POE Configuration

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Chapter 1 Power Over Ethernet

1.1 POE Overview

PoE, called Power Over Ethernet, refers that power is supplied through the 10BASE-T, 100BASE-TX and 1000BASE-T Ethernet, and its reliable power supply reaches up to 100 meters at maximum. In this way, the centralized power supply problem of the IP phone, wireless AP, portable device charger, POS machine, camera and data collection and other terminals can be effectively solved. For these terminals, there is no need to consider the problem of indoor power system wiring; the device is supplied with power while access to the network. In terms of universality, the current PoE power supply has also a unified standard; as long as 802.3af Standard which has been released is followed, the problem of adaptability between the devices from different manufacturers can be solved.

1.1.1 Introduction to POE Power Supply

According to the definition of the 802.3af Standard, PoE power supply system involves two kinds of device: PSE and PD. PSE (power-sourcing equipment), is primarily used to supply power to other devices, which can be divided into two kinds: Midspan (PoE functions are out of the switch) and Endpoint (PoE functions are integrated into the switch).

For the PoE-powered devices, their power supply systems are all integrated inside the device, which are the PSE device belonging to Endpoint. Meanwhile, the PD is defined as follows: PD (Powered Device) is the device which is used to receive power in the PoE power supply system, mainly referring to some wireless AP devices or some IP PHONE devices as well as some low power SOHO switches. Its typical networking diagram is as follows:
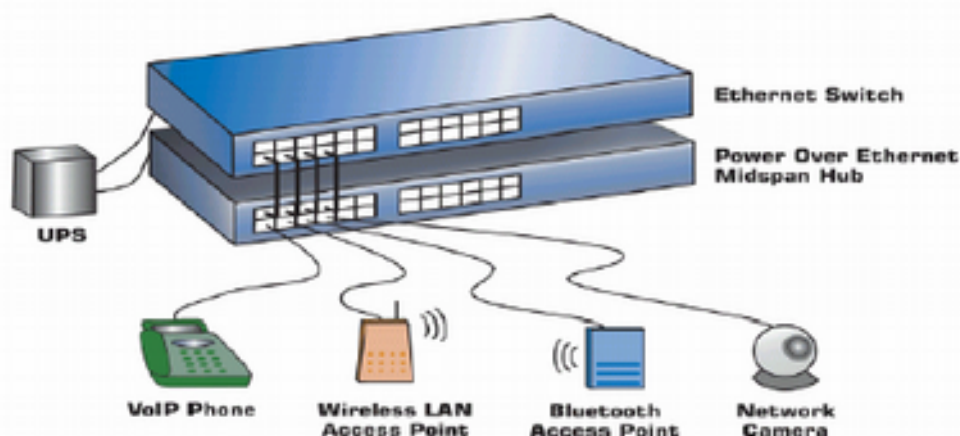
Meanwhile, 802.3af Standard also defines the PI (Power Interface: The interface between PSE/PD and network cable). At present, two power supply modes: Alternative A (Signal line No. 1, 2, 3, 6) and Alternative B (Free line 4, 5, 7, 8), have been defined, which are described as follows:

1) Supply the power through the idle pairs — Mode B (Alternative B)

As shown in the following figure, link 4 and link 5 form the anode, while link 7 and link 8 form

the cathode. The power supply is from PSE to PD.
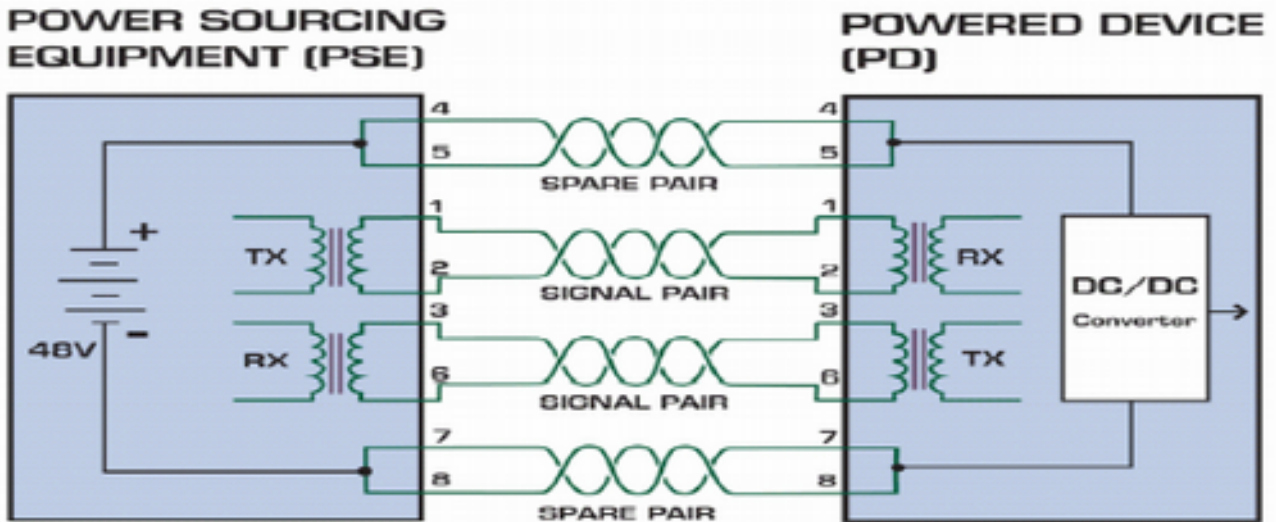
2) Power supply through the data pair—alternative A

As shown in the following figure, PSE can provide the power to PD through the data pair. Because DC and data frequency does not interfere each other, the electric power and data can be transmitted simultaneously at the same pair. In fact, it can be seen as the multiplexing of the cable. Link 1 and link 2 form the anode (or cathode), while link 3 and 6 form the cathode (or anode).
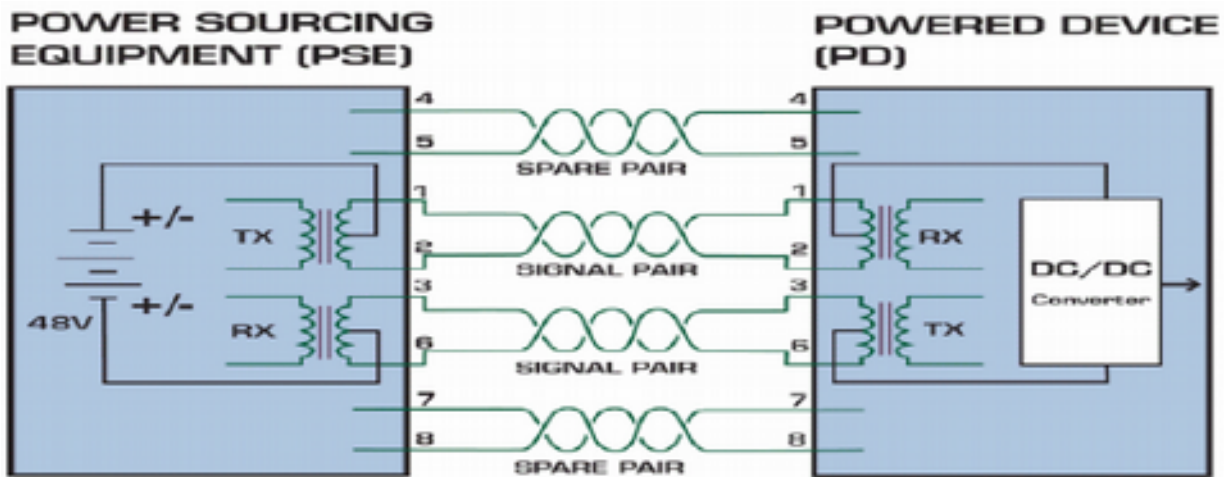
Generally speaking, standard PD has to support two power reception modes, while PSE only needs to support one of the two modes. All products, as the PSE switches, only support the signal line power supply—alternative A.

1.1.2 Power-Up Procedure of PoE Equipment

The procedure for PD to obtain the power when PD accesses the PSE system is shown in the following figure:
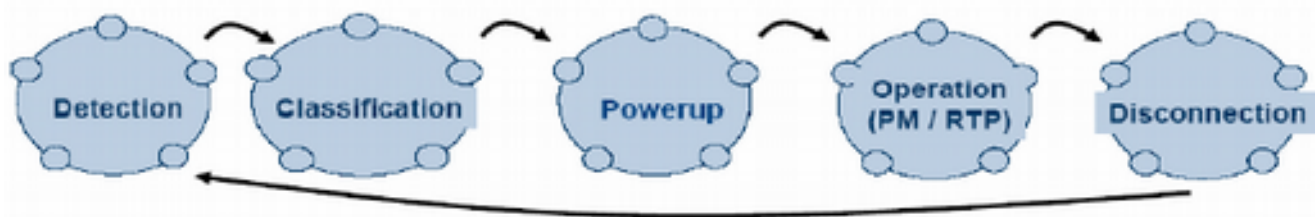
The above-mentioned procedure is described below:

1) Detection: PSE checks whether PD exists.

PSE detects the resistance value between the power-output lines to judge whether PD exists. At the detection phase, the output voltage is between 2.8V and 10V, and the voltage polarity is consistent with the polarity of the minus -48V output voltage. Only when PD is detected can PSE conduct the next operation.

The characteristics of PD existence: a. the DC resistance is between 19Kohm and 26.5Kohm; b. the capacitance is no more than 150nF.

2) Classification (optional): PSE confirms the power of PD.

PSE checks the output current of the power supply to confirm the power level of PD. On the Classification phase, the output voltage is between 15.5V and 20.5V. The voltage polarity is consistent with the polarity of the minus -48V output voltage.

3) Powerup: PSE supplies PD with power. When PSE finds that a mounted device belongs to legal PD and completes the classification of PD (optional), PSE starts to provide the power to this device and exports a voltage of -48V. 4) RTP & Power management: Real-time monitoring; power management. 5) Disconnection: PSE detects whether the PD disconnects — PSE uses a specific method to detect the disconnection of PD. The interface will return to the Detection phase. The ideal output of PSE is shown in the following figure:
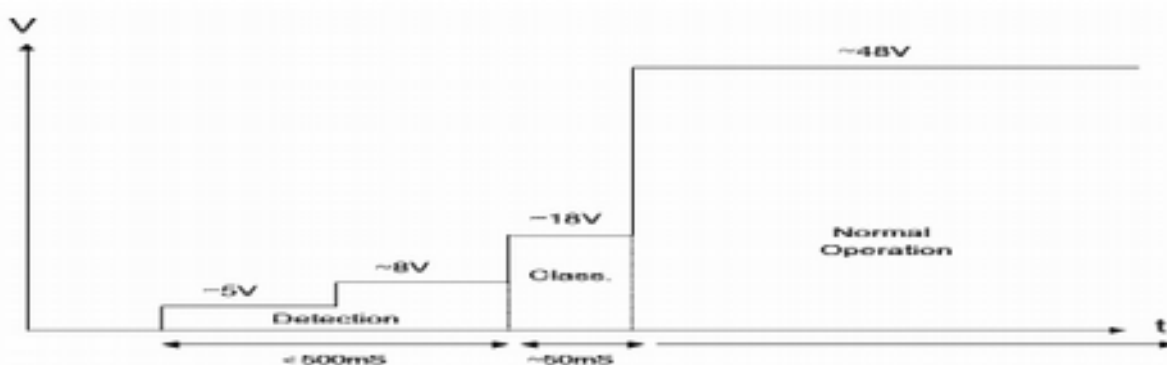
1.2 PoE Configuration Task List
- Displaying the Configuration
- Sets the power supply management mode for a switch.
- Sets the lasting time of the LED in PoE mode.
- Stopping Sending the Trap Notification to Users When Power Supply Changes Or Power Alarm Occurs

- Sets the percentage between alarm power and the total power.
- Setting Power Supply Protection
- Setting the Power Statistics
- Setting the Standard of PSE Power Supply
- Enabling the Power Supply of a Port
- Setting the Maximum Power of a Port
- Setting the Power Supply Priority for a Port
- Setting the Port Description (usually for PD)
- Setting the Forced Power Supply

1.3 PoE Configuration Tasks

1.3.1 Displaying the Information about POE-Related Systems

You can observe the information about the PoE module and ports by running the following commands in EXEC mode.

Run the following commands in EXEC mode:

Show poe system	Displays the information about POE-related systems.
Show poe all	Displays the information description table of the POE port.
Show poe power	Displays the information about the power supply of all ports.
Show poe interface *type slot/port*	To display the detailed POE information of a designated port, run the following command.

1.3.2 Setting the Power Supply Management Mode for a Switch

The default management mode is auto. In auto mode, the maximum power limit cannot be set and the default one is the maximum port's power supported by the chip; the power supply priority of a port cannot be set and the default priority is low.

But in preemptive or non-preemptive mode, the maximum power limit and the power supply priority of a port can be set.

In preemptive mode, the interface with high power supply priority will continue providing the power to the newly accessed PD even in full load and the interface with low power supply priority is cut off from the power, while in non-preemptive mode, the prompt information will occur on an interface with high power supply priority when PD is accessed this interface in full load.

Run the following commands in global mode to configure the power supply management mode of a switch:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe power-management** {auto | preemptive | non-preemptive}	Sets the power supply management mode for a switch.

Run the following commands in global mode to further set the systematic parameters in non-auto mode:

When the total power exceeds lowDisable, the port cannot be powered; when the total power is

less than lowDisable, the power supply can go again.

lowDisable = total power - value

When the total power exceeds lowNoConnect, those ports whose priorities are lower than or equal to the priority of the currently powered port, which is lowest priority among the powered ports, will be cut off from the power supply.

lowNoConnect = lowDisable – value

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe power-management** {lowDisable | lowNoConnect } *value*	Sets the systematic parameters of a switch in non-auto mode.

1.3.3 Setting the Lasting Time of the LED in PoE Mode

In global mode, run the following commands to set the lasting time of PoE LED:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe led-time** *time*	Sets the lasting time of the LED in PoE mode.

Run the following commands to resume the default settings:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**no poe led-time**	Resumes the default interval, that is, 30 seconds.

1.3.4 Stopping Sending the Trap Notification to Users When Power Supply Changes or Power Alarm Occurs

Run the following commands in global mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe mib notification-stop**	Means that the trap notification will not be sent to users when the power supply of a port changes.

Resume the default settings by running the following commands:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**no poe mib notification-stop**	Means that the trap notification will be sent to users when the power supply of a port changes.

1.3.5 Setting the Percentage between Alarm Power and the Total Power

Run the following commands in global mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe threshold** *value*	Sets the percentage between alarm power and the total power.

Resume the default settings by running the following commands:

Procedure	Command	Purpose

Step1	config	Enters the GLOBAL configuration mode.
Step2	no poe threshold	The default percentage between alarm power and the total power is 100%.

1.3.6 Setting Power Supply Protection

To set power supply protection for a port, run the following command:

Run the following command in global mode to enable the interface protection by default:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	poe pse-unprotect	Disables the power supply protection of a port.

Disables the port protection

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	no poe pse-unprotect	Enables the power supply protection of a port.

1.3.7 Setting the Power Statistics

Run the following command in global mode to enable the power statistics:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	poe counter *value*	Sets the sampling interval of power statistics.

Run the following commands to resume the default settings:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	no poe counter	Disables the power statistics.

1.3.8 Setting the Standard of PSE Power Supply

If you select the AF standard, the power supply for a port can reach up to 15.4W.

If you select the AT standard, the power supply for a port can reach up to 30W.

If you select MAX, it means that as to the switch with support of both AF and AT, the AT standard will be selected, and as to the switch only support AF, the AF standard will be selected.

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	poe standard {AT | AF | MAX}	Sets the power supply standard of a switch.

1.3.9 Enabling the Power Supply of a Port

Provide two ways to control the port's power supply enabling: 1. directly enabling and disabling the port; 2. supplying power based on the time range.

Method 1:

By default, the port's power supply is enabled; in the port configuration mode, use the following commands to prohibit the port enabling:

Procedure	Command	Purpose
Step1	config	Enters the GLOBAL configuration mode.
Step2	interface intf-type intf-id	Enters the interface configuration mode.
Step3	poe disable	Disables the power supply of a port.

To resume the default settings, you can run the following commands:

Procedure	Command	Purpose

Step1	config	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**no poe disable**	Enables the power supply of a port.

Method 2:

By default, there is no control over the port's power supply enabling based on time range; in the port configuration mode, use the following commands to configure the port's power supply enabling based on time range:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**poe disable time-range** *name*	Configure the control over the port's power supply enabling with the name "disable the port's power supply based on time range"

To return to the default setting, use the no form of this command.

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**no poe disable time-range**	Cancel the control over the port's power supply enabling based on time range"

1.3.10 Setting the Maximum Power of a Port

The default maximum power of a port is 30000mW and you can set the maximum power of this port by running this command in interface configuration mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**poe max-power** *value*	Sets the maximum power of a port, whose unit is mW.

Resume the default settings by running the following commands:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**no poe max-power**	The default maximum power of a port is 30000mW.

1.3.11 Setting the Power Supply Priority for a Port

The default power supply priority of a port is low and you can set the maximum power of this port by running this command in interface configuration mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.

| Step3 | **poe priority** {critical \| high \| low } | Sets the power supply priority of a port to critical, high or low. |

1.3.12 Setting the Port Description (usually for PD)

The port description is null by default and you can set the port description by running this command in interface configuration mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**poe PD-discription** *string*	Sets the port description.

Resume the default settings by running the following commands:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**no poe PD-discription**	Deletes the character string of port's description.

1.3.13 Setting the Forced Power Supply

The forced power supply is disabled by default and you can enable it by running the following commands in interface configuration mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**poe force-power**	Enables the forced power supply on a port.

To resume the default settings, run the following commands:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**interface** intf-type intf-id	Enters the interface configuration mode.
Step3	**no poe force-power**	Disables the forced power supply on a port.

1.3.14 Setting the Power Value of the External Power Supply

When using the external power supply, the power value of the external power supply must be configured, so that the POE can provide the total power which equals to the internal power supply plus the power of the external power supply. The configuration value should be be actual power of the external power supply.

The power without configuring the external power supply by default. Run the following commands in global mode:

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.
Step2	**poe extern-power** *value*	Configure the power value of external power supply (Unit: W) , so that the total power equals to the power of the internal power supply plus the power of the external power supply.

Return to the default setting when there is no external power supply.

Procedure	Command	Purpose
Step1	**config**	Enters the GLOBAL configuration mode.

Step2	no poe extern-power	Return the total power to the power of the original power supply.