Cisco External Power Supply Overview

The Cisco external power supply provides -48V power for inline IP telephony support for the Cisco Ethernet switch network modules. The system includes two AC power inputs and four DC output power modules for connection to external devices. The Cisco external power supply supports redundant configurations.

This chapter provides an overview of the Cisco external power supply features in the following sections:

Features

The following features are standard:

- Support for two separate AC power inputs
- Support for up to four 360W DC output power modules providing -48V each.
- Rack-mountable chassis (19-inch rack-mount brackets included)
- An LED for output status for each power module and an LED on the front for overall power supply status.

- Support for several cable types, as follows:
  - One-to-one (D-shell 15-pin to Micro-D 15-pin) cables for connection to the Cisco Ethernet switch network module. One of this type of cable is shipped with the chassis; additional cables must be ordered separately
  - One-to-two Y cables (one D-shell 15-pin to two Micro-D 15-pin) for connection to two Cisco Ethernet switch network modules. This cable must be ordered separately.
  - Two-to-one Y cables (two D-shell 15-pin to one Micro-D 15-pin) for fully redundant support for connection to the Cisco Ethernet switch network module. This cable must be ordered separately.

Power Configurations

The Cisco external power supply can supply power to the Cisco Ethernet switch network module in three ways:

- One-to-One Connection
- One-to-Two Connection
- Redundant Connection

The AC power sources support the DC power supplies shown in Table 1-1.

Table 1-1 Releated Power Inputs and Outputs

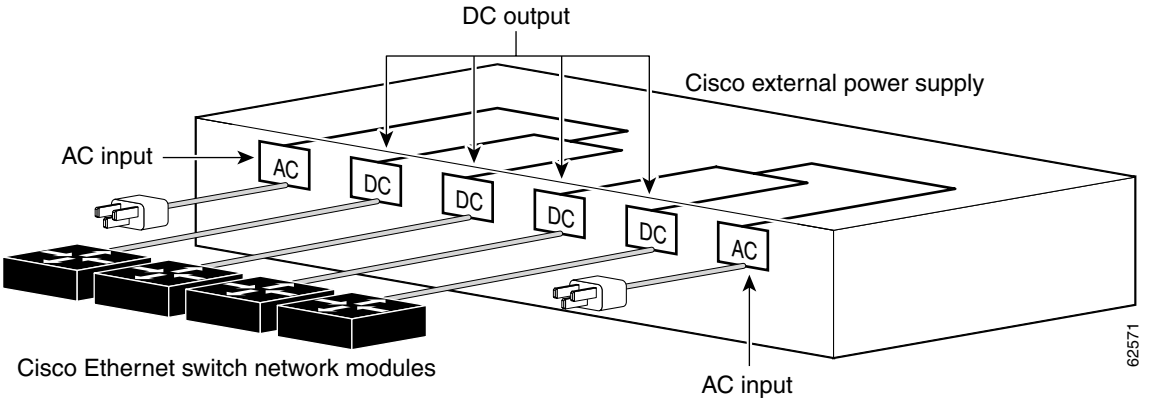
AC Power Source	DC Power Supply
AC input 1	DC module 1 (DC output 1)
	DC module 2 (DC output 2)
AC input 2	DC module 3 (DC output 3)
	DC module 4 (DC output 4)

Each power supply module can provide up to 360W, which is enough power for up to 36 IP phones at 10W each.

One-to-One Connection

In a one-to-one configuration, one of the DC outputs from the Cisco external power supply connects to one Cisco Ethernet switch network module, as shown in Figure 1-1.

Figure 1-1 One-to-One Configuration



One-to-Two Connection

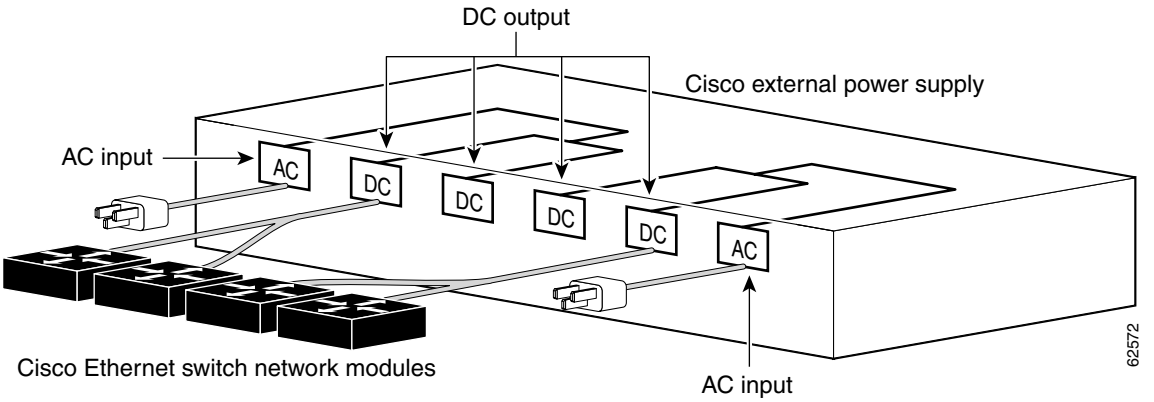
In a one-to-two configuration, one of the DC outputs from the Cisco external power supply connects to two 16-port Cisco Ethernet switch network modules, as shown in Figure 1-2.

Each power supply module can provide up to 360W, which is enough power for up to 36 10W IP phones. If using the 16-port Cisco Ethernet switch network module, then two network modules can be powered by one power supply module.You can use a one-to-two cable (ordered separately) to connect the power module to two Ethernet power supply modules.

Note All ends of the cable must be connected and both network modules must be installed for the power supply to turn on.

The connectors at one end of the Y-shaped cable connect to two Cisco Ethernet switch network modules; the single connector on the other end of the cable connects to one Cisco external power supply DC output power module.

Figure 1-2 One-to-Two Configuration

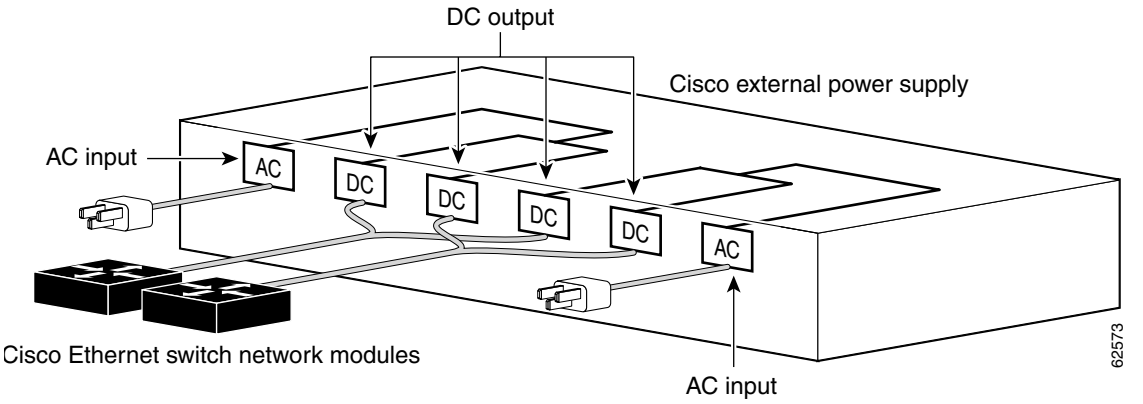


Redundant Connection

The Cisco external power supply can provide a fully redundant power source for two of the supported Cisco Ethernet switch network modules. You can use a two-to-one cable (ordered separately) to connect an Ethenet switch network module to two DC output power modules, as shown in Figure 1-3. The two-to-one cable is a Y-shaped cable with two connectors at one end and one connector at the other end.

In this configuration, the connectors at one end of the Y-shaped cable connect to two DC ouputs on the Cisco external power supply; the single connector on the other end of the cable connects to one Cisco Ethernet switch network module. The power source is fully redundant because there are two AC inputs and two DC output power modules connected to each external device. If any power module fails due to AC input failure or DC module failure, there is a full backup.

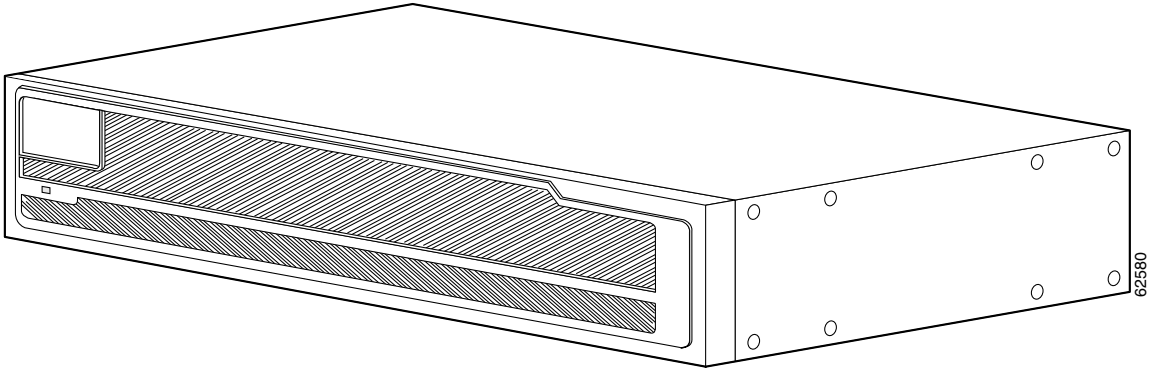
Figure 1-3 Fully Redundant Configuration



Front and Rear Panel Descriptions

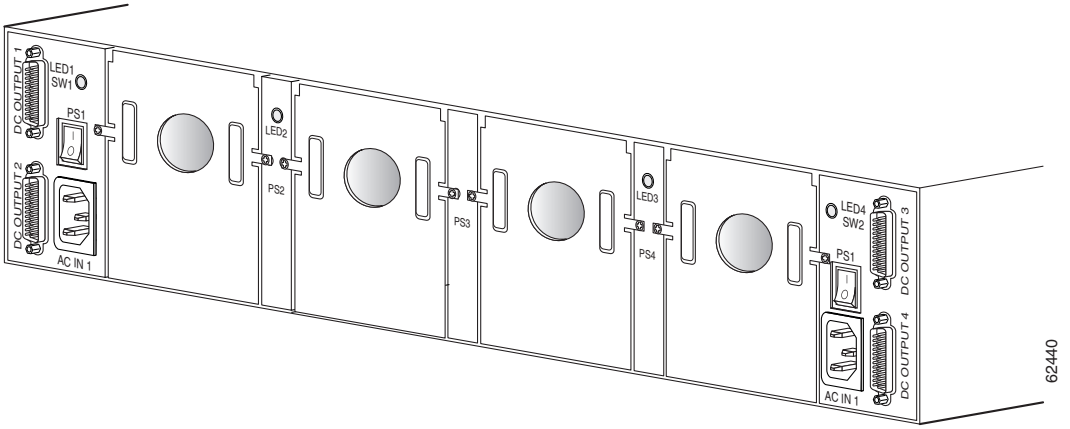
The LEDs on the Cisco external power supply front panel show the Cisco external power supply operational status. Figure 1-4 illustrates the front panel of the Cisco external power supply.

Figure 1-4 Cisco External Power Supply Front Panel



The Cisco external power supply rear panel has two AC power connectors, each with an on/off switch, and four DC connectors for connecting to devices.There is an LED for each module slot. Figure 1-5 shows the rear panel. Refer to Chapter 5, "Connecting the Cisco External Power Supply to the Cisco Ethernet Switch Network Modules," for information about required cables and connectors.

Figure 1-5 Cisco External Power Supply Rear Panel



LEDs

The Cisco external power supply has an LED on the front of the chassis and on each external power supply module slot. The LEDs on the front panel of the Cisco external power supply display the current operating condition of the Cisco external power supply. The LEDs on the individual module slots display the status of that module. When the Cisco external power supply is working properly, all LEDs on its front panel and each individual module slot that has a module installed are solid green.

Figure 1-6 shows the external power supply front panel LED, Figure 1-7shows the rear panel LEDs, and Figure 1-8 and Figure 1-9 show the 16- and 36-port Cisco Ethernet switch network module LEDs. Table 1-2 explains the meaning of the LED colors for the front and rear panels of the external power supply chassis and Table 1-3 explains the meaning of the LED colors for the rear chassis LEDs and Cisco Ethernet switch network module.

When checking for potential problems with the power delivery, perform the following steps before checking the LEDs:

Step 1 Plug the AC power into the external power supply chassis and turn the power switch on.

Step 2 Connect the external power cables to both the external power chassis and the network module. The mounting screws on the cables must be securely tightened.

Step 3 Verify that the network module is fully inserted into the router.

Step 4 Verify that the power is on to the router where the network module is installed.

Step 5 Boot the Cisco IOS software on the router where the network module is installed and the network module is recognized by the router. This step is required because Cisco IOS software controls the -48V LED on the network module.

Figure 1-6 Cisco External Power Supply Front Panel LED

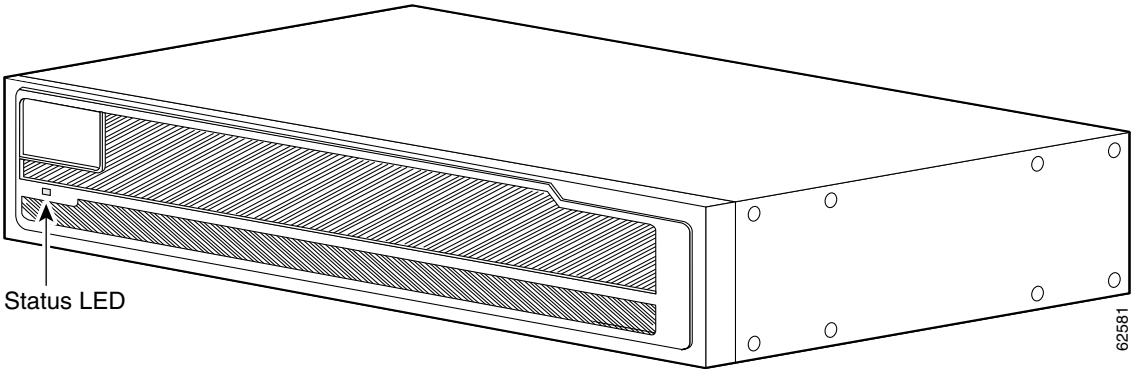


Figure 1-7 Cisco External Power Supply Rear Panel LEDs

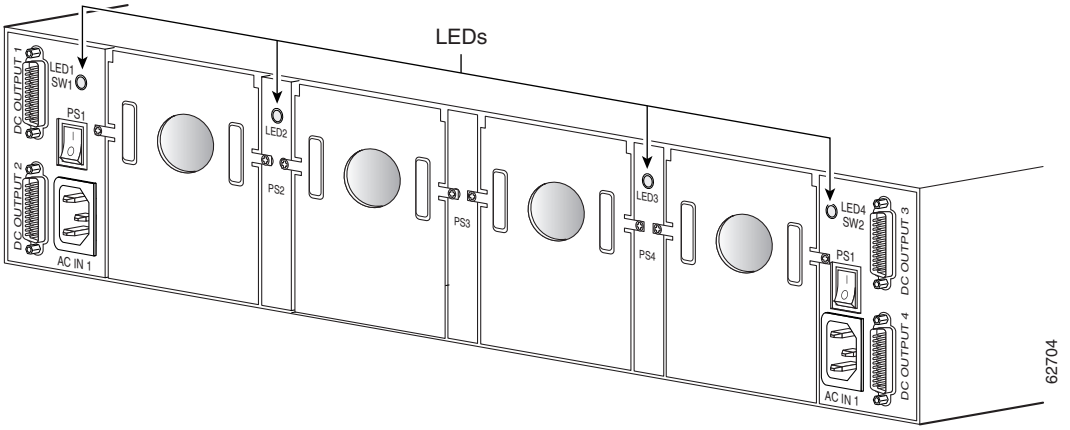


Figure 1-8 16-Port Cisco Ethernet Switch Network Module LEDs

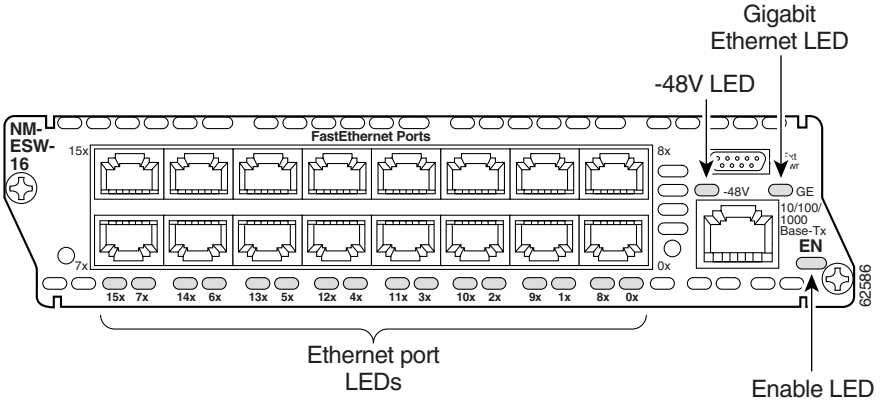


Figure 1-9 36-Port Cisco Ethernet Switch Network Module LEDs

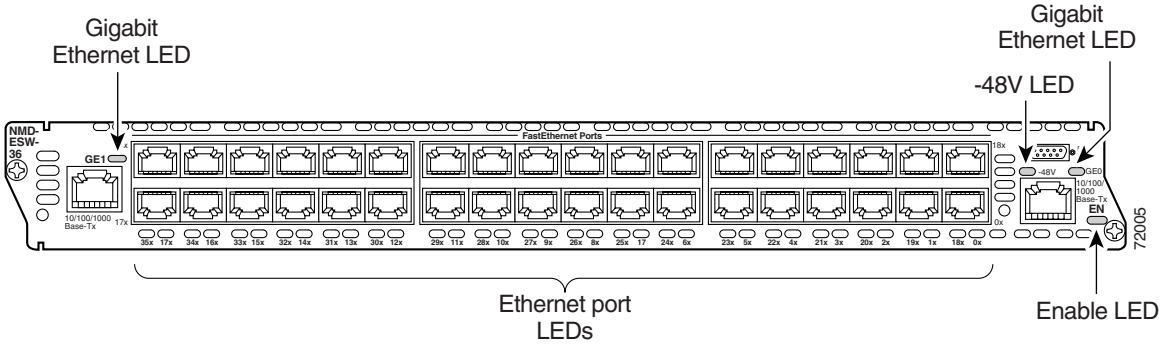


Table 1-2 LED Descriptions for Front and Rear Cisco External Power Supply Chassis

Front Panel LEDs	Rear Panel LED	Description
Green	Green	-48V power is normal for all installed DC power modules in the Cisco external power supply.
Yellow	Yellow	At least one of the installed modules is not delivering power. Check the following: • Make sure that the power module is installed properly with both thumb screws tightened. • Make sure that the external cable is installed properly at the power supply output connector and at the network module end. • Make sure that the network module is installed properly in the router. • The cable or power module could be bad.
Off	Off	Input to the Cisco external power supply is not present. Check the following: • The power switch should be turned on. • Make sure the power cord is properly attached.

Table 1-3 LED Descriptions for Cisco External Power Supply Rear Panel and Attached Network Module

Rear Panel LED	Network Module -48V LED	Description
Green	Green	-48V power is normal
Yellow	Off	• The cable is not fully seated into external power chassis connector • The cable is not fully seated into the network module • Bad cable
Yellow or Off	Off	The power module is not fully seated into the external power chassis
Yellow or Off	Yellow	Bad power supply module
Off	Yellow	External power supply is turned off

Safety Recommendations

Follow these guidelines to guarantee general safety:

- Keep the chassis area clear and dust-free during and after installation.
- Keep tools and chassis components away from walk areas where you or others could fall over them.
- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses when working under conditions that might be hazardous to your eyes.
- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

Safety Warnings

Safety warnings appear throughout this guide in procedures that, if performed incorrectly, might harm you. A warning symbol precedes each warning statement.

Safety with Electricity

Warning **Only trained and qualified personnel should be allowed to install or replace this equipment. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Warning **Read the installation instructions before you connect the system to its power source. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Warning **The device is designed to work with TN power systems. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Make sure that a fuse or circuit breaker is no larger than 120 VAC, 15A U.S. (240 VAC, 10A international) is used on the phase conductors (all**

current-carrying conductors). To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.

Warning **This equipment is intended to be grounded. Make sure that the host is connected to earth ground during normal use. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied your equipment.**

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-off switch in the room in which you are working. Then, if an electrical accident occurs, you can quickly shut the power off.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
  - Use caution; do not become a victim yourself.
  - Turn off power to the Cisco external power supply.
  - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim and then call for help.
  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.