



# ADTRAN Switch Engine (ASE)

## Configuring Power Over Ethernet

Configuration Guide

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## Revision History

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## 1. Overview

This document explains the technology, applications, and configuration involved with Power over Ethernet (PoE) and power management for use with ADTRAN switch engine (ASE) products. Included in this guide are a brief introduction to PoE technology outlining PoE basics and standards, specific ASE PoE and power management configurations, and a brief troubleshooting section.

## 2. Understanding PoE

PoE is a technology that is used to transmit electrical power (along with data) to remote devices over a standard twisted-pair cable on an Ethernet network. PoE is used to provide power to a variety of network appliances, including, but not limited to, IP phones, IP cameras, and wireless access points (APs). PoE can be a cost-effective and convenient method of powering devices in currently existing areas where upgrading the infrastructure is prohibited by a variety of factors, by supplying power management strategies and power resource control for devices on the network using PoE, PoE+, or even legacy (pre-PoE) power constructs.

The following sections describe the details of PoE, PoE+, legacy power technologies, and power management.

### PoE Overview

PoE, defined by IEEE 802.3af, can be used in 10Base-T and 100Base-TX networks, as well as in 1000Base-T (Gigabit Ethernet) applications due to a phantom power technique that allows power to be transmitted over data transmission wire pairs. PoE provides 48 VDC over two pairs of a CAT 3/CAT 5e Ethernet cable. The maximum current of 400 mA provides a maximum load power of 15.4 W prior to power losses within the system.

The IEEE specification for PoE requires that at least two devices be present in the network for operation. There are two types of these devices: those that are powered devices (PDs), and those that are power sourcing equipment (PSEs).

### Powered Devices (PDs)

A PD is a device that operates on power supplied by a PSE rather than conventional means. PDs include a broad range of network equipment, and can operate in one of two modes determined by the PSE: mode A or mode B. The two modes differ in the wire pairs/pins used in the PoE process. Mode A uses pins 1, 2, 3, and 6, while mode B uses pins 4, 5, 7, and 8. Consequently, mode B requires that a 4-pair cable be used. In order to indicate its compliance with IEEE standard 802.3af, the PD places a 25 k $\Omega$  resistance between the powered pairs. In order to stay powered, the PD must use 5 to 110 mA continuously for at least 60 ms with no greater than 400 ms since its last use.

PDs fall into one of five classes that dictate the maximum amount of power that they will use. These classes are described in [Table 1](#). The maximum power consumed by the PD, and the class in which it is placed, is determined by resistor and capacitor values. These values are measured by hardware during the initial PD connection to the PSE.

**Table 1. PD Classes**

Class	Description	Maximum Power Consumption	PD Power Range
0	Default (PoE)	15.4 W	0.44 to 12.95 W
1	Optional (PoE)	4 W	0.44 to 3.84 W
2	Optional (PoE)	7 W	3.84 to 6.49 W

**Table 1. PD Classes (Continued)**

Class	Description	Maximum Power Consumption	PD Power Range
3	Optional (PoE)	15.4 W	6.49 to 12.95 W
4	Optional (PoE+)	12.95-25.50 W	15.4 to 25.5 W

**NOTE**

*Classes zero to three are defined in IEEE 802.3af (PoE), and class four is defined in IEEE 802.3at (PoE+).*

## Power Sourcing Equipment (PSEs)

PSE devices are classified as either a midspan or endspan device. A midspan device simply functions as a power supply for the PD and is placed between a non-PoE switch and a PD, without having an effect on the data. An endspan device combines an Ethernet switch with the necessary hardware to transmit PoE along with data. Midspan devices are typically used when there is no need to add a new switch to the network, but rather to add PoE capability to an existing network.

## PoE+

PoE+ is a higher powered version of PoE. PoE+ is necessary to support certain devices, such as 802.11n APs, pan tilt zoom (PTZ) cameras, and other class four devices whose power demands exceed the capabilities of standard PoE. Units that support PoE+ can provide a maximum of 25.5 W power per port. Depending on the number of ports utilizing PoE or PoE+, and the total internal power of the unit's power supply, a full 25.5 W may not be available for each port. If there is insufficient power available to support the request of a PD, the power can be limited. Typically power limits are only valid for PoE+ devices that use Link Layer Discovery Protocol (LLDP) to negotiate power.

## Additional Power Negotiation Methods

Prior to the ratification of IEEE 802.3af, powered devices were detected by measuring for large capacitance volume on the switch. If large capacitance volume was detected, the presence of a PD was confirmed. With the finalization of IEEE 802.3af, PoE became industry standard for power negotiation between devices; however, this legacy form of power negotiation is still used for non-PoE devices, and can be used in conjunction with the ASE product.

In addition, LLDP can be used to determine power resources for a PD using software. Using LLDP for power negotiation provides a dynamic method for determining PD power requirements and power management. To use LLDP for power negotiation, both the PD and the PSE must have LLDP enabled.

## Power Management

Power management is a feature that measures, in real time, the total power used by all PDs connected to the PSE. When the power management feature detects a PD connected to a port in the PSE unit, it determines if there is enough available power for the device based on the PD's power budget requirement. The PD falls into one of five classes that determine how much power the device will use (as described in [Table 1 on page 5](#)), and the PD uses resistance to indicate its power class to the PSE. If the power requirement of the PD is within the range of available power on the PSE, then power is transmitted to the PD. If there is not enough available power, however, then power is not allowed on the port.

If the total allocated power exceeds the power limit on the PSE, then the power management feature begins shutting down the power to ports, starting with the lowest priority ports, until the total allocated power is below the threshold that the PSE is capable of supplying. If ports have the same priority, the power management feature will shut down the highest number ports first.

Power management is configured to begin shutting down ports based on either actual power consumption on the port(s) or the reserve power required by the PD on the port. Both modes of power management can be configured on the ASE device, and an overview of their functionality is discussed in the following sections.

### Power Management Based on Actual Power Consumption

In this mode, when the power actually consumed by the PD begins to exceed the amount of power that can be delivered by the PSE, power is shut down to the ports (beginning with the lowest priority ports) until the total power consumption is below the threshold that the PSE is capable of supplying.

Once power is shut down to the port, and the PD is turned off, it is automatically turned back on after a random time interval to check if the PD is still consuming too much power on the port. If the PD power consumption still exceeds the power supplied by the PSE, then the PD is shut down again. This process repeats until the PD power consumption is within the threshold of power supplied by the PSE.

### Power Management Based on Reserved Power

In this mode, power to the ports is shut down when the total reserved power for the PD exceeds the amount of power that the PSE can deliver. Reserved power for the port(s) is specified in one of three ways: by user-specified allocated power, by PD class mode, or by LLDP-MED protocol.

Allocated reserved power is a user-specified value, configured on a per-port basis. When reserved power is specified in this manner, a connected PD is initially powered on the port, and then subsequently turned off if the PD uses more power than is specified on the port.



#### NOTE

*Maximum power configuration for a port takes effect only when power management is operating in **allocated** mode.*

If reserved power is configured based on PD class mode, then when the PD connects to the PSE, and indicates its class, power is reserved on the port accordingly (refer to [Table 1 on page 5](#) for information about PD class modes). This is the default mode for determining power reservation for the PD on the port.

Reserved power can also be automatically configured on a per-port basis for PDs using LLDP-MED. When this protocol is used, the PD exchanges PoE information with the PSE, and power is reserved accordingly. If no LLDP information is available for the port, the port reserves power based on the PD class.

## 3. Hardware and Software Requirements and Limitations

PoE, PoE+, and power management features are supported on the ASE products outlined in [Table 2](#) that are running ASE firmware 4.4-41 or later.

**Table 2. Supported Products**

Product	P/N
NetVanta 1560-08-150W Switch	17108108PF2
NetVanta 1560-24-740W Switch	17108124PF2
NetVanta 1560-48-740W Switch	17108148PF2

**Table 2. Supported Products (Continued)**

Product	P/N
NetVanta 1560-08-65W Switch	17101561PF2
NetVanta 1560-24-370W Switch	17101564PF2
NetVanta 1560-48-370W Switch	17101568PF2

Although the IEEE has defined both PoE and PoE+, it has not defined power management. ADTRAN supports multiple PoE vendors, some of which have their own PoE controllers, while others require ADTRAN software to control power management configurations. When used with ADTRAN software, power requirements, power management, and PoE settings of connected PDs are automatically detected and configured. These settings can be manually adjusted if needed, as described in the rest of this document.

## 4. Configuring PoE and Power Management Using the GUI

PoE functionality is configured on the ASE device by specifying the ASE power management behavior, the power supply settings, and the power settings per-port. To configure these settings, connect to the ASE GUI and complete the following tasks:

- [Configuring Power Management Behavior via the GUI on page 8](#)
- [Specifying the Power Supply's Deliverable Power via the GUI on page 10](#)
- [Specifying Port PoE Settings via the GUI \(Optional\) on page 10](#)



### NOTE

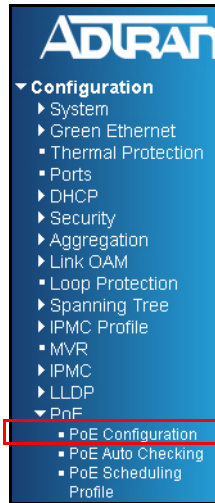
*It is recommended to restore defaults on the ASE device before beginning any configuration. To restore the defaults on the device, connect to the GUI, navigate to the **Maintenance** tab, and select **Factory Defaults**.*

## Configuring Power Management Behavior via the GUI

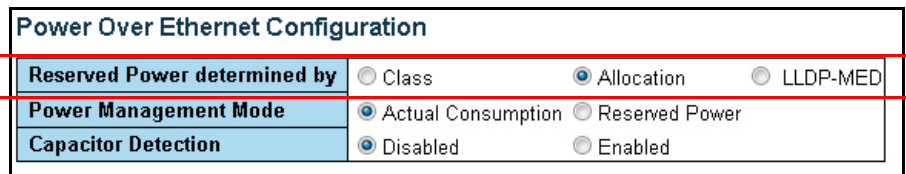
Power management is configured by specifying how the reserved power is determined (by class, allocation, or LLDP), specifying the power management mode (actual consumption or reserved power), and optionally enabling capacitor detection mode. To configure the ASE power management behavior, follow these steps:



1. Navigate to the **Configuration** tab in the menu on the left, and select **PoE > PoE Configuration**.



2. In the **Power Over Ethernet Configuration** menu, select **Class**, **Allocation**, or **LLDP-MED** in the **Reserved Power determined by** field. This selection specifies what reserved power value is used by power management when determining if power limits have been exceeded.



The **Class** selection, enabled by default, specifies that each port has power reserved based on the PD class indicated by the PD connected to the port (refer to [Table 1 on page 5](#) for PD class information). If the PD uses more power than specified by its class, it is turned off.

The **Allocation** selection indicates that power reserved on the port is based on the user-configured setting. The reserved power for each port where a PD resides is specified in the maximum power fields for each port (refer to [Specifying the Port’s Maximum Power on page 12](#)). If a PD uses more power than what is specified, it is turned off.

**i** **NOTE**

*Maximum Power port settings take effect only when reserved power is determined by **Allocation**. Refer to [Specifying the Port’s Maximum Power on page 12](#) for more information.*

The **LLDP-MED** selection indicates that power reserved on the port is determined by an exchange between the PD and PSE using LLDP. If no LLDP information is available, the port reserves power using the **Class** setting.

3. Next, specify the mode of power management to be used on the ASE device by selecting either **Actual Consumption** or **Reserved Power** in the **Power Management Mode** field of the **Power Over Ethernet Configuration** menu. Selecting **Actual Consumption** means power management will shutdown ports

when the actual power consumption is above what the PSE can deliver, whereas selecting **Reserved Power** indicates port shutdown occurs when PDs require more power than is reserved on the port.

Power Over Ethernet Configuration	
Reserved Power determined by	<input type="radio"/> Class <input checked="" type="radio"/> Allocation <input type="radio"/> LLDP-MED
Power Management Mode	<input checked="" type="radio"/> Actual Consumption <input type="radio"/> Reserved Power
Capacitor Detection	<input checked="" type="radio"/> Disabled <input type="radio"/> Enabled

- Optionally, you can enable **Capacitor Detection**. This feature is used for PoE detection in legacy products that do not meet PoE or PoE+ IEEE standards, and is disabled by default. To enable this feature, select **Enabled** in the **Capacitor Detection** field of the **Power Over Ethernet Configuration** menu.

Power Over Ethernet Configuration	
Reserved Power determined by	<input type="radio"/> Class <input checked="" type="radio"/> Allocation <input type="radio"/> LLDP-MED
Power Management Mode	<input checked="" type="radio"/> Actual Consumption <input type="radio"/> Reserved Power
Capacitor Detection	<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled

- Select **Save** at the bottom of the menu to save these settings, and continue the configuration process by specifying the PSE power capability and optionally specifying the maximum power allowed on a per-port basis, as described in the following sections.

## Specifying the Power Supply's Deliverable Power via the GUI

In order to manage the PDs, the ASE needs to know the maximum amount of power the power supply can deliver. This value is not automatically detected and must be specified. Typically, the configured power supply value is less than the actual power that the power supply can deliver in order to prevent the power supply from being exceeded when the PDs are turned on.

To specify the power supply's deliverable power, follow these steps:

- Navigate to the **Configuration** tab in the menu on the left, and select **PoE > PoE Configuration**. In the **PoE Power Supply Configuration** menu, specify the power (in Watts) supplied by the PSE in the **Primary Power Supply** field.

PoE Power Supply Configuration	
Primary Power Supply [W]	150

- Select **Save** at the bottom of the menu to save these settings.

## Specifying Port PoE Settings via the GUI (Optional)

You can optionally configure PoE settings on a per-port basis by specifying the port's PoE mode, priority, maximum allotted power, and PoE scheduling. These settings can be used by power management to determine which ports are shut down first if configured power settings are exceeded by the PD. The following sections describe the various port PoE settings.

### Configuring the Port’s PoE Mode

You can enable a specific PoE standard on a per-port basis, or disable PoE for a specified port by specifying the port’s PoE mode. Port mode options include **Disabled**, **PoE**, and **PoE+**. To configure the port’s PoE mode, follow these steps:

1. Navigate to the **Configuration** tab and select **PoE > PoE Configuration**. In the **PoE Port Configuration** menu, select **Disabled**, **PoE**, or **PoE+** from the **PoE Mode** drop-down menu for the appropriate port(s). Selecting **Disabled** disables PoE functionality on the port, selecting **PoE** specifies that PD classes one, two, and three are supported on the port, and selecting **PoE+** specifies that all PD classes, including class four, are supported on the port. If **PoE** mode is selected, then class four PDs are limited to 15.4 W power.

**PoE Port Configuration**

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	0	<>	0
1	PoE+	Disabled	Low	0	Disabled	0
2	PoE+	Disabled	Low	0	Disabled	0
3	PoE+	Disabled	Low	0	Disabled	0
4	PoE+	Disabled	Low	0	Disabled	0
5	PoE+	Disabled	Low	0	Disabled	0
6	PoE+	Disabled	Low	0	Disabled	0
7	PoE+	Disabled	Low	0	Disabled	0
8	PoE+	Disabled	Low	0	Disabled	0
9	PoE+	Disabled	Low	0	Disabled	0
10	PoE+	Disabled	Low	0	Disabled	0

Save    Reset

2. Select **Save** at the bottom of the menu to save these settings.

### Specifying the Port Priority

You can assign each port one of three priorities—low, high, or critical. The lowest priority port is shut down when a remote device requires more power than the power supply can deliver. If port priorities are equal, the highest numbered port is shut down.

To specify the priority for a port, follow these steps:

1. Navigate to the **Configuration** tab and select **PoE > PoE Configuration**. In the **PoE Port Configuration** menu, select **Low**, **High**, or **Critical** from the **Priority** drop-down menu for the appropriate port(s).

**PoE Port Configuration**

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	0	<>	0
1	PoE+	Disabled	Low	0	Disabled	0
2	PoE+	Disabled	Low	0	Disabled	0
3	PoE+	Disabled	Low	0	Disabled	0
4	PoE+	Disabled	Low	0	Disabled	0
5	PoE+	Disabled	Low	0	Disabled	0
6	PoE+	Disabled	Low	0	Disabled	0
7	PoE+	Disabled	Low	0	Disabled	0
8	PoE+	Disabled	Low	0	Disabled	0
9	PoE+	Disabled	Low	0	Disabled	0
10	PoE+	Disabled	Low	0	Disabled	0

Save Reset

2. Select **Save** at the bottom of the menu to save these settings.

### Specifying the Port’s Maximum Power

When power management is completed by verifying power allocation to a port, it takes into account the maximum power (in Watts) specified for the port.

To specify the maximum power allocated to a port, follow these steps:

1. Navigate to the **Configuration** tab and select **PoE > PoE Configuration**. In the **PoE Port Configuration** menu, enter maximum power (in Watts) to be allocated to the port in the **Maximum Power (W)** field for the appropriate port. Valid port power range is **0 to 15.4** Watts for ports using standard PoE, and **0 to 30.0** Watts for ports using PoE+.

**PoE Port Configuration**

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	0	<>	0
1	PoE+	Disabled	Low	0	Disabled	0
2	PoE+	Disabled	Low	0	Disabled	0
3	PoE+	Disabled	Low	0	Disabled	0
4	PoE+	Disabled	Low	0	Disabled	0
5	PoE+	Disabled	Low	0	Disabled	0
6	PoE+	Disabled	Low	0	Disabled	0
7	PoE+	Disabled	Low	0	Disabled	0
8	PoE+	Disabled	Low	0	Disabled	0
9	PoE+	Disabled	Low	0	Disabled	0
10	PoE+	Disabled	Low	0	Disabled	0

Save Reset

2. Select **Save** at the bottom of the menu to save these settings.

### Specifying the Port's Delay Mode (Optional)

You can optionally choose to specify that the port operates on a timed delay when it becomes active by specifying the delay time (in seconds) and enabling the delay feature.

To specify the port operates on a timed delay, follow these steps:

1. Navigate to the **Configuration** tab and select **PoE > PoE Configuration**. In the **PoE Port Configuration** menu, first specify the timed delay to apply to the port by entering a value in the **Delay Time** field. Valid range is **0** to **300** seconds. Next, enable the delay feature by selecting **Enabled** from the **Delay Mode** drop-down menu.

**PoE Port Configuration**

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	0	<>	0
1	PoE+	Disabled	Low	0	Disabled	0
2	PoE+	Disabled	Low	0	Disabled	0
3	PoE+	Disabled	Low	0	Disabled	0
4	PoE+	Disabled	Low	0	Disabled	0
5	PoE+	Disabled	Low	0	Disabled	0
6	PoE+	Disabled	Low	0	Disabled	0
7	PoE+	Disabled	Low	0	Disabled	0
8	PoE+	Disabled	Low	0	Disabled	0
9	PoE+	Disabled	Low	0	Disabled	0
10	PoE+	Disabled	Low	0	Disabled	0

Save Reset

2. Select **Save** at the bottom of the menu to save these settings.

### Specifying the Port's PoE Schedule (Optional)

You can choose to apply a PoE schedule to a port to automate when the port is enabled or disabled. To apply a previously created PoE schedule to the port, follow these steps:

1. Navigate to the **Configuration** tab and select **PoE > PoE Configuration**. In the **PoE Port Configuration** menu, select the appropriate schedule profile from the **PoE Schedule** drop-down menu.

**PoE Port Configuration**

Port	PoE Mode	PoE Schedule	Priority	Maximum Power [W]	Delay Mode	Delay Time(0~300 sec)
*	<>	<>	<>	0	<>	0
1	PoE+	Disabled	Low	0	Disabled	0
2	PoE+	Disabled	Low	0	Disabled	0
3	PoE+	Disabled	Low	0	Disabled	0
4	PoE+	Disabled	Low	0	Disabled	0
5	PoE+	Disabled	Low	0	Disabled	0
6	PoE+	Disabled	Low	0	Disabled	0
7	PoE+	Disabled	Low	0	Disabled	0
8	PoE+	Disabled	Low	0	Disabled	0
9	PoE+	Disabled	Low	0	Disabled	0
10	PoE+	Disabled	Low	0	Disabled	0

Save Reset

2. Select **Save** at the bottom of the menu to save these settings.

**NOTE**

*If you have not previously created a PoE schedule for the port, you can create one by navigating to the **Configuration** tab, and selecting **PoE > PoE Scheduling Profile**. Enter the profile's number, name, and scheduling parameters in the appropriate fields and select **Save** at the bottom of the menu.*

Once the power management behavior of the switch, the power supply settings, and any required port PoE settings have been configured, the PoE configuration of the ASE device have been completed. You can view PoE statistics or monitor PoE behavior by using the instructions included in [Troubleshooting on page 18](#).

## 5. Configuring PoE and Power Management Using the CLI

PoE functionality is configured on the ASE device by specifying the ASE power management behavior, the power supply settings, and the power settings per-port. To configure these settings, connect to the ASE CLI and complete the following tasks:

- [Configuring Power Management Behavior via the CLI on page 14](#)
- [Specifying the Power Supply's Deliverable Power via CLI on page 15](#)
- [Specifying Port PoE Settings via the CLI \(Optional\) on page 15](#)

**NOTE**

*It is recommended to restore defaults on the ASE device before beginning any configuration. To restore the defaults on the device, connect to the CLI, and enter the `reload defaults` command from the Enable mode prompt.*

### Configuring Power Management Behavior via the CLI

Power management is configured by specifying how the reserved power is determined (by class, allocation, or LLDP), specifying the power management mode (actual consumption or reserved power), and optionally enabling capacitor detection mode.

To configure the power management behavior using the CLI, enter the `[no] poe management mode [allocation-consumption | allocation-reserved-power | class-consumption | class-reserved-power | lldp-consumption | lldp-reserved-power]` command from the Global Configuration mode prompt. Using the `no` form of this command disables PoE and power management on the switch, which is enabled by default.

Entering either the `allocation-consumption` or `allocation-reserved-power` parameters specifies that power management is completed by shutting down ports whose actual power usage exceeds their allocated power, or whose power usage exceeds the amount of power reserved on the port, respectively.

Entering either the `class-consumption` or `class-reserved-power` parameters specifies that the class of PD on the port determines which ports are shut down if actual power usage exceeds the power allocated for the specific class, or if power usage exceeds the amount of power reserved on the port for the PD class, respectively. Refer to [Table 1 on page 5](#) for more information regarding PoE device classes and their allotted power.

Entering either the `lldp-consumption` or `lldp-reserved-power` parameters specifies that the power assigned to a port is determined by LLDP, and that power management is completed by shutting down ports

whose actual power usage exceeds the power allocated by LLDP, or whose power usage exceeds the amount of power reserved on the port by LLDP, respectively.

For example, to specify that power allocated to the port is determined by PD class, and that power management on the port is completed by shutting down ports whose actual power usage exceeds the power allotted by that class, enter the `poe management mode class-consumption` command as follows:

```
(config)#poe management mode class-consumption
```

Additionally, when configuring PoE and power management, you can optionally enable capacitor detection. This feature is used for PoE detection in legacy products that do not meet PoE or PoE+ IEEE standards, and is disabled by default. To enable this feature, enter the `[no] poe capacitor-detect` command from the Global Configuration mode prompt. Use the `no` form of this command to disable the capacitor detection feature if it has been enabled.

To enable the capacitor detection feature, enter the command as follows:

```
(config)#poe capacitor-detect
```

## Specifying the Power Supply's Deliverable Power via CLI

In order to manage the PDs, the ASE needs to know the maximum amount of power the power supply can deliver. This value is not automatically detected and must be specified. Typically, the configured power supply value is less than the actual power that the power supply can deliver in order to prevent the power supply from being exceeded when the PDs are turned on.

To specify the power supply's deliverable power, enter the `poe supply <value>` command from the Global Configuration mode prompt. Valid `<value>` range is **1 to 150 Watts**. Enter the command as follows to specify a maximum power of 150 Watts for the power supply:

```
(config)#poe supply 150
```

## Specifying Port PoE Settings via the CLI (Optional)

You can optionally configure PoE settings on a per-port basis by specifying the port's PoE mode, priority, and maximum allotted power. These settings can be used by power management to determine which ports are shut down first if configured power settings are exceeded by the PD. The following sections describe the various port PoE settings.

### Configuring the Port's PoE Mode

You can enable a specific PoE standard on a per-port basis, or disable PoE for a specified port by specifying the port's PoE mode. Port mode options include PoE or PoE+. To configure the port's PoE mode, enter the `[no] poe mode [plus | standard]` command from the port's configuration mode. Entering the `plus` parameter specifies that the port uses PoE+, and will have a maximum power value of **30 W**. Entering the `standard` parameter specifies that the port uses PoE, and will have a maximum power value of **15.4 W**. Using the `no` version of this command disabled PoE on the port.

To specify that port **2** on the GigabitEthernet interface **1** has PoE+ enabled, enter the command as follows:

```
(config)#interface GigabitEthernet 1/2
(config-if)#poe mode plus
```

### Specifying the Port's Priority

You can assign each port one of three priorities—low, high, or critical. The lowest priority port is shut down when a remote device requires more power than the power supply can deliver. If port priorities are equal, the highest numbered port is shut down.



To specify a port's priority, enter the `poe priority [critical | high | low]` command from the port's configuration mode. The `critical` parameter assigns a critical priority to the port, the `high` parameter assigns a high priority to the port, and the `low` parameter assigns a low priority to the port.

Enter the command as follows to specify that port 1 on the GigabitEthernet interface 1 has a low priority, and that port 2 on the same interface has a high priority:

```
(config)#interface GigabitEthernet 1/1
(config-if)#poe priority low
(config-if)#interface GigabitEthernet 1/2
(config-if)#poe priority high
```

## Specifying the Port's Maximum Power

When power management is completed by verifying power allocation to a port, it takes into account the maximum power (in Watts) specified for the port. You can specify the port's maximum power by entering the `poe power limit <value>` command from the port's configuration mode. Valid `<value>` range is 0 to 15.4 Watts for ports using standard PoE, and 0 to 30.0 Watts for ports using PoE+.

To configure the maximum power for port 2 on the GigabitEthernet interface 1, enter the command as follows:

```
(config)#interface GigabitEthernet 1/2
(config-if)#poe power limit 10.2
```

## Specifying the Port's Delay Mode (Optional)

You can optionally choose to specify that the port operates on a timed delay by specifying the delay time (in seconds) and enabling the delay feature.

Specify the delay time (in seconds) by entering the `poe delay-time <value>` command from the port's configuration mode. Valid `<value>` range is 0 to 300 seconds.

Next, enable the delay feature by entering the `[no] poe delay-mode` command from the port's configuration mode. Using the `no` form of this command disables the delay feature.

Enter the commands as follows:

```
(config)#interface GigabitEthernet 1/2
(config-if)#poe delay-time 100
(config-if)#poe delay-mode
```

## Specifying the Port's PoE Schedule (Optional)

You can choose to apply a PoE schedule to a port to automate when the port is enabled or disabled. To apply a PoE schedule to a port, follow these steps:

1. To create the PoE schedule, enter the `poe profile id <id> <day> <start hour> <start minute> <end hour> <end minute>` command from the Global Configuration mode prompt. The `<id>` parameter specifies a numerical ID for the PoE schedule profile. Valid ID range is 1 to 16. The `<day>` parameter specifies the day of the week (`Mon`, `Tue`, `Wed`, `Thr`, `Fri`, `Sat`, or `Sun`) on which to employ the PoE schedule. The `<start hour>` and `<end hour>` parameters specify the start and end hour for the schedule, respectively. Valid range is 0 to 23. The `<start minute>` and `<end minute>` parameters specify the start and end time (in minutes) for the schedule. Valid minute range is 0 to 55, and must be entered in multiples of 5. For example, to create a PoE schedule profile with an ID of 1, that enables PoE on the port on Mondays, from 8:30 am to 12:30 pm, enter the command as follows:

```
(config)#poe profile id 1 Mon 8 30 12 30
(config)#
```



- To apply the created PoE schedule to the port, enter the `[no] poe port-profile name <name>` command from the port's configuration mode. The `<name>` parameter specifies the name of the previously created PoE scheduling profile. Profile names are limited to **32** characters in length. Using the `no` form of this command disables the scheduling feature on the port.

To apply the PoE schedule profile with the profile ID of **1** to the port, enter the command as follows:

```
(config)#interface GigabitEthernet 1/1
(config-if)#poe port-profile name 1
```

Once the power management behavior of the switch, the power supply settings, and any required port PoE settings have been configured, the PoE configuration of the ASE device have been completed. You can view PoE statistics or monitor PoE behavior by using the instructions included in [Troubleshooting on page 18](#).

## 6. PoE and Power Management Command Summary

The following table summarizes the commands used in conjunction with PoE and power management configurations.

**Table 3. PoE and Power Management Configuration Commands**

Prompt	Command	Description
(config)#	<code>[no] poe management mode</code> <code>[allocation-consumption   allocation-reserved   class-consumption   class-reserved-power   lldp-consumption   lldp-reserved-power]</code>	Specifies the PoE power management mode for the switch. Mode choices include basing power allocations on specified port power settings, PD classes, or LLDP information. Power management decisions can be made by using either actual consumed power or the reserved power on the ports.
(config)#	<code>[no] poe capacitor-detection</code>	Enables legacy PoE detection. Using the <code>no</code> form of the command disables legacy PoE detection.
(config)#	<code>poe supply &lt;value&gt;</code>	Specifies the maximum power deliverable by the power supply. Valid <code>&lt;value&gt;</code> range is <b>1 to 150 Watts</b> .
(config)#	<code>poe profile id &lt;id&gt;</code> <code>&lt;day&gt; &lt;start hour&gt;</code> <code>&lt;start minute&gt; &lt;end hour&gt;</code> <code>&lt;end minute&gt;</code>	Creates a PoE schedule that can be applied on a port-by-port basis. Valid <code>&lt;id&gt;</code> range is <b>1 to 16</b> . The <code>&lt;day&gt;</code> parameter specifies the day of the week ( <b>Mon</b> through <b>Sun</b> ) on which to employ the PoE schedule. The <code>&lt;start hour&gt;</code> and <code>&lt;end hour&gt;</code> parameters specify the start and end hour for the schedule, respectively. Valid range is <b>0 to 23</b> . The <code>&lt;start minute&gt;</code> and <code>&lt;end minute&gt;</code> parameters specify the start and end time (in minutes) for the schedule. Valid minute range is <b>0 to 55</b> , and must be entered in multiples of <b>5</b> .
(config-if)#	<code>[no] poe mode [plus   standard]</code>	Specifies the PoE mode for the specified port. The <code>plus</code> parameter indicates the port uses PoE+, and the <code>standard</code> parameter indicates the port uses PoE. Using the <code>no</code> form of the command disables PoE on the port.
(config-if)#	<code>poe priority [critical   high   low]</code>	Specifies the PoE priority for the port. Port priorities can be set to critical, high, or low.

**Table 3. PoE and Power Management Configuration Commands (Continued)**

Prompt	Command	Description
(config-if)#	<b>poe power limit</b> <value>	Specifies the maximum power allotted to the port. This value is used when power management is configured in <b>allocation</b> mode. Valid <value> range is <b>0</b> to <b>15.4</b> W for PoE ports, and <b>0</b> to <b>30.0</b> W for PoE+ ports.
(config-if)#	<b>poe delay-time</b> <value>	Specifies the power delay time for the port. Valid range is <b>0</b> to <b>300</b> seconds.
(config-if)#	<b>[no] poe delay-mode</b>	Enables a power delay on the port. Using the <b>no</b> form of the command disables the time delay feature.
(config-if)#	<b>[no] poe port-profile</b> name <profile name>	Applies a previously created PoE schedule profile to the port. Using the <b>no</b> form of the command disables the scheduling feature on the port. Profile names are limited to <b>32</b> characters.

## 7. Troubleshooting

You can view several types of PD statistics on the ASE device that can aid in troubleshooting PoE networks. The power consumption, allocation, class, and status of PD devices can be used to aid in debug procedures and other troubleshooting measures. PD network statistics can be viewed using either the GUI or the CLI.

### Viewing PoE Statistics Using the GUI

Detailed information about ports to which PDs are connected can be viewed by navigating to the **Monitor** tab, and selecting **PoE**. Port information, such as power allocations, requests, and consumption, as well as priorities and status, are displayed in the **Power Over Ethernet Status** menu.

Power Over Ethernet Status							
Local Port	PD class	Power Requested	Power Allocated	Power Used	Current Used	Priority	Port Status
1	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
2	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
3	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
4	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
5	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
6	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
7	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
8	4	30 [W]	30 [W]	1.1 [W]	23 [mA]	Low	PoE turned ON
9	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
10	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
11	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
12	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
13	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
14	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
15	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
16	3	6.3 [W]	6.3 [W]	3.9 [W]	82 [mA]	Low	PoE turned ON
17	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
18	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
19	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
20	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
21	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
22	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
23	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
24	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	No PD detected
25	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	PoE not available - No PoE chip found
26	-	0 [W]	0 [W]	0 [W]	0 [mA]	Low	PoE not available - No PoE chip found
Total		36.3 [W]	36.3 [W]	5 [W]	105 [mA]		

In addition, if LLDP is used on a port for power information exchanges, you can view the LLDP neighbor table to determine power types, sources, priorities, and allocations for the LLDP connected devices. To view LLDP neighbor PoE information, connect to the GUI and navigate to the **Monitor** tab. Next, select **LLDP > PoE**. The LLDP PoE information is displayed.

LLDP Neighbor Power Over Ethernet Information				
Local Interface	Power Type	Power Source	Power Priority	Maximum Power
GigabitEthernet 1/16	PD Device	Unknown	Unknown	6.3 [W]

## Viewing PoE Statistics Using the CLI

The CLI can also be used to view various PoE statistics, including PoE port configurations, statuses, and LLDP neighbor information. Use the following **show** commands to view PoE information in the CLI.

Use the **show poe** command to display all PoE configurations on the ASE device. Reported statistics include the port status, power consumed, allocated, and reserved on the port, and the PoE PD class assigned to the port. Enter the command from the Enable mode prompt as follows:

```
#show poe
Interface   PD      Pwr   Pwr   Port      Power   Current  Priority
            Class  Req   Alloc Status    Used [W  Used[mA]
-----
GigEth 1/8   4      30.0  30.0  POE turned ON  1.1     23     low
GigEth 1/16  3      6.3   6.3   POE turned ON  3.9     82     high
Total                -     36.3  -           5.0
```

Use the **show poe interface <interface>** command to display per-port PoE information. Some of this information can be used to determine why a PoE port might have been shutdown during power management (such as for power budget issues or because PoE is disabled). Enter the command from the Enable mode prompt as follows:

```
#show poe interface GigabitEthernet 1/1, 9, 16
Interface   PD      Pwr   Pwr   Port      Power   Current  Priority
            Class  Req   Alloc Status    Used[W]  Used[mA]
-----
GigEth 1/1   --      0.0   0.0   No PD detected  0.0     0     low
GigEth 1/9   2      7.0   7.0   POE turned ON  2.4     46     low
GigEth 1/1   --      0.0   0.0   No PD detected  0.0     0     low
Total                -     7.0   7.0   -           2.4     46
```

Use the **show lldp neighbors** command to display LLDP information about connected PDs. Enter the command from the Enable mode prompt as follows:

```
#show lldp neighbors
Local Interface : GigabitEthernet 1/1
Chassis ID : 00-A0-C8-C9-2C-70
Port ID : giga-swx 0/2
Port Description : giga-swx 0/2: Gigabit Ethernet (BCM56xxx vxgs-6.3.1)
System Name : Switch
System Description : NetVanta 1531P, Version: R12.3.2, Date: Wed May 3
11:26:23 CDT 2017
System Capabilities : Bridge(+), Router(+)
Management Address : 10.19.221.25 (IPv4) OID:
0.0.0.0.1.0.0.0.3.0.0.0.6.0.0.0.1.0.0.0.2.0.0.0.1.0.0.0.2.0.0.0.2.0.0.0.1.0.
```

```

0.0.1.0.0.0.0
PoE Type :
PoE Source :
PoE Power :
PoE Priority :

Local Interface : GigabitEthernet 1/4
Chassis ID : 0.0.0.0
Port ID : 00-04-F2-50-09-65
Port Description : 1
System Name : Polycom SoundPoint IP 335
System Description : Polycom;SoundPointIP-SPIP_335;2345-12375-001,1;SIP
4.0.8.1547/27-Jan-15 16:02;UP/5.0.8.0935/14-Jan-15 20:09;
System Capabilities : Bridge(-), Telephone(+)
PoE Type : PD Device,
PoE Source : PSE and local
PoE Power : 3.9 [W]
PoE Priority : Unknown Priority#

```

## 8. Warranty and Contact Information

### Warranty

Warranty information can be found at:

[www.adtran.com/warranty](http://www.adtran.com/warranty).

### Contact Information

For all customer support inquiries, please contact ADTRAN Customer Care:

Contact	Support	Contact Information
Customer Care	From within the U.S. From outside the U.S. <b>Technical Support:</b> • Web: <b>Training:</b> • Email: • Web:	1-888-4ADTRAN (1-888-423-8726) + 1 (256) 963-8716  <a href="http://www.adtran.com/support">www.adtran.com/support</a>  training@adtran.com <a href="http://www.adtran.com/training">www.adtran.com/training</a> <a href="http://www.adtranuniversity.com">www.adtranuniversity.com</a>
Sales	Pricing and Availability	1-800-827-0807