoE available. The range is 1 to 100.

Description The switch enters an event in the event log whenever the total power requirements of the powered devices cross the specified percentage threshold of the total maximum power available on the switch. The crossing of this threshold may be in either an upward or downward direction. This command sets this adjustable threshold.

Example To set the threshold to 80% of the available power, use the command:

```
set poe thr=80
```

Related Commands

- [set poe port](#)
- [set poe detect](#)
- [show poe](#)

show poe

Syntax `SHoW POE [PORt={port-list|ALL}]`

where *port-list* specifies a port number, a range of port numbers (specified as n-m), or a comma-separated list of port numbers and/or ranges. Port numbers start at 1 and end at 24.

Description This command displays information about Power over Ethernet for the specified port or ports.

If no port number is specified, summary information about all PoE ports is displayed, as shown in [Table 11-2 on page 11-14](#). If an port, or range of ports is specified, more detailed information is displayed. If **all** is specified, detailed information about all Power over Ethernet ports is displayed.

Entering this command without specifying a port displays the information shown in [Table 11-2 on page 11-14](#).

Figure 11-2: Example output from the **show poe** command

PoE Global Power Status:			
Max Available Power.... 400 W			
Power Threshold..... 95 percent			
Consumed Power..... 0 W			
Available Power..... 400 W			
Power Usage..... 0.00 percent			
Power Detect Mode..... IEEE			
Min Shutdown Voltage... 44.0 V			
Max Shutdown Voltage... 57.0 V			
PoE All Ports Power Status Summary:			
Port	PoE Status	Consumed Power (mW)	Power State

1	ENABLED	13100	ON - Valid PD detected
2	ENABLED	0	OFF - Detection in process
3	ENABLED	13100	ON - Valid PD detected
4	ENABLED	0	OFF - Detection in process
5	ENABLED	13100	ON - Valid PD detected
6	ENABLED	0	OFF - Detection in process
7	ENABLED	13100	ON - Valid PD detected
8	ENABLED	0	OFF - Detection in process
9	ENABLED	0	OFF - Overload state
10	ENABLED	0	OFF - Detection in process
11	ENABLED	0	OFF - Overload state
12	ENABLED	0	OFF - Detection in process
13	ENABLED	0	OFF - Overload state
14	ENABLED	0	OFF - Detection in process
15	ENABLED	12900	ON - Valid PD detected
16	ENABLED	0	OFF - Detection in process
17	ENABLED	12900	ON - Valid PD detected
18	ENABLED	0	OFF - Detection in process
19	ENABLED	12900	ON - Valid PD detected
20	ENABLED	0	OFF - Detection in process
21	ENABLED	12900	ON - Valid PD detected
22	ENABLED	0	OFF - Detection in process
23	ENABLED	12900	ON - Valid PD detected
24	ENABLED	0	OFF - Detection in process

Table 11-2: Parameters displayed in the output of the **show poe** command

Parameter	Meaning
Max Available Power	Total available power for PoE supplied by the switch.
Power Threshold	A percentage of the maximum available power. Default: 95%
Consumed Power	The amount of power being used by the powered devices.
Available Power	The amount of power available for additional powered devices.
Power Usage	The amount of power currently consumed by the powered devices connected to the switch. The value is give as a percentage of the total amount of power available.
Power Detect Mode	Displays the power detection mode in the switch, one of IEEE or Legacy.

Table 11-2: Parameters displayed in the output of the **show poe** command (Continued)

Parameter	Meaning
Min Shutdown Voltage	The minimum threshold voltage at which the switch shuts down PoE. This value is not adjustable.
Max Shutdown Voltage	The maximum threshold voltage at which the switch shuts down PoE. This value is not adjustable.

Figure 11-3: Example output from the **show poe port=1** command

```

PoE Status Of Port 1:
PoE Status..... ENABLED
Power Limit..... 15,400 mW
Power Priority..... LOW
Power State..... OFF - Detection in process
Power Consumed..... 0 mW
Power Class..... 0
Voltage..... 0.0 V
Current..... 0 mA

```

Table 11-3: Parameters displayed in the output of the **show poe port=1** command

Parameter	Meaning
PoE Status	Whether PoE is enabled or disabled on the port. Default: Enabled
Power Limit	The maximum amount of power allowed by the port for the device. Default: 15,400 milliWatts (15.4 W)
Power Priority	The port priority.
Power State	Whether power is being supplied to the device. ON means that the port is providing power to a powered device. OFF means the device is not a powered device or PoE has been disabled on the port.
Power Consumed	The amount of power in milliWatts currently consumed by the powered device connected to the port. If the port is not connected to a powered device, this value will be 0 (zero).
Power Class	The IEEE 802.3af class of the device.
Voltage	The voltage being provided to the powered device.
Current	The current drawn by the powered device.

Examples To display general PoE information, use the command:

```
sh poe
```

To display PoE information about port 1, use the command:

```
sh poe po=1
```

Related Commands

- [set poe port](#)
- [set poe threshold](#)
- [set poe detect](#)
- [show poe version](#)

show poe version

Syntax SHow POE VERsion

Description Use this command to display the version number of the PoE firmware that is currently running on your switch.

Figure 11-4: Example output from the **show poe version** command

```
PoE version information:  
Firmware version .... 2.9.0
```

Example To display the PoE firmware version number, use the command:

```
sh poe ver
```

See Also [set poe firmware](#)
 [show poe](#)