



## **Cisco Catalyst 3650 Switches Hardware Installation Guide**

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**Cisco Systems, Inc.**  
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- Move the equipment farther away from the television or radio.
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# Preface

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This guide describes the hardware features of the Cisco Catalyst 3650 Series switches. It describes the physical and performance characteristics of each switch, explains how to install a switch, and provides troubleshooting information.



**Note**

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This guide does not describe system messages that you might receive or how to configure your switch. For information about these topics, see the switch's software configuration guide, the command reference document, and the system message guide at: [http://www.cisco.com/go/cat3650\\_docs](http://www.cisco.com/go/cat3650_docs)

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This chapter includes the following topics:

- [Document Conventions, page ix](#)
- [Related Documentation, page x](#)
- [Obtaining Documentation and Submitting a Service Request, page x](#)

## Document Conventions

This document uses the following conventions.



**Note**

---

Means *reader take note*. Notes contain helpful suggestions or references to materials not contained in this manual.

---



**Caution**

---

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

---

**Warning****IMPORTANT SAFETY INSTRUCTIONS**

**This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.** Statement 1071

**SAVE THESE INSTRUCTIONS**

The safety warnings for this product are translated into several languages in the *Regulatory Compliance and Safety Information for the Catalyst 3650 Switch* that is available on Cisco.com. The EMC regulatory statements are also included in that guide.

## Related Documentation

**Note**

Before installing or upgrading the switch, refer to the switch's release notes.

- Catalyst 3650 Series documentation at:  
[http://www.cisco.com/go/cat3650\\_docs](http://www.cisco.com/go/cat3650_docs)
- Cisco SFP and SFP+ modules documentation, including compatibility matrices, at:  
[http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd\\_products\\_support\\_series\\_home.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd_products_support_series_home.html)
- Cisco Validated Designs documents at:  
<http://www.cisco.com/go/designzone>
- Error Message Decoder, located at:  
<https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi>

## Obtaining Documentation and Submitting a Service Request

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<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

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# Product Overview

The Catalyst 3650 Series switches are Ethernet switches to which you can connect devices such as Cisco IP phones, Cisco Wireless Access Points, workstations, and other network devices such as servers, routers, and other switches.

The Catalyst 3650 switches support stacking through Cisco StackWise-160 technology.

Unless otherwise noted, the term *switch* refers to a standalone switch and to a switch stack.

This chapter includes the following topics:

- [Switch Models, page 1-1](#)
- [Front Panel, page 1-10](#)
- [Rear Panel, page 1-28](#)
- [Management Options, page 1-38](#)

## Switch Models

**Table 1-1 Catalyst 3650 Switch Models**

Switch Model	Cisco IOS Image	Description
WS-C3650-24TS-L	LAN Base	Stackable 24 10/100/1000 Ethernet downlink ports 4 1-Gigabit small form-factor pluggable (SFP) uplink ports, 250-W power supply
WS-C3650-48TS-L	LAN Base	Stackable 48 10/100/1000 Ethernet downlink ports 4 1-Gigabit SFP uplink ports 250-W power supply
WS-C3650-24PS-L	LAN Base	Stackable 24 10/100/1000 PoE+ <sup>1</sup> downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply



**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-48PS-L	LAN Base	Stackable 48 10/100/1000 PoE+ downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply
WS-C3650-48FS-L	LAN Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 1-Gigabit SFP uplink ports 1025-W power supply
WS-C3650-24TD-L	LAN Base	Stackable 24 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-48TD-L	LAN Base	Stackable 48 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-24PD-L	LAN Base	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48PD-L	LAN Base	Stackable 48 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48FD-L	LAN Base	Stackable 48 10/100/1000 Full PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 1025-W power supply

Table 1-1 Catalyst 3650 Switch Models (continued)

Switch Model	Cisco IOS Image	Description
WS-C3650-48FQ-L	LAN Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports 1025-W power supply
WS-C3650-48PQ-L	LAN Base	Stackable 48 10/100/1000 PoE+ downlink ports 4 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48TQ-L	LAN Base	Stackable 48 10/100/1000 Ethernet downlink ports 4 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-8X24UQ-L	LAN Base	Stackable 8 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 16 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit uplink SFP+ ports 1100-W power supply
WS-C3650-8X24PD-L	LAN Base	Stackable 8 100M/1G/2.5G/5G/10G PoE+ downlink ports 16 10/100/1000 PoE+ downlink ports 2 10-Gigabit SFP+ uplink ports 715-W power supply
WS-C3650-12X48UZ-L	LAN Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 2 40-Gigabit uplink QSFP+ ports 1100-W power supply
WS-C3650-12X48UR-L	LAN Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 8 10-Gigabit uplink SFP+ ports 1100-W power supply

Table 1-1 Catalyst 3650 Switch Models (continued)

Switch Model	Cisco IOS Image	Description
WS-C3650-12X48UQ-L	LAN Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit uplink SFP+ ports 1100-W power supply
WS-C3650-12X48FD-L	LAN Base	Stackable 12 100M/1G/2.5G/5G/10G Full PoE downlink ports 36 10/100/1000 Full PoE downlink ports 2 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-24PDM-L	LAN Base	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports Fixed 640-W power supply
WS-C3650-48FQM-L	LAN Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports Fixed 975-W power supply
WS-C3650-24TS-S	IP Base	Stackable 24 10/100/1000 Ethernet downlink ports 4 1-Gigabit SFP uplink ports 775-W power supply
WS-C3650-48TS-S	IP Base	Stackable 48 10/100/1000 Ethernet downlink ports 4 1-Gigabit SFP uplink ports 250-W power supply
WS-C3650-24PS-S	IP Base	Stackable 24 10/100/1000 PoE+ downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply

**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-48PS-S	IP Base	Stackable 48 10/100/1000 PoE+ downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply
WS-C3650-48FS-S	IP Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 1-Gigabit SFP uplink ports 1025-W power supply
WS-C3650-24TD-S	IP Base	Stackable 24 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-48TD-S	IP Base	Stackable 48 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-24PD-S	IP Base	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48PD-S	IP Base	Stackable 48 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48FD-S	IP Base	Stackable 48 10/100/1000 Full PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 1025-W power supply

**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-48FQ-S	IP Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports 1025-W power supply
WS-C3650-48PQ-S	IP Base	Stackable 48 10/100/1000 PoE+ downlink ports 4 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48TQ-S	IP Base	Stackable 48 10/100/1000 Ethernet downlink ports 4 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-8X24UQ-S	IP Base	Stackable 8 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 16 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit uplink SFP+ ports 1100-W power supply
WS-C3650-8X24PD-S	IP Base	Stackable 8 100M/1G/2.5G/5G/10G PoE+ downlink ports 16 10/100/1000 PoE+ downlink ports 2 10-Gigabit SFP+ uplink ports 715-W power supply
WS-C3650-12X48UR-S	IP Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 8 10-Gigabit uplink SFP+ ports 1100-W power supply
WS-C3650-12X48UZ-S	IP Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 2 40-Gigabit uplink QSFP+ ports 1100-W power supply

**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-12X48UQ-S	IP Base	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit uplink SFP+ ports 1100-W power supply
WS-C3650-12X48FD-S	IP Base	Stackable 12 100M/1G/2.5G/5G/10G Full PoE downlink ports 36 10/100/1000 Full PoE downlink ports 2 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-24PDM-S	IP Base	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports Fixed 640-W power supply
WS-C3650-48FQM-S	IP Base	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports Fixed 975-W power supply
WS-C3650-24TS-E	IP Services	Stackable 24 10/100/1000 Ethernet downlink ports 4 1-Gigabit SFP uplink ports 250-W power supply
WS-C3650-48TS-E	IP Services	Stackable 48 10/100/1000 Ethernet downlink ports 4 1-Gigabit SFP uplink ports 250-W power supply
WS-C3650-24PS-E	IP Services	Stackable 24 10/100/1000 PoE+ downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply

Table 1-1 Catalyst 3650 Switch Models (continued)

Switch Model	Cisco IOS Image	Description
WS-C3650-48PS-E	IP Services	Stackable 48 10/100/1000 PoE+ downlink ports 4 1-Gigabit SFP uplink ports 640-W power supply
WS-C3650-48FS-E	IP Services	Stackable 48 10/100/1000 Full PoE downlink ports 4 1-Gigabit SFP uplink ports 1025-W power supply
WS-C3650-24TD-E	IP Services	Stackable 24 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-48TD-E	IP Services	Stackable 48 10/100/1000 Ethernet downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-24PD-E	IP Services	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48PD-E	IP Services	Stackable 48 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48FD-E	IP Services	Stackable 48 10/100/1000 Full PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports 1025-W power supply



**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-48FQ-E	IP Services	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports 1025-W power supply
WS-C3650-48PQ-E	IP Services	Stackable 48 10/100/1000 PoE+ downlink ports 4 10-Gigabit SFP+ uplink ports 640-W power supply
WS-C3650-48TQ-E	IP Services	Stackable 48 10/100/1000 Ethernet downlink ports 4 10-Gigabit SFP+ uplink ports 250-W power supply
WS-C3650-8X24UQ-E	IP Services	Stackable 8 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 16 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-8X24PD-E	IP Services	Stackable 8 100M/1G/2.5G/5G/10G PoE+ downlink ports 16 10/100/1000 PoE+ downlink ports 2 10-Gigabit SFP+ uplink ports 715-W power supply
WS-C3650-12X48UR-E	IP Services	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 8 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-12X48UZ-E	IP Services	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 2 40-Gigabit QSFP+ uplink ports 1100-W power supply

**Table 1-1 Catalyst 3650 Switch Models (continued)**

Switch Model	Cisco IOS Image	Description
WS-C3650-12X48UQ-E	IP Services	Stackable 12 100M/1G/2.5G/5G/10G Cisco UPOE downlink ports 36 10/100/1000 Cisco UPOE downlink ports 4 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-12X48FD-E	IP Services	Stackable 12 100M/1G/2.5G/5G/10G Full PoE downlink ports 36 10/100/1000 Full PoE downlink ports 2 10-Gigabit SFP+ uplink ports 1100-W power supply
WS-C3650-24PDM-E	IP Services	Stackable 24 10/100/1000 PoE+ downlink ports 2 1-Gigabit SFP uplink ports 2 10-Gigabit SFP+ uplink ports Fixed 640-W power supply
WS-C3650-48FQM-E	IP Services	Stackable 48 10/100/1000 Full PoE downlink ports 4 10-Gigabit SFP+ uplink ports Fixed 975-W power supply

1. PoE+ = Power over Ethernet plus (provides up to 30 W per port).

## Front Panel

This section describes the front panel components:

- 24 or 48 downlink ports of one of these types:
  - 10/100/1000 ports
  - 10/100/1000 PoE+ ports
  - 10/100/1000 Cisco UPOE ports
  - 100M/1G/2.5G/5G/10G PoE+ ports
  - 100M/1G/2.5G/5G/10G Cisco UPOE ports
- Uplink ports of one of these types or combinations of:
  - SFP module slots
  - SFP+ module slots
  - QSFP+ module slots

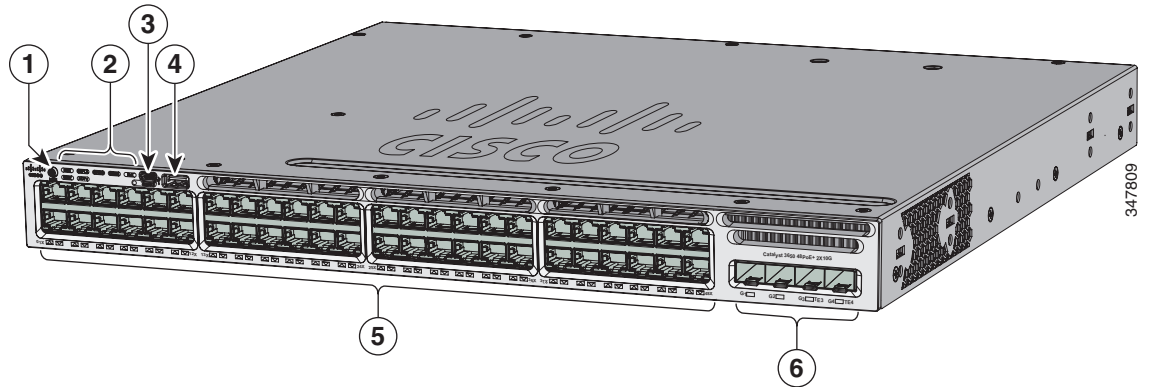
- USB Type A connector
- USB mini-Type B (console) port
- LEDs
- Mode button
- UDI button

All the switches have similar components. See the following figures for examples.



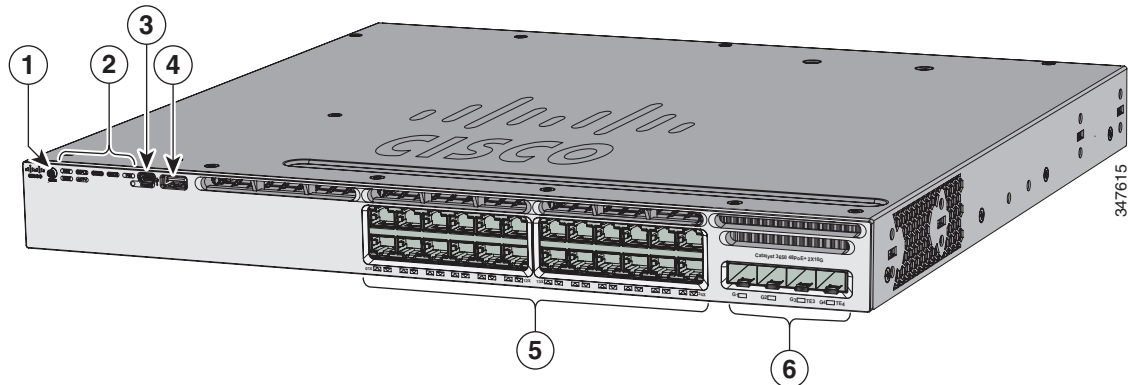
**Note** The illustrations of the Catalyst 3650 switch are not intended to depict any particular color scheme. They are provided as a reference for various features and markings described within this guide.

**Figure 1-1 Catalyst 3650-48PD-L Switch Front Panel**



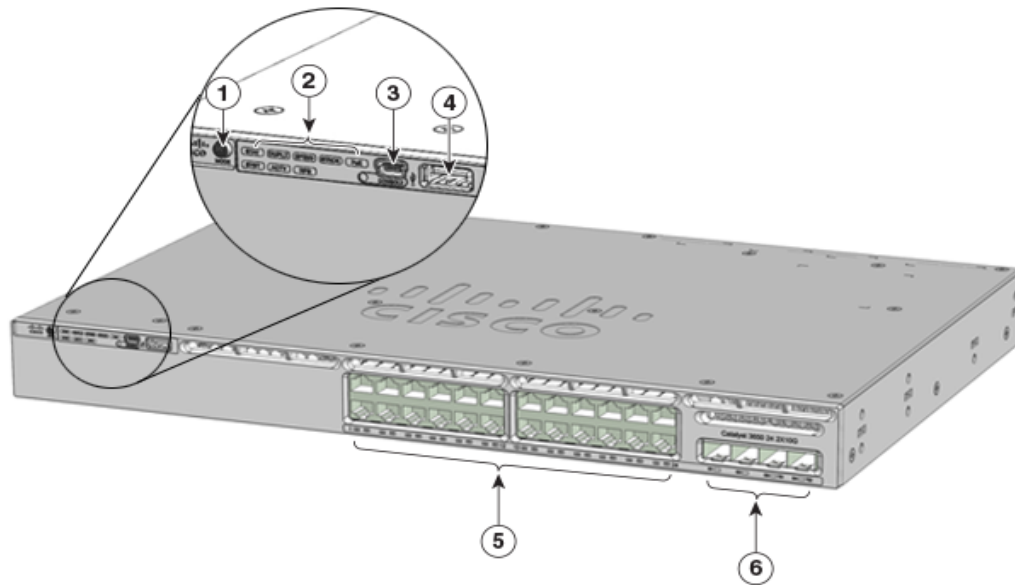
<b>1</b>	Mode button	<b>4</b>	USB Type A storage port
<b>2</b>	Status LEDs	<b>5</b>	10/100/1000 PoE+ Ethernet ports
<b>3</b>	USB mini-Type B (console) port	<b>6</b>	Uplink ports

**Figure 1-2 Catalyst 3650-24PS-L Switch Front Panel**



1	Mode button	4	USB Type A storage port
2	Status LEDs	5	10/100/1000 PoE+ Ethernet ports
3	USB mini-Type B (console) port	6	Uplink ports

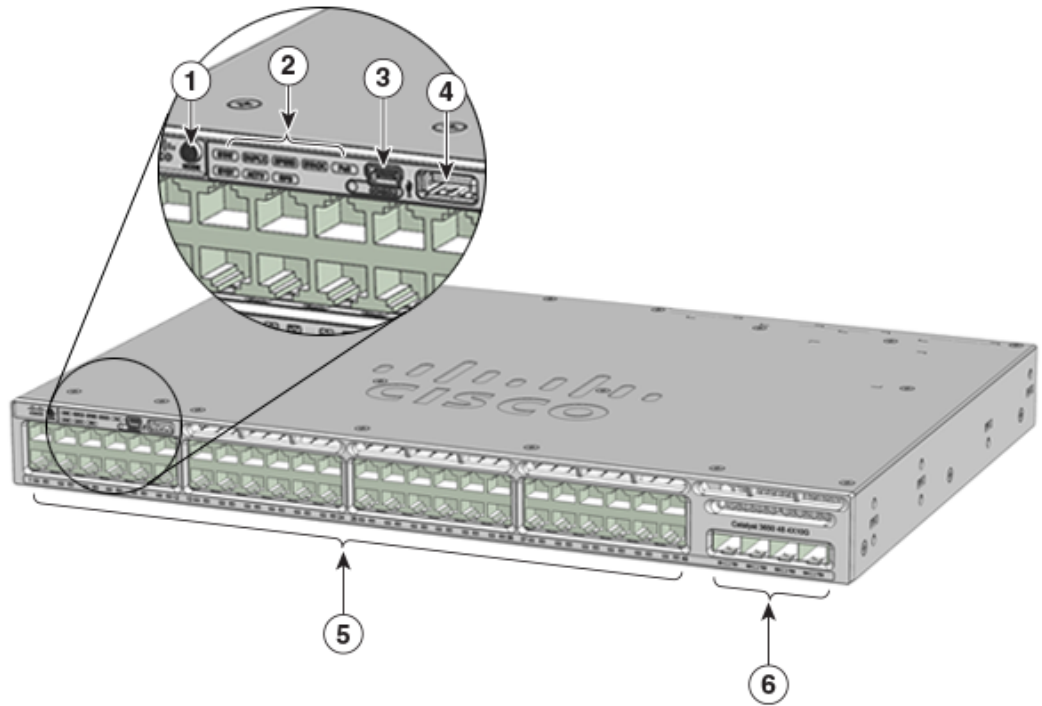
**Figure 1-3 Catalyst 3650-24PDM Switches Front Panel**



354551

1	Mode button	4	USB Type A storage port
2	Status LEDs	5	10/100/1000 PoE+ Ethernet ports
3	USB mini-Type B (console) port	6	Uplink ports

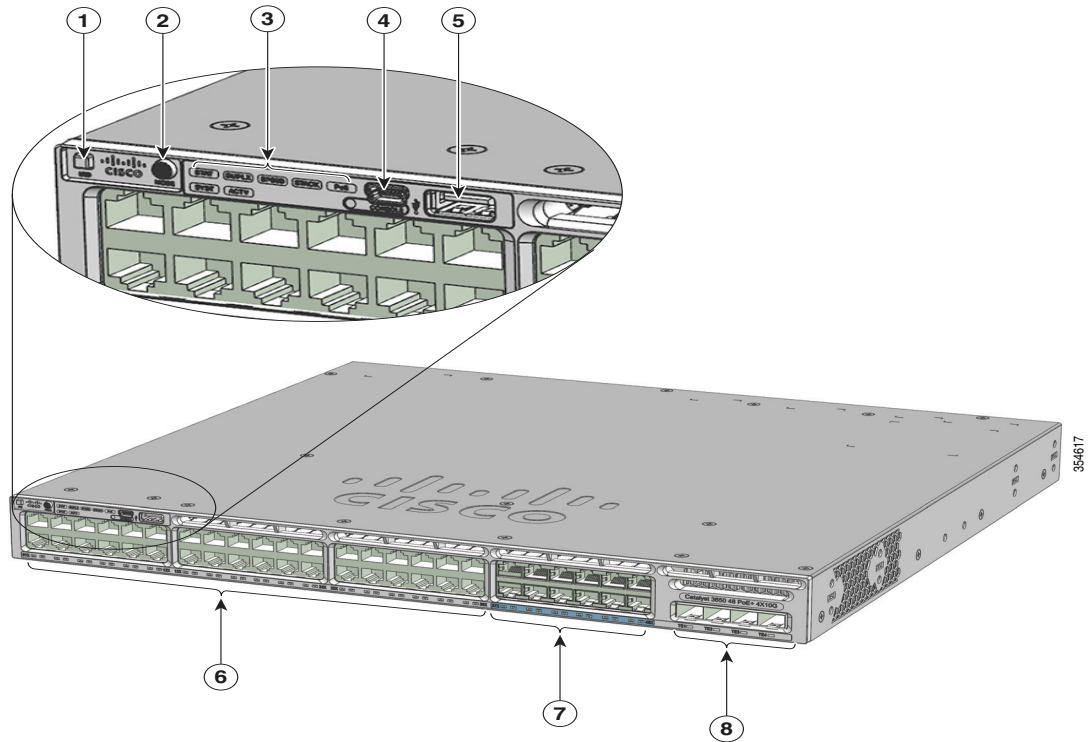
Figure 1-4 Catalyst 3650-48FQM Switches Front Panel



354552

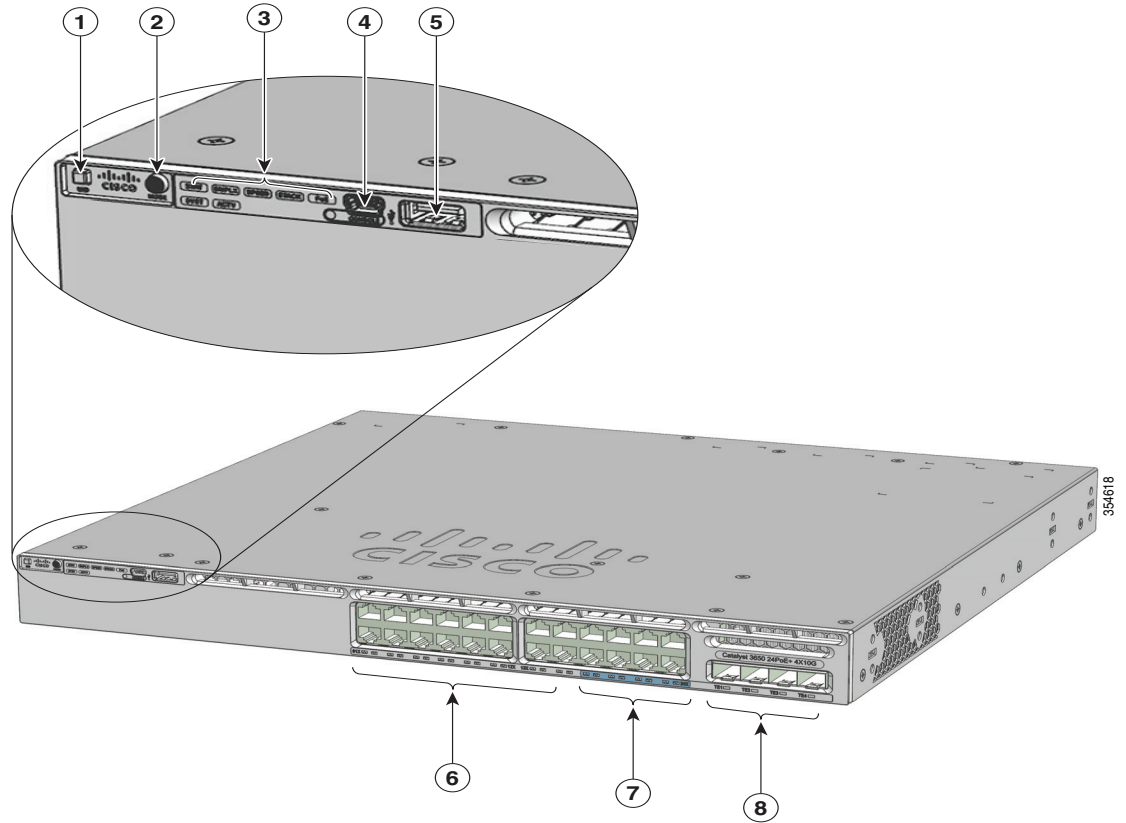
1	Mode button	4	USB Type A storage port
2	Status LEDs	5	10/100/1000 PoE+ Ethernet ports
3	USB mini-Type B (console) port	6	Uplink ports

**Figure 1-5 Catalyst WS-3650-12X48UQ-L/S/E Switches Front Panel**



<b>1</b>	UID LED/Button	<b>5</b>	USB Type A storage port
<b>2</b>	Mode button	<b>6</b>	10/100/1000 Cisco UPOE downlink ports
<b>3</b>	Status LEDs	<b>7</b>	100M/1G/2.5G/5G/10G Cisco UPOE downlink ports
<b>4</b>	USB mini-Type B (console) port	<b>8</b>	Uplink ports

**Figure 1-6** Catalyst WS-3650-8X24UQ-L/S/E Switches Front Panel



<b>1</b>	UID LED/Button	<b>5</b>	USB Type A storage port
<b>2</b>	Mode button	<b>6</b>	10/100/1000 Cisco UPOE downlink ports
<b>3</b>	Status LEDs	<b>7</b>	100M/1G/2.5G/5G/10G Cisco UPOE downlink ports
<b>4</b>	USB mini-Type B (console) port	<b>8</b>	Uplink ports

## 10/100/1000 Ethernet Ports

The 10/100/1000 Ethernet ports use RJ-45 connectors with Ethernet pinouts. The maximum cable length is 328 feet (100 meters). The 100BASE-TX and 1000BASE-T traffic requires Category 5, Category 5e, or Category 6 unshielded twisted pair (UTP) cable. The 10BASE-T traffic can use Category 3 or Category 4 UTP cable.



## 100M/1G/2.5G/5G/10G Ethernet Ports

The 100M/1G/2.5G/5G/10G Ethernet ports use RJ45 connectors with Ethernet pinouts. These ports do not support 10 Mbps speed. The 100 Mbps and 1 Gbps traffic requires Category 5/5e/6 unshielded twisted pair (UTP) cable, with a maximum cable length of 100 m. The 2.5 Gbps traffic requires Category 5e/6/6a UTP cable, with a maximum cable length of 100 m. The 5 Gbps traffic requires Category 5e UTP cable, with a maximum cable length of 70 m, and Category 6/6a UTP cable, with a maximum cable length of 100 m. The 10G traffic requires Category 6 UTP cable, with a maximum cable length of 55 m, and Category 6a UTP cable, with a maximum cable length of 100 m.

## PoE+ and Cisco UPOE Ports

The PoE+ and Cisco UPOE ports use the same connectors, as described in the “[10/100/1000 Ethernet Ports](#)” section on page 1-15.

These PoE+ ports provide:

- Support for IEEE 802.3af-compliant powered devices (up to 15.4 W PoE per port) and support for IEEE 802.3at-compliant powered devices (up to 30 W PoE+ per port).
- Support for Cisco-enhanced PoE.
- Support for prestandard Cisco-powered devices.
- Configurable support for Cisco intelligent power management, including enhanced power negotiation, power reservation, and per-port power policing.

The Cisco UPOE ports provide support for powered devices (up to 60 W per port).

Depending on the installed power supply modules, each port can deliver up to 60 W of Cisco UPOE. See [Table 1-15 on page 1-33](#) for the power supply matrix that defines the available PoE and PoE+, and Cisco UPOE power per port.



### Note

- For information on 250-W AC power supply support on the PoE-capable switch models, refer to the *Cisco Catalyst 3650 Series Switches Release Notes* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-release-notes-list.html>.
- The output of the PoE+ circuit has been evaluated as a Limited Power Source (LPS) according to IEC 60950-1.

## Management Ports

- Ethernet management port (see the “[Ethernet Management Port](#)” section on page 1-37)
- RJ-45 console port (EIA/TIA-232) (see the “[RJ-45 Console Port](#)” section on page 1-38)
- USB mini-Type B console port (5-pin connector)

You can connect the switch to a host such as a Windows workstation or a terminal server through the Ethernet management port, the RJ-45 console port, or the USB console port (USB mini-Type B port).

The USB console port connection uses a USB Type A to 5-pin USB Mini-Type B cable. The USB console interface speeds are the same as the RJ-45 console interface speeds.

## USB Mini-Type B Port

The switch provides a USB mini-Type B console connection on the front panel, and the RJ-45 console port on the switch's rear panel. Console output is always active on both the connectors, but the console input is active on only one connector at a time, with the USB connector taking precedence over the RJ-45 connector.

Use a USB type-A-to-USB 5-pin mini-Type B cable to connect a PC or other device to the switch. The required USB cable is included in the optional accessory kit.

The connected device must include a terminal emulation application.

**Note**

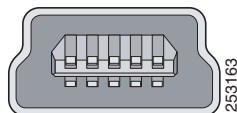
Windows PCs need a driver for the USB port.

When the switch detects a valid USB connection to a powered device, input from the RJ-45 console port is immediately disabled, and input from the USB console is enabled. Removing the USB connection immediately re-enables input from the RJ-45 console connection. An LED on the switch front panel (see [Figure 1-8](#)) is green when the USB console connection is enabled.

The switch provides a configurable inactivity timeout that reactivates the RJ-45 console if no input activity has occurred on the USB console for a specified time period. After the USB console has been deactivated due to a timeout, you can restore its operation by disconnecting and reconnecting the USB cable. You can disable USB console operation by using Cisco IOS commands. For details, see the Cisco *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

The 4-pin mini-Type B connectors resemble 5-pin mini-Type B connectors. However, they are not compatible. Use only the 5-pin mini-Type B. See [Figure 1-7](#).

**Figure 1-7** USB Mini-Type B Port



Use the CLI to configure an inactivity timeout that reactivates the RJ-45 console if the USB console has been activated and no input activity has occurred on the USB console for a specified time period.

After the USB console deactivates due to inactivity, you cannot use the CLI to reactivate it. Disconnect and reconnect the USB cable to reactivate the USB console. For information on using the CLI to configure the USB console interface, see the Cisco *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

## USB Type A Port

The USB Type A interface provides access to external USB flash devices (also known as thumb drives or USB keys).

The interface supports Cisco USB flash drives with capacities ranging from 64 MB to 1 GB.

Cisco IOS software provides standard file system access to the flash device: read, write, erase, and copy, as well as the ability to format the flash device with a FAT file system.

## Uplink Ports

Depending upon the switch model, several uplink ports are available to connect to other devices:

- Four slots supporting only 1-Gigabit SFP modules
- Two slots (left side) supporting only 1-Gigabit SFP modules and two slots (right side) supporting either 10-Gigabit SFP+ modules or 1-Gigabit SFP modules
- Two slots supporting either 1-Gigabit SFP modules or 10-Gigabit SFP+ modules
- Four slots supporting either 1-Gigabit SFP modules or 10-Gigabit SFP+ modules
- Eight slots supporting either 1-Gigabit SFP modules or 10-Gigabit SFP+ modules
- Two slots supporting 40-Gigabit QSFP+ modules



### Note

If you insert an SFP+ module in an SFP module slot, the SFP+ module slot does not operate, and the switch logs an error message. SFP modules can operate in SFP+ module slots.

## SFP, SFP+, and QSFP+ Modules

The SFP and SFP+ modules provide copper or fiber-optic connections to other devices. These transceiver modules are field replaceable, and provide the uplink interfaces when installed in an SFP module slot. The SFP modules have LC connectors for fiber-optic connections or RJ-45 connectors for copper connections.

Use only Cisco SFP and SFP+ modules on the switch. For the latest information about supported SFP/SFP+ modules, refer to *Cisco Transceiver Modules Compatibility Matrix* at:

[http://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_device\\_support\\_tables\\_list.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html)

The 40-Gigabit QSFP+ transceiver module is a hot-swappable, parallel fiber-optical module with four independent optical transmit and receive channels. These channels can terminate in another 40-Gigabit QSFP+ transceiver, or the channels can be broken out to four separate 10-Gigabit SFP+ transceivers.

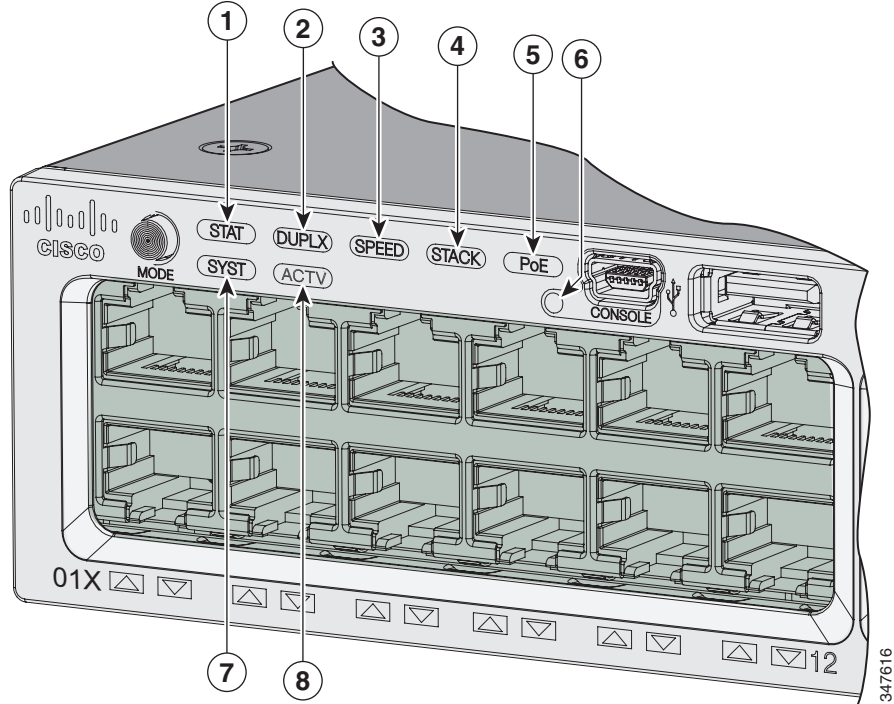
For information on the 40-Gigabit QSFP+ module, refer to *Cisco 40-Gigabit QSFP+ Transceiver Modules Installation Note* at:

[http://www.cisco.com/c/en/us/td/docs/interfaces\\_modules/transceiver\\_modules/installation/note/OL\\_24862.html](http://www.cisco.com/c/en/us/td/docs/interfaces_modules/transceiver_modules/installation/note/OL_24862.html)

## LEDs

You can use the switch LEDs to monitor switch activity and its performance. [Figure 1-8](#) shows the switch LEDs and the Mode button that you use to select a port mode.

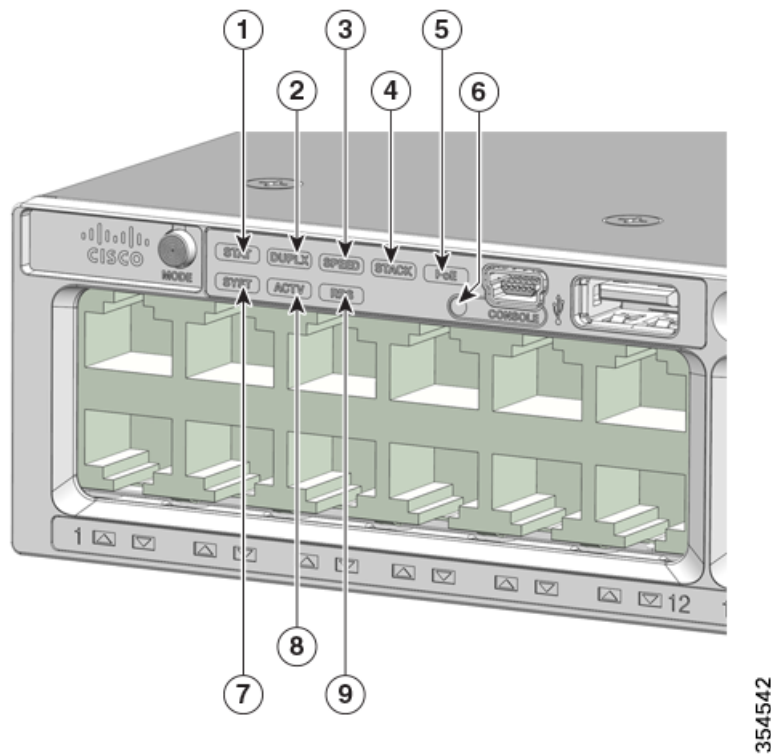
Figure 1-8 Switch Front Panel LEDs



1	STAT (status)	5	PoE <sup>1</sup>
2	DUPLX (duplex)	6	CONSOLE (USB mini-Type B (console) port)
3	SPEED	7	SYST (system)
4	STACK	8	ACTV (active)

1. Only switches with PoE+ or Cisco UPOE ports

Figure 1-9 Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches Front Panel LEDs



1	STAT (status)	6	CONSOLE (USB mini-Type B (console) port)
2	DUPLX (duplex)	7	SYST (system)
3	SPEED	8	ACTV (active)
4	STACK	9	RPS
5	PoE <sup>1</sup>		

1. Only switches with PoE+ ports.



**Note** The illustrations of the Catalyst 3650 switch are not intended to depict any particular color scheme. They are provided as a reference for various features and markings described within this guide.

## SYST LED

The LED colors for the switch and their corresponding status indications are given below:

**Table 1-2 SYST LED**

Color	System Status
Off	System is not powered on.
Green	System is operating normally.
Blinking green	Switch is running POST.
Blinking amber	There is a fault with one of the following: <ul style="list-style-type: none"> <li>Power supply</li> <li>Fan module</li> </ul>
Amber	System is receiving power but is not functioning properly.

## Port LEDs and Modes

Each Ethernet port, 1-Gigabit Ethernet module slot, and 10-Gigabit Ethernet module slot has a port LED. These port LEDs, either as a group, or individually, display information about the switch and the individual ports. The port mode determines the type of information shown by the port LEDs. [Table 1-3](#) lists the mode LEDs and their associated port modes and meanings.

To select or change a mode, press the **Mode** button until the desired mode is highlighted. When you change port modes, the meanings of the port LED colors also change. [Table 1-4](#) explains how to interpret the port LED colors in different port modes.

When you press the **Mode** button on any switch in the switch stack, all the stack switches change to show the same selected mode. For example, if you press the **Mode** button on the active switch to show the SPEED LED, all the other switches in the stack also show the SPEED LED.

**Table 1-3 Port Mode LEDs**

Mode LED	Port Mode	Description
STAT	Port status	The port status. This is the default mode.
SPEED	Port speed	The port operating speed: 10, 100 Mbps, 1 Gbps or 10 Gbps.
DUPLX	Port duplex mode	The port duplex mode—full duplex or half duplex.
ACTV	Active	The active switch status.
PoE <sup>1</sup>	PoE port power	The PoE port status.


1. Only switches with PoE+ or Cisco UPOE ports

**Table 1-4** *Meaning of Switch LED Colors in Different Modes*

Port Mode	Port LED Color	Meaning
STAT (port status)	Off	No link or port was administratively shut down.
	Green	Link present, but no activity.
	Blinking green	Activity. Port is sending or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, Cyclic Redundancy Check (CRC) errors, and alignment and jabber errors are monitored for a link-fault indication.
	Amber	Port is blocked by Spanning Tree Protocol (STP) and is not forwarding data.  After a port is reconfigured, the port LED can be amber for up to 30 seconds because STP checks the switch for possible loops.
SPEED	<b>10/100/1000/2.5G/5G/10G ports</b>	
	Off	Port is operating at 10 Mb/s.
	Green	Port is operating at 100 Mb/s.
	Single green flash (on for 100 ms, off for 1900 ms)	Port is operating at 1000 Mb/s.
	Double green flash	Port is operating at 2.5 Gbps, 5 Gbps, or 10 Gbps link speeds. Use CLI to determine link speed.
	<b>SFP+/QSFP+ ports</b>	
	Off	Port is not operating.
	Blinking green	Port is operating at up to 10 Gb/s.
DUPLX (duplex)	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.
ACTV (data active switch)	Off	The switch is not the active switch. <b>Note</b> For a standalone switch, this LED is off.
	Green	The switch is the active switch.
	Amber	Error during active switch election.
	Blinking green	Switch is a standby member of a data stack and assumes active responsibilities if the current active switch fails.
STACK (stack member)	Off	No stack member corresponding to that member number.
	Blinking green	Stack member number.
	Green	Member numbers of other stack member switches.



**Table 1-4** *Meaning of Switch LED Colors in Different Modes (continued)*

Port Mode	Port LED Color	Meaning
PoE <sup>1</sup>	Off	PoE is off.  If the powered device is receiving power from an AC power source, the port LED is off even if the device is connected to the switch port.
	Green	PoE is on. The port LED is green when the switch port is providing power.
	Alternating green and amber	PoE is denied because providing power to the powered device will exceed the switch power capacity.
	Blinking amber	PoE is off due to a fault or because it has exceeded a limit set in the switch software.  <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px;">  <p><b>Caution</b></p> </div> <div> <p>PoE faults occur when noncompliant cabling or powered devices are connected to a PoE port. Use only standards-compliant cabling to connect Cisco prestandard IP phones and wireless access points or IEEE 802.3af-compliant devices to PoE ports. You must remove any cable or device from the network if they cause a PoE+ fault.</p> </div> </div>
Amber	PoE for the port has been disabled.  <p><b>Note</b> PoE is enabled by default.</p>	

1. Only switches with PoE+ or Cisco UPOE ports

## USB Console LED

The USB console LED (Figure 1-8) shows whether there is an active USB connection to the port.

**Table 1-5** *USB Console Port LED*

Color	Description
Off	USB console is disabled.
Green	USB console is enabled.

## ACTV LED

The ACTV LED (Figure 1-8) shows the status of the switch being active or not.

**Table 1-6** *ACTV LED*

Color	Description
Off	Switch is not the active switch.
Green	Switch is the active switch or a standalone switch.

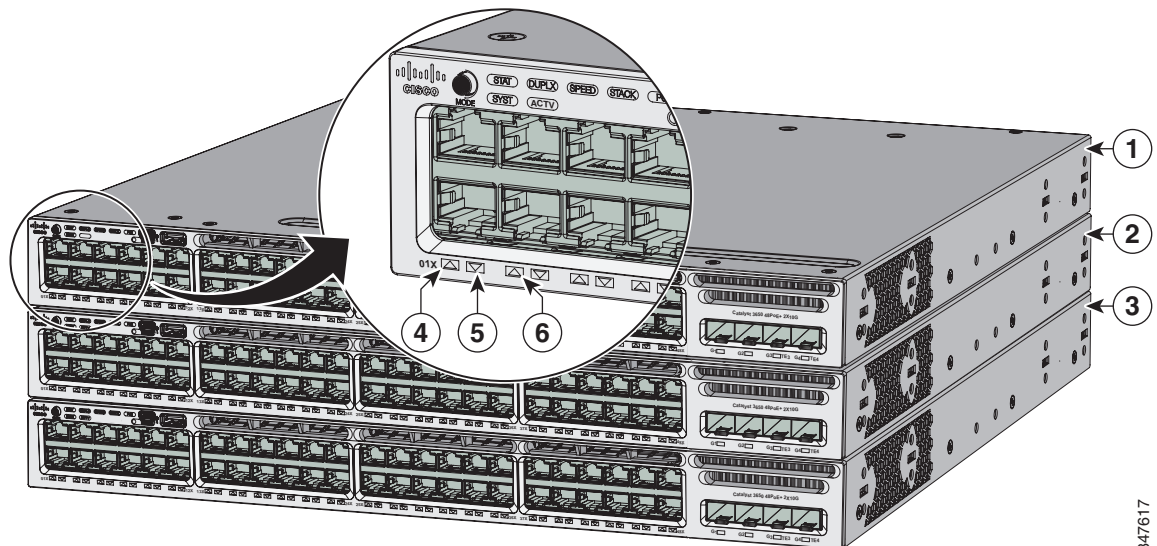
Table 1-6 ACTV LED (continued)

Color	Description
Amber	An error occurred when the switch was selecting the active switch, or another type of stack error occurred.
Slow blinking green	Switch is in stack standby mode.

## STACK LED

The STACK LED shows the sequence of member switches in a stack. Up to nine switches can be members of a stack. The first nine port LEDs show the member number of a switch in a stack. [Figure 1-10](#) shows the LEDs on the first switch, which is stack member number 1. For example, if you press the **Mode** button and select **Stack**, the LED for port 1 blinks green. The LEDs for port 2 and port 3 are solid green, as these represent the member numbers of other switches in the stack. The other port LEDs are off because there are no more members in the stack.

Figure 1-10 STACK LED



1	Stack member 1	4	LED blinks green to show that this is switch 1 in the stack.
2	Stack member 2	5	LED is solid green to show that switch 2 is a stack member.
3	Stack member 3	6	LED is solid green to show that switch 3 is a stack member.

When you select the STACK LED mode, the representative STACK LEDs are green when the StackWise ports are up, and the representative STACK LEDs are amber when the ports are down.

## RPS LED

The RPS LED is available only on the Catalyst 3650-24PDM and Catalyst 3650-48FQM switch models.

**Table 1-7 RPS LED**

Color	RPS Status
Off	RPS is off or not properly connected.
Green	RPS is connected and can provide backup power.
Blinking green	RPS is connected but is unavailable. It is providing power to another device (redundancy has been allocated to another device).
Amber	The RPS is in standby mode or in a fault condition. See the corresponding RPS documentation.
Blinking amber	The RPS is providing power to the switch.

## PoE LED

The PoE LED have the following colors to indicate the status.

**Table 1-8 PoE Mode LED**

Color	PoE+ Status
Off	PoE mode is not selected.
Green	PoE mode is selected, and the port LEDs show the PoE status.

## Uplink port LEDs

The uplink ports have various status LEDs. Each port LED is labeled according to its SFP and SFP+ module status.

For SFP ports, a G(x) labeling nomenclature is used, where G = 1 Gigabit and x = the port number. The G(x) label appears to the left of the uplink port LED.

For SFP+ ports, a TE(x) labeling nomenclature is used, where TE = 10 Gigabit and x = the port number. The TE(x) label appears to the right of the uplink port LED.

QSFP+ ports are labelled 1, 2, 3, and so on.

An SFP+ module ports has two labels, G(x) and TE(x), because it supports both SFP and SFP+ modules.

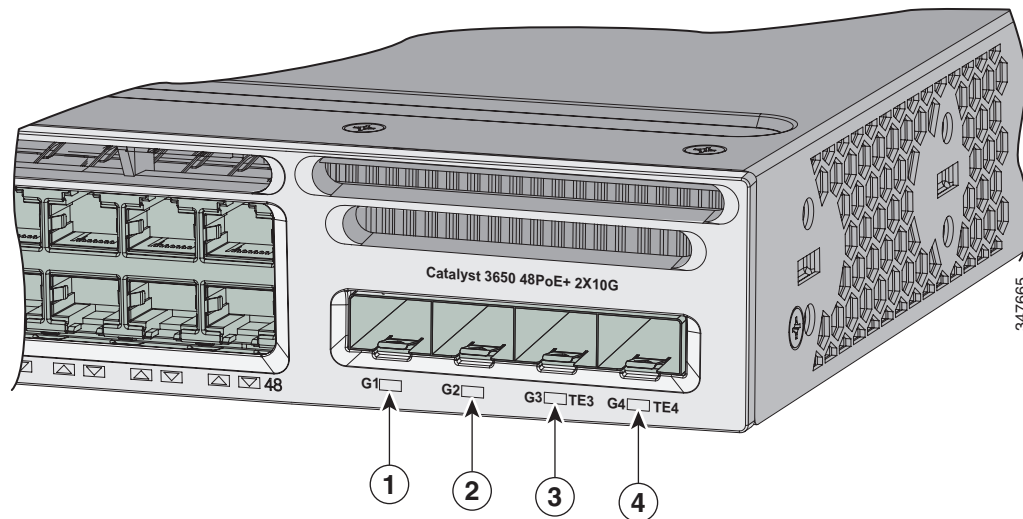
The uplink port labeling layouts for the various switch models are:

- Four uplink port LEDs labeled G1, G2, G3, G4—This labeling represents four ports supporting SFP modules.
- Four uplink port LEDs labeled G1, G2, G3, G4 and two right-side uplink port LEDs also labeled TE3 and TE4—This labeling represents two ports (left side) supporting SFP modules and two ports (right side) supporting SFP and SFP+ modules.
- Four uplink port LEDs labeled G1, G2, G3, G4 and TE1, TE2, TE3, TE4—This labeling represents four slots supporting SFP and SFP+ modules.
- Ports labelled 1 to 8—This labelling represents eight ports supporting SFP and SFP+ modules.
- Two ports labelled 40G1 and 40G2—This labelling represents QSFP+ uplink ports.
- Four uplink port LEDs labeled TE1, TE2, TE3, TE4—This labeling represents four slots supporting SFP and SFP+ modules.

- Two uplink port LEDs labeled TE1, TE2—This labeling represents two slots supporting SFP and SFP+ modules.

Figure 1-11 shows an example of an uplink port LED arrangement representing two SFP and two SFP+ ports (Catalyst 3650-48FD-S switch model).

**Figure 1-11 Uplink port LED**



<b>1</b>	G1 LED	<b>3</b>	G3, TE3 LED
<b>2</b>	G2 LED	<b>4</b>	G4, TE4 LED

**Table 1-9 Uplink Port LEDs**


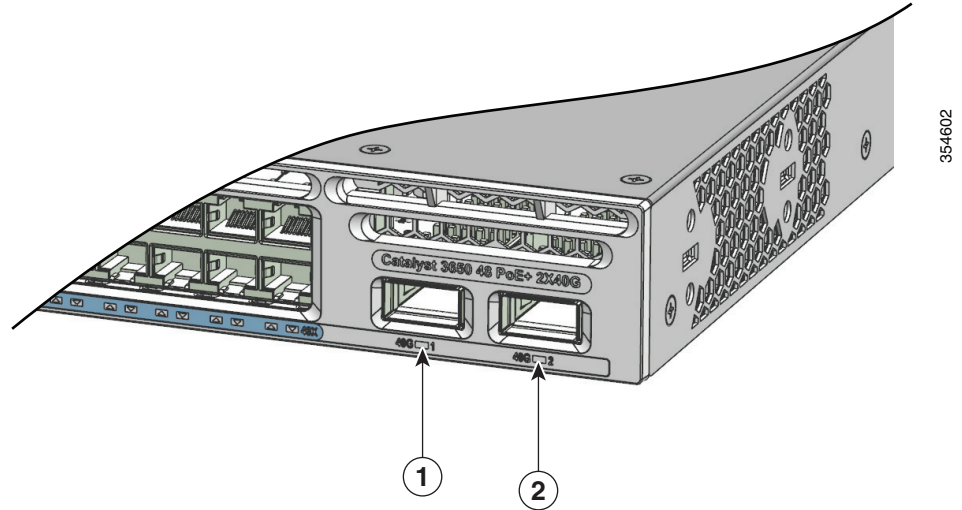
Color	Uplink Port Link Status
Off	Link is off.
Green	Link is on, no activity.
Blinking green	Activity on a link, no faults.
Blinking amber	Link is off due to a fault or because it has exceeded a limit set in the switch software.
	<p></p> <p><b>Caution</b> Link faults occur when noncompliant cabling is connected to an SFP or SFP+ port. Use only standards-compliant cabling to connect to Cisco SFP and SFP+ ports. You must remove any cable or device from the ports if they cause a link fault.</p>
Amber	Link for the SFP or SFP+ has been disabled.

Figure 1-12 shows an example of an uplink port LED arrangement representing QSFP+ ports (Catalyst 3650-12X48UZ-X switch models).


**Figure 1-12** QSFP+ ports for Catalyst 3650-12X48UZ-X Switches



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<b>1</b>	QSFP+ port 1	<b>2</b>	QSFP+ port 2
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**Table 1-10** Uplink Port LEDs on Catalyst 3650-12X48UZ-X Switches

Color	Uplink Port Link Status
Off	Link is off.
Green	Link is on, no activity.
Blinking green	Activity on a link, no faults.
Blinking amber	<p>Link is off due to a fault or because it has exceeded a limit set in the switch software.</p> <p> <b>Caution</b> Link faults occur when non-compliant cabling is connected to a QSFP+ port. Use only standards-compliant cabling to connect to Cisco QSFP+ ports. You must remove from the ports any cable or device that causes a link fault.</p>
Amber	Link for the QSFP+ port has been disabled.

## UID/Beacon LED

The UID and the Beacon LED can be turned on by the administrator to indicate that the switch needs attention. It helps the administrator identify the switch. The beacon can be turned on by either pressing the UID button on the switch front panel, or by using the CLI. There is a blue beacon on the front and rear panel of the switch. The blue beacon on the front panel is a button labeled UID, and on the back panel it is a LED labeled BEACON.

The following switch models have a UID LED:

- WS-C3650-8X24UQ-L/S/E
- WS-C3650-8X24PD-L/S/E
- WS-C3650-12X48UZ-L/S/E
- WS-C3650-12X48UR-L/S/E
- WS-C3650-12X48UQ-L/S/E
- WS-C3650-12X48FD-L/S/E

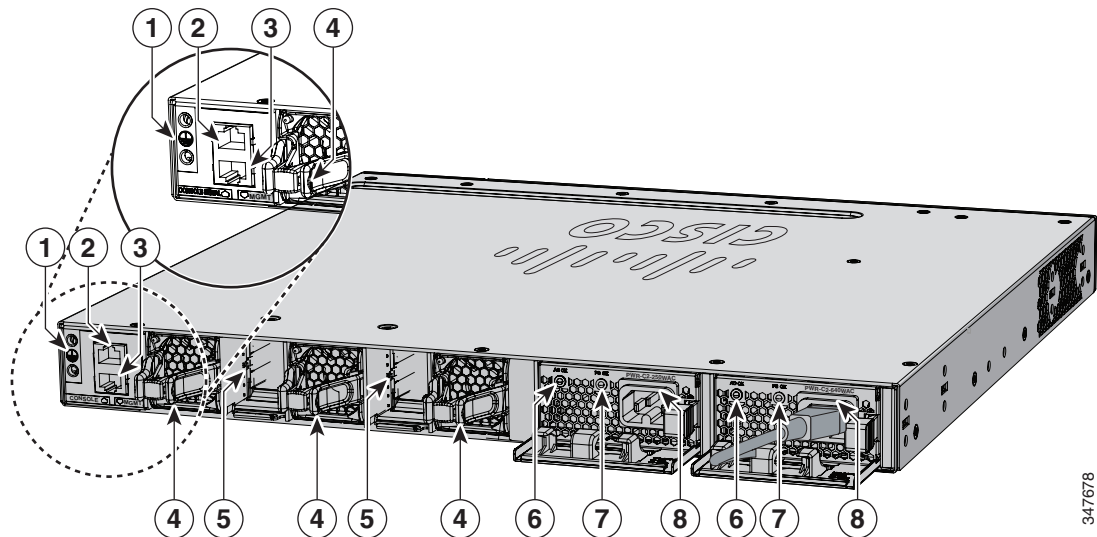
**Table 1-11** UID/Beacon LED Indicator

Color	Description
Solid blue	The operator has indicated that the system needs attention.

## Rear Panel

The switch rear panel includes StackWise connectors, ports, fan modules, and power supply modules. See [Figure 1-13](#).

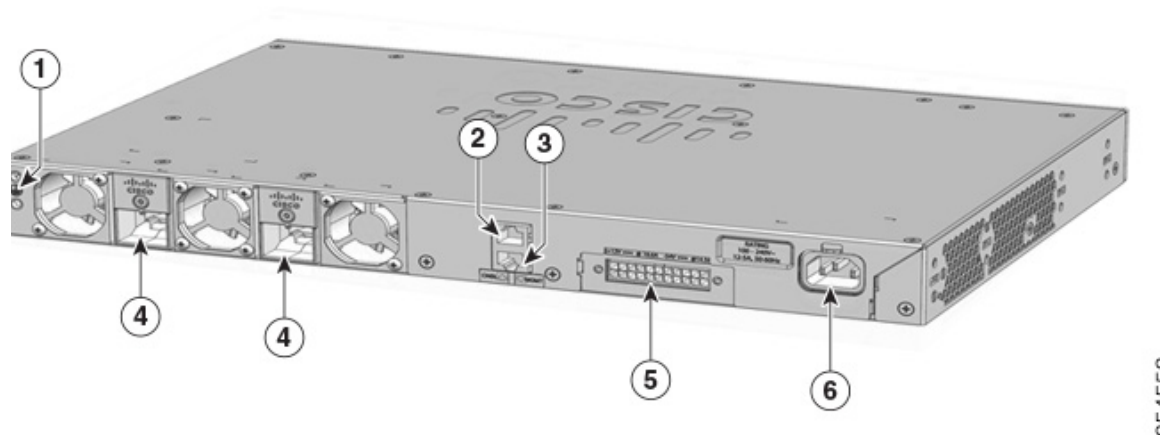
**Figure 1-13** Catalyst 3650 Switch Rear Panel



347678

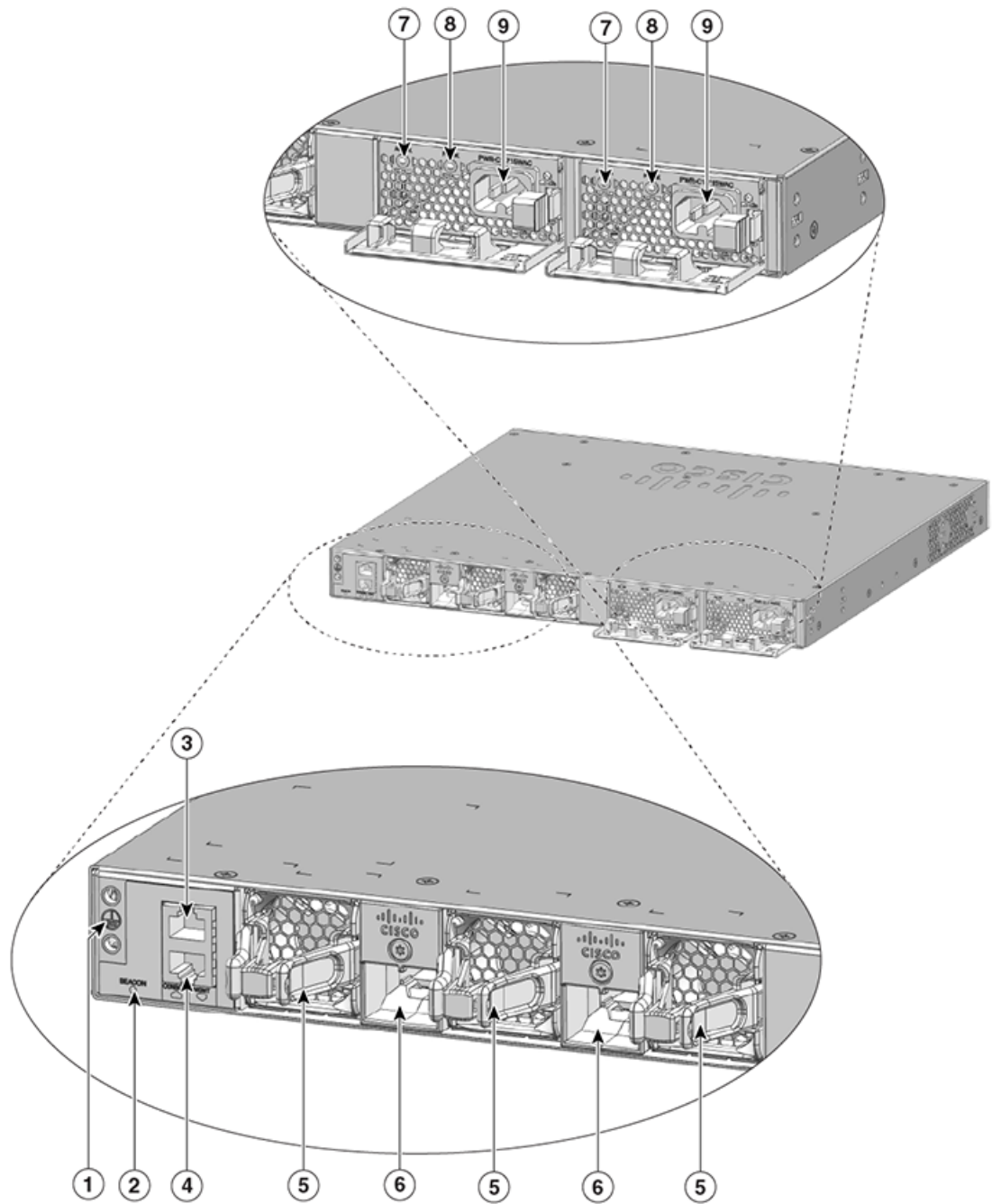
1	Ground connector	5	StackWise port connector
2	CONSOLE (RJ-45 console port)	6	AC OK (input) status LED
3	MGMT (RJ-45 10/100/1000 management port)	7	PS OK (output) status LED
4	Fan module	8	Power supply modules (AC power supply modules shown)

Figure 1-14 Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches' Rear Panel



1	Ground connector	4	Data stack ports
2	CONSOLE (RJ-45 console port)	5	Redundant Power Supply
3	MGMT (RJ-45 10/100/1000 management port)	6	Power Supply

Figure 1-15 Catalyst 3650-8X24UQ/PD and 3650-12X48FD/UQ/UR/UZ Switches Rear Panel



354595

1	Ground connector	6	Data stack ports
2	BEACON LED	7	AC OK (input) status LED



3	CONSOLE (RJ-45 console port)	8	PS OK (output) status LED
4	MGMT (RJ-45 10/100/1000 management port)	9	Power supply
5	Fan module		

Figure 1-15 is a representative illustration for the following switch models:

- WS-C3650-8X24UQ-L/S/E
- WS-C3650-8X24PD-L/S/E
- WS-C3650-12X48UZ-L/S/E
- WS-C3650-12X48UR-L/S/E
- WS-C3650-12X48UQ-L/S/E
- WS-C3650-12X48FD-L/S/E

## RJ-45 Console Port LED

The RJ-45 Console Port LED indicates whether the RJ-45 console is enabled or disabled.

**Table 1-12 RJ-45 Console Port LED**

Color	RJ-45 Console Port Status <sup>1</sup>
Off	RJ-45 console is disabled. USB console is active.
Green	RJ-45 console is enabled. USB console is disabled.

1. The USB console has priority over the RJ-45 console.

## StackWise Ports

StackWise ports are used to connect switches in StackWise stacking configurations. StackWise cables are used to connect the StackWise ports for stacking.

A StackWise adapter must be installed in a StackWise port to enable stacking. StackWise adapter blanks installed in the StackWise ports is the default setup.

For Catalyst 3650 switches in which stacking is specified, StackWise adapters are preinstalled in the StackWise ports, and optional StackWise cables can be ordered. When stacking is not specified, but is required, the StackWise adapter blanks must be removed and StackWise adapters installed.



### Caution

Use only approved cables, and connect only to similar Cisco equipment. Equipment might be damaged if connected to nonapproved Cisco cables or equipment.



### Note

You cannot have a switch stack containing a mix of Catalyst 3650 and Catalyst 3850 switches.

## Power Supply Modules

The 24-port and 48-port switches are powered through one or two internal power supply modules.

The switch has two internal power supply module slots. You can use two AC modules, two DC modules, a mixed configuration of one AC and one DC power supply module, or one power supply module and a blank cover. The switch can operate with either one or two active power supply modules.

[Table 1-1](#) shows the default power supply modules that ship with each switch model. All power supply modules (except the blank covers) have internal fans. All switches ship with a blank cover in the second power supply slot if switches are configured with only one power supply.



### Caution

Do not operate the switch with one power supply module slot being empty. For proper chassis cooling, both the power supply module slots must be populated, or with either a power supply or a blank cover.

- [Power Supply for Catalyst 3650-24TS/PS/TD/PD and Catalyst 3650-48TS/PS/FS/TD/PD/FD/FQ/PQ/TQ Switches, page 1-32](#)
- [Power Supply Module for Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches, page 1-33](#)
- [Power Supply for Catalyst 3650-8X24UQ/PD and Catalyst 3650-12X48FD/UQ/UR/UZ Switches, page 1-34](#)
- [Power Supply Module LEDs, page 1-35](#)

## Power Supply for Catalyst 3650-24TS/PS/TD/PD and Catalyst 3650-48TS/PS/FS/TD/PD/FD/FQ/PQ/TQ Switches

For the following Catalyst switch models:

- WS-C3650-24TS-L/S/E
- WS-C3650-48TS-L/S/E
- WS-C3650-24PS-L/S/E
- WS-C3650-48PS-L/S/E
- WS-C3650-48FS-L/S/E
- WS-C3650-24TD-L/S/E
- WS-C3650-48TD-L/S/E
- WS-C3650-24PD-L/S/E
- WS-C3650-48PD-L/S/E
- WS-C3650-48FD-L/S/E
- WS-C3650-48FQ-L/S/E
- WS-C3650-48PQ-L/S/E
- WS-C3650-48TQ-L/S/E
- WS-C3650-24PDM-L/S/E
- WS-C3650-48FQM-L/S/E

the following power supply modules are supported:

- PWR-C2-250WAC

- PWR-C2-640WAC
- PWR-C2-1025WAC
- PWR-C2-640WDC

## Power Supply Module Specifications

This section specifies the power requirements for Catalyst 3650 switches.

**Table 1-13 Available PoE with AC Power Supply**

Model	Default Power Supply	Available PoE Power
24-port data switch	PWR-C2-250WAC	—
48-port data switch		
24-port PoE switch	PWR-C2-640WAC	390 W
48-port PoE switch		
48-port full PoE switch	PWR-C2-1025WAC	775 W

**Table 1-14 Available PoE with DC Power Supply<sup>1</sup>**

Model	Number of Power Supplies	Available PoE Power
24-port PoE switch	1	390 W
	2	780 W
48-port PoE switch	1	390 W
	2	780 W

1. The 640-W DC (PWR-C2-640WDC) power supply is the only DC module.

**Table 1-15 Switch Power Supply Requirements for PoE and PoE+**

PoE Option	24-Port Switch	48-Port Switch <sup>1</sup>
PoE (up to 15.4 per port)	(1) 640 W	Power supply combinations: <ul style="list-style-type: none"> <li>• (1) 1025 W</li> <li>• (1) 640 W + (1) 640 W</li> </ul>
PoE+ (up to 30 W per ports)	Power supply combinations: <ul style="list-style-type: none"> <li>• (1) 1025 W</li> <li>• (1) 640 W + (1) 640 W</li> </ul>	Power supply combinations: <ul style="list-style-type: none"> <li>• (2) 1025 W</li> </ul>

1. A 48-port switch with one 640-W power supply provides up to 390 W of PoE to all ports.

## Power Supply Module for Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches

The Catalyst WS-3650-24PDM and Catalyst WS-3650-48FQM switches come with fixed power supplies. Unlike the other Catalyst 3650 switches, they do not have slots for changing the power supplies.

**Table 1-16 Available PoE with Fixed Power Supply**

Model	Power Supply	Available PoE Power
24-port PoE switch	640 W	390 W
48-port PoE switch	975 W	775 W

## Power Supply for Catalyst 3650-8X24UQ/PD and Catalyst 3650-12X48FD/UQ/UR/UZ Switches

The Catalyst switch models and their supported power modules are shown below:

**Table 1-17 Switch Models and Supported Power Supply Modules**

Switch Model	Supported Power Supply Modules
WS-C3650-8X24UQ-L/S/E	PWR-C1-715WAC PWR-C1-1100WAC (default at bay 1)
WS-C3650-8X24PD-L/S/E	PWR-C1-715WAC (default at bay 1) PWR-C1-1100WAC
WS-C3650-12X48UZ-L/S/E	PWR-C1-715WAC PWR-C1-1100WAC (default at bay 1)
WS-C3650-12X48UR-L/S/E	PWR-C1-715WAC PWR-C1-1100WAC (default at bay 1)
WS-C3650-12X48UQ-L/S/E	PWR-C1-715WAC PWR-C1-1100WAC (default at bay 1)
WS-C3650-12X48FD-L/S/E	PWR-C1-715WAC PWR-C1-1100WAC (default at bay 1)

Regardless of which power supply is used, some power is drawn by the switch, and the remaining is available for connected devices.

**Table 1-18 Available PoE with AC Power Supply**

Model	Drawn by the Switch	Available for Connected Devices
24-port Cisco UPOE switch	280 W	Power Supply – 280-W
48-port Cisco UPOE switch	440 W	Power Supply – 440 W

As an example, if the default power supply of 1100-W is used, the power available for connected devices will be as follows:

**Table 1-19 Available PoE with AC Power Supply**

Model	Power Supply	Available PoE Power
24-port Cisco UPOE switch	1100 W	820 W
48-port Cisco UPOE switch	1100 W	660 W

**Table 1-20 Switch Power Supply Requirements for Catalyst 3650-8X24UQ/PD and Catalyst 3650-12X48FD/UQ/UR/UZ Switches**

24-Port Switch	48-Port Switch
Power supply combinations:	Power supply combinations:
<ul style="list-style-type: none"> <li>• (2) 1100 W AC</li> <li>• (2) 715 W AC</li> <li>• (1) 1100 W AC + (1) 715 W AC</li> </ul>	<ul style="list-style-type: none"> <li>• (2) 1100 W AC</li> <li>• (2) 715 W AC</li> <li>• (1) 1100 W AC + (1) 715 W AC</li> </ul>

## Power Supply Module LEDs

The power supply modules have two status LEDs.

**Table 1-21 Switch Power Supply Module LEDs**

AC Power Supply Module LEDs			
AC OK	Description	PS OK	Description
Off	No AC input power.	Off	Output is disabled, or input is outside operating range (AC LED is off).
Green	AC input power present.	Green	Power output to switch active.
		Red	Output has failed.
DC Power Supply Module LEDs			
DC OK	Description	PS OK	Description
Off	No DC input power.	Off	Output is disabled, or input is outside operating range (DC LED is off).
Green	DC input power present.	Green	Power output to switch active.
		Red	Output has failed.

## RPS Connector

The Cisco Redundant Power Supply (RPS) 2300 (Model PWR-RPS2300) supports the Catalyst 3650-24PDM and Catalyst 3650-48FQM switches.

**Warning**


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**Attach only the following Cisco RPS model to the RPS receptacle: RPS2300. Statement 370**

---

Connect the switch and the redundant power system to different AC power sources.

Use the CAB-RPS2300-E cable for the RPS.

## Cisco RPS 2300

Cisco RPS 2300 is a redundant power system that can support six external network devices and provide power to one or two failed devices at a time. It senses when the internal power supply of a connected device fails and provides power to the failed device, preventing loss of network traffic. For more information, see the *Cisco Redundant Power System 2300 Hardware Installation Guide*: [http://www.cisco.com/en/US/products/ps7148/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/ps7148/prod_installation_guides_list.html)

The Cisco RPS 2300 has two output levels, 52 V and 12 V, with a total maximum output power of 2300 W.

All supported and connected switches can simultaneously communicate with the RPS 2300. You can configure these RPS 2300 features through the switch software:

- Enable RPS active or standby mode for each connected switch
- Configure switch priority for RPS support
- List the connected switches and the power supply module sizes
- Obtain reports when a switch is powered by the RPS
- Obtain status reports for the RPS power supply module
- Read and monitor backup, failure, and exception history

## Fan Modules

The switch has three internal hot-swappable 12-V fan modules. The air circulation system consists of the fan modules and the power supply modules. The airflow patterns vary depending on the power supply configuration.

**Figure 1-16** shows the airflow patterns for the 24-port and 48-port switches. The blue arrow shows cool air flow, and the red arrow shows warm air flow. When the fan modules are operating properly, a green LED is on at the top left corner of the fan assembly (viewed from the rear). If the fan fails, the LED turns to amber. The switch can operate with two operational fans, but the failed fan should be replaced as soon as possible to avoid a service interruption due to a second fan fault.

**Note**


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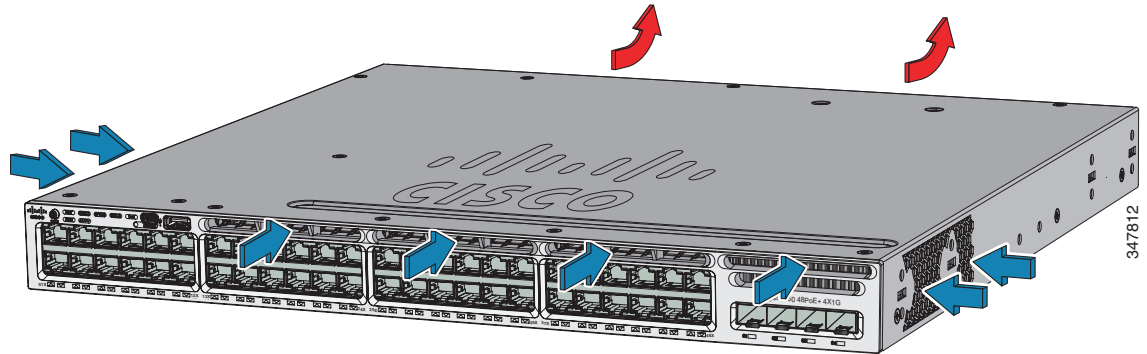
Three fans are required for proper cooling.

---

**Table 1-22**      **Switch Fan Module**

Fan Module	Description
FAN-T1=	Fan module

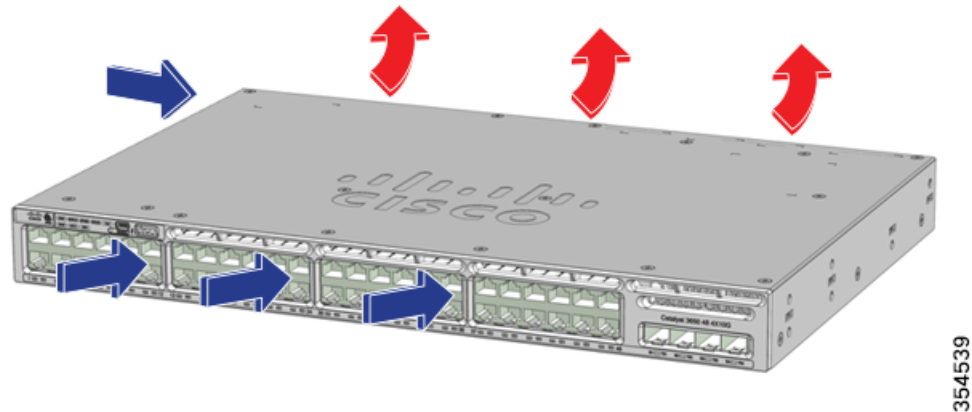
**Figure 1-16** 24-Port and 48-Port Switch Airflow Patterns



## Fan Airflow for Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches

The Catalyst 3650-24PDM and Catalyst 3650-48FQM switches have fixed fan modules. Unlike the other Catalyst 3650 switches, they do not have slots for changing the fan modules.

**Figure 1-17** Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches' Airflow Pattern



## Management Ports

The switch configurations can be managed through a 10/100/1000 Ethernet port or an RJ-45 console port.

### Ethernet Management Port

You can connect the switch to a host such as a Windows workstation or a terminal server through the 10/100/1000 Ethernet management port, or one of the console ports (see [Figure 1-13](#)). The 10/100/1000 Ethernet management port is a VPN routing and forwarding interface and uses an RJ-45 crossover cable or straight-through cable.

**Note**

The 10/100/1000 Ethernet management port is an RJ-45 connector that should be connected to a Windows workstation or a terminal server. Do not connect this port to another port in the same switch or to any port within the same switch stack.

Table 1-23 shows the Ethernet management port LED colors and their meanings.

**Table 1-23 Ethernet Management Port LED**

Color	Description
Green	Link up but no activity.
Blinking green	Link up and activity.
Off	Link down.

## RJ-45 Console Port

The RJ-45 console port connection uses the supplied RJ-45-to-DB-9 female cable.

Table 1-24 shows the RJ-45 console port LED colors and their meanings.

**Table 1-24 RJ-45 Console LEDs**

Color	Description
Green	RJ-45 console port is active.
Off	The port is not active.

## Management Options

- Configuration Wizard

The Configuration Wizard is a web-based controller user interface (UI) that lets you complete the initial wireless configuration after you configure the IP address, local username, and password or authorization using the authentication server. Using the web UI, you can configure the controller, WLAN, and radios for all initial operations, establish management parameters, set security policies, access software management commands, configure system logs, and other tasks.

For more information on using the Configuration Wizard, see the *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at

<http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

- Cisco Network Assistant

Cisco Network Assistant is a PC-based network management GUI application for LANs. You can use the GUI to configure and manage switch clusters or standalone switches. Cisco Network Assistant can be downloaded from the following URL:

<http://www.cisco.com/cgi-bin/tablebuild.pl/NetworkAssistant>



For information on starting the Network Assistant application, see the *Getting Started with Cisco Network Assistant* guide at <http://www.cisco.com/c/en/us/support/cloud-systems-management/network-assistant/products-installation-guides-list.html>.

- Device Manager

You can use Device Manager, which is in the switch memory, to manage individual and standalone switches. This web interface offers quick configuration and monitoring. You can access Device Manager from anywhere in your network through a web browser. For more information, see the *Catalyst 3650 Switch Getting Started Guide* at [http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650\\_gsg.html](http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650_gsg.html).

- Cisco IOS CLI

You can configure and monitor the switch and switch cluster members from the CLI. You can access the CLI by connecting your management station directly to the switch console port or by using Telnet from a remote management station. See the *Cisco Catalyst 3650 Series Switches Command Reference Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-command-reference-list.html>.

- Cisco Prime Infrastructure

Cisco Prime Infrastructure combines the wireless functionality of Cisco Prime Network Control System (NCS) and the wired functionality of Cisco Prime LAN Management Solution (LMS), with the application performance monitoring and troubleshooting capabilities of Cisco Prime Assurance Manager. For more information, see the Cisco Prime Infrastructure documentation at:

<http://www.cisco.com/en/US/products/ps12239/index.html>

## Network Configurations

See the switch's software configuration guide on Cisco.com for network configuration concepts and examples about how to use the switch to create dedicated network segments and interconnecting the segments through Gigabit Ethernet connections.





# Switch Installation

---

This chapter describes how to install and connect a Catalyst 3650 switch. It also includes planning and cabling considerations for stacking switches.

Read the topics and perform the procedures in this order:

1. [Preparing for Installation, page 2-1](#)
2. [Planning a Switch Data Stack, page 2-5](#)
3. [Installing the Switch, page 2-9](#)
4. [Installing the StackWise Ports, page 2-15](#)
5. [Installing and Removing an SFP and SFP+ Module, page 2-17](#)
6. [Connecting a Device to an Ethernet Port, page 2-19](#)
7. [Where To Go Next, page 2-21](#)

For initial switch setup, how to assign the switch IP address, and for powering information, see the switch getting started guide on Cisco.com.

## Preparing for Installation

Ensure that the following sections are read and understood carefully before the switch is installed.

## Safety Warnings

This section includes the basic installation caution and warning statements. Translations of the warning statements appear in the *Regulatory Compliance and Safety Information for the Catalyst 3650 Switch* at [http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/regulatory/compliance/cat3650\\_rcsi.html](http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/regulatory/compliance/cat3650_rcsi.html). Read this section before you start the installation procedure.



**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.** Statement 43

---



**Warning**

---

**Do not stack the chassis on any other equipment. If the chassis falls, it can cause severe bodily injury and equipment damage.** Statement 48

---

**Warning**

---

**Ethernet cables must be shielded when used in a central office environment.** Statement 171

---

**Warning**

---

**Voice over IP (VoIP) service and the emergency calling service do not function if power fails or is disrupted. After power is restored, you might have to reset or reconfigure equipment to regain access to VoIP and the emergency calling service. In the USA, this emergency number is 911. You need to be aware of the emergency number in your country.** Statement 361

---

**Warning**

---

**Attach only the following Cisco external power system to the switch: PWR-RPS2300.** Statement 387

---

**Warning**

---

**Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001

---

**Warning**

---

**Read the installation instructions before connecting the system to the power source.** Statement 1004

---

**Warning**

---

**This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.** Statement 1017

---

**Warning**

---

**The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.** Statement 1019

---

**Warning**

---

**Use copper conductors only.** Statement 1025

---

**Warning**

---

**This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028

---

**Warning**

---

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

---

**Warning**

---

**Ultimate disposal of this product should be handled according to all national laws and regulations.** Statement 1040

---

**Warning**

---

**For connections outside the building where the equipment is installed, the following ports must be connected through an approved network termination unit with integral circuit protection: 10/100/1000 Ethernet.** Statement 1044

---

**Warning**

**To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 113°F (45°C)** Statement 1047

**Warning**

**No user-serviceable parts inside. Do not open.** Statement 1073

**Warning**

**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

**Warning**

**To prevent airflow restriction, allow clearance around the ventilation openings to be at least: 3 in. (7.6 cm)** Statement 1076

**Caution**

To comply with the Telcordia GR-1089 Network Equipment Building Systems (NEBS) standard for electromagnetic compatibility and safety, connect the Ethernet cables only to intrabuilding or nonexposed wiring or cabling.

**Caution**

To comply with the Telcordia GR-1089 NEBS standard, PoE or non-PoE 10/100/1000 Ethernet port cables that exit from either the left or right side of the switch should be routed and tied to the nearest rack metal.

**Note**

The grounding architecture of this product is DC-isolated (DC-I).

## Installation Guidelines

Before installing the switch, verify that these guidelines are met.

- For the clearance to the front and rear panels, make sure that:
  - Front-panel indicators can be easily read.
  - Clearance is at least 4.4 in. (11.1 cm) from the switch's rear panel.
  - Access to ports is sufficient for unrestricted cabling.
  - AC power cord can reach from the AC power outlet to the connector on the switch's rear panel.
  - The SFP or SFP+ module minimum bend radius and connector length are met. See the corresponding SFP or SFP+ module documentation for more information.
  - Access to the rear of the rack is sufficient for connecting the optional Cisco RPS 2300 module.
- For switches with the optional 1025-W power supply module (PWR-C2-1025WAC) or the 1100-W power supply module (PWR-C1-1100WAC), rack-mount the switch before installing the power supply module.
- Ensure that the power supply modules and fan modules are securely inserted in the chassis before moving the switch.

- When connecting or disconnecting the power cord on a switch that is installed above or below a 1025 W or 1100 W power supply-equipped switch, you might have to remove the module from the switch to access the power cord.
- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent lighting fixtures. Make sure that cabling is safely away from other devices that might damage the cables.
- For copper connections on Ethernet ports, cable lengths from the switch to connected devices can be up to 328 feet (100 meters).
- Each port must match the wave-length specifications on the other end of the cable, and the cable must not exceed the maximum cable length.
- Operating environment is within the correct ranges.
- Airflow around the switch and through the vents is unrestricted.
- Temperature around the unit does not exceed 113°F (45°C). If the switch is installed in a closed or multirack assembly, the temperature around it might be greater than normal room temperature.
- Cisco Ethernet switches are equipped with cooling mechanisms, such as fans and blowers. However, these fans and blowers can draw dust and other particles, causing contaminant build-up inside the chassis, which can result in system malfunction. You must install this equipment in an environment that is as free from dust and foreign conductive material (such as metal flakes from construction activities), as is possible.
- The following standards provide guidelines for acceptable working environments and acceptable levels of suspended particulate matter:
  - Network Equipment Building Systems (NEBS) GR-63-CORE (only with the DC power supply)
  - National Electrical Manufacturers Association (NEMA) Type 1
  - International Electrotechnical Commission (IEC) IP-20

## Tools and Equipment

Obtain these necessary tools and equipment:

- A number-2 Phillips screwdriver to rack-mount the switch.
- A Torx T15 screwdriver, or the Torx T15 key that ships with StackWise upgrade kits, to install the StackWise adapter.

## Verifying Switch Operation

Before you install the switch in a rack, or on a table or shelf, you should power on the switch and verify that the switch passes POST. For the steps that should be performed to connect a PC to the switch and to run the Express Setup, see the “Running Express Setup” section in the *Catalyst 3650 Switch Getting Started Guide* at

[http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650\\_gsg.html](http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650_gsg.html).



### Note

When you connect the RPS to the switch, put the RPS in standby mode. Set the RPS to active mode during normal operation.

**Warning****Attach only the following Cisco external power system to the switch: PWR-RPS2300.** Statement 387

## Powering Off the Switch

After a successful POST, disconnect the power cord from the switch. Install the switch in a rack, on a table, or on a shelf, as described in [Chapter 2, “Installing the Switch,”](#) section.

# Planning a Switch Data Stack

Catalyst 3650 switches can share bandwidth by using data stacking.

## Switch Stacking Guidelines

For general concepts and management procedures for switch stacks, see the *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at

<http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

A StackWise adapter must be installed in the stacking port to enable stacking. The StackWise cable connects to the StackWise adapter in the stacking port. For switches ordered with stacking, the StackWise adapters are preinstalled. If the switch is not ordered with stacking, the adapters must be ordered separately and installed.

Before connecting the switches in a stack, observe these stacking guidelines:

- Size of the switch and any optional power supply module. The 1025-W and 1100-W power supply modules are longer than the other modules. Stacking switches with the same power supply modules makes it easier to cable the switches.
- Length of the StackWise cable. Depending on the configurations that you have, you might need different-sized StackWise cables. If you do not specify the length of the StackWise cable, the 0.5-meter cable is supplied. If you need the 1-meter cable or the 3-meter cable, you can order it from your Cisco supplier. The [“Data Stack Cabling Configurations”](#) section on page 2-5 provides examples of recommended configurations.
- Minimum bend radius and coiled diameter for StackWise cables. We recommend a minimum bend radius and coiled diameter for each StackWise cable.
- Data stacks can be created with up to nine switches in a stack.

**Note**

You cannot have a switch stack containing a mix of Catalyst 3650 and Catalyst 3850 switches.

## Data Stack Cabling Configurations

[Figure 2-1](#) is an example of a recommended configuration that uses the supplied 0.5-meter StackWise cable. In this example, the switches are stacked in a vertical rack or on a table. This configuration provides redundant connections.

The configuration example (Figure 2-1) uses the supplied 0.5-meter StackWise cable. The example shows the full-ring configuration that provides redundant connections.

**Figure 2-1** Data Stacking the Catalyst 3650 Switches in a Rack or on a Table Using the 0.5-meter StackWise Cables

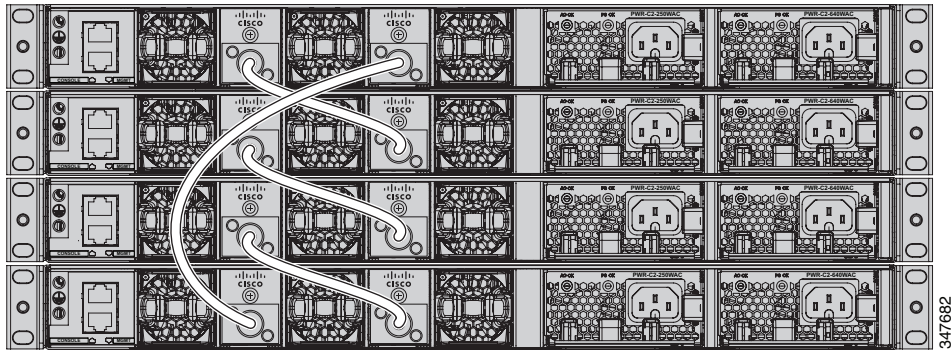
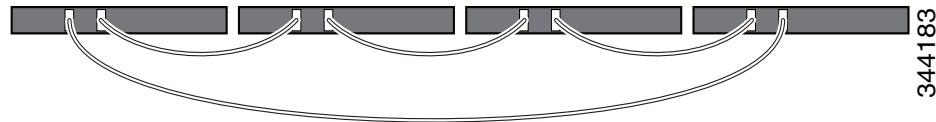


Figure 2-2 shows a recommended configuration when the switches are mounted side-by-side. Use the 1-meter and the 3-meter StackWise cables to connect the switches. This configuration provides redundant connections.

**Figure 2-2** Data Stacking up to Four Switches in a Side-by-Side Mounting



## Data Stack Bandwidth and Partitioning Examples

This section provides examples of data stack bandwidth and possible data stack partitioning.

Figure 2-3 shows a data stack of Catalyst 3650 switches that provides full bandwidth and redundant StackWise cable connections.

**Figure 2-3** Example of a Data Stack with Full Bandwidth Connections

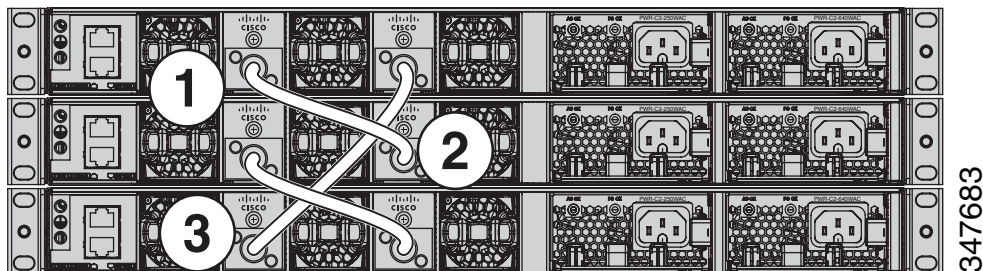




Figure 2-4 shows an example of a stack of Catalyst 3650 switches with incomplete StackWise cabling connections. This stack provides only half bandwidth and does not have redundant connections.

**Figure 2-4** Example of a Data Stack with Half Bandwidth Connections

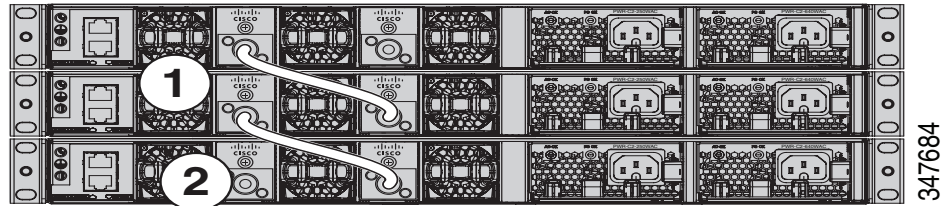
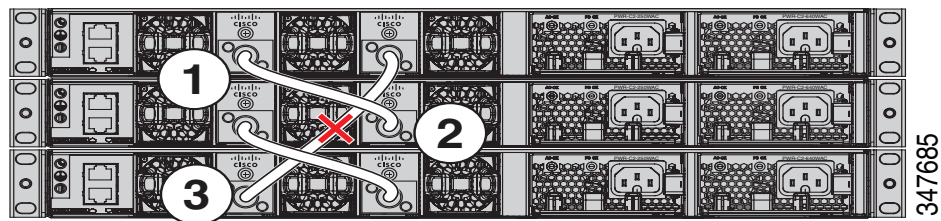
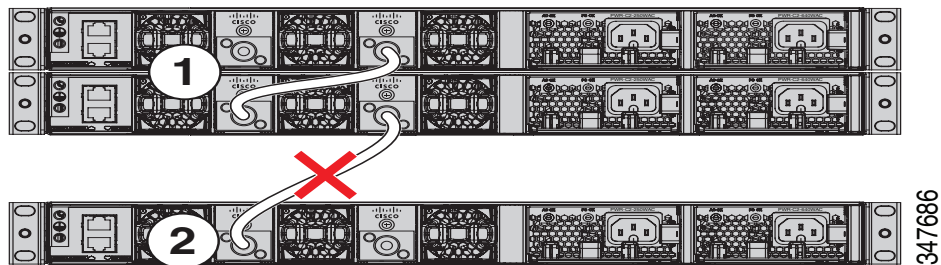


Figure 2-5 and Figure 2-6 show data stacks of Catalyst 3650 switches with failover conditions. In Figure 2-5, the StackWise cable is bad in link 2. Therefore, this stack provides only half bandwidth and does not have redundant connections. In Figure 2-6, link 2 is bad. Therefore, this stack partitions into two stacks, and the top and bottom switches become the active switches in the stack. If the bottom switch is a member (not the active or standby switch), it reloads.

**Figure 2-5** Example of a Data Stack with a Failover Condition



**Figure 2-6** Example of a Partitioned Data Stack with a Failover Condition



## Power-On Sequence for Switch Data Stacks

Consider these guidelines before you power on the switches in a stack:

- The sequence in which the switches are first powered on might affect the choice of switch that becomes the active switch and the standby switch.
- There are two ways to elect an active switch:
  - If you want a particular switch to become the active switch, configure it with the highest priority. Among switches with same priority, the switch with the lowest MAC address becomes the active switch.

- If you want a particular switch to become the active switch, power on that switch first. This switch remains the active switch until a re-election is required. After 2 minutes, power on the other switches in the stack. If you have no preference as to which switch becomes the active switch, power on all the switches in the stack within 1 minute. These switches participate in the active switch election. Switches powered on after 2 minutes do not participate in the election.

If changes are made to the stack without powering down the switches, the following results might occur:

- If two operating partial-ring stacks are connected together using a stack cable, a stack merge might occur. This situation reloads the whole stack (all the switches in the stack).
- If some switches in the stack are completely separated from the stack, a stack split might occur.
- A stack split might occur on a full-ring stack if:
  - More than one running switch is removed without powering down.
  - More than one stack cable is removed without powering down.
- A stack split might occur in a partial-ring stack if:
  - A switch is removed without powering down.
  - A stack cable is removed without powering down.
- In a split stack, depending on where the active and standby switches are located, either two stacks might be formed (with the standby taking over as the new active switch in the newly formed stack), or all the members in the newly formed stack might reload.




---

**Note** These results depend on how the switches are connected. You can remove two or more switches from the stack without splitting the stack.

---

For conditions that may cause a stack re-election or to manually elect the active switch, see the switch's software configuration guide at:

[http://www.cisco.com/go/cat3650\\_docs](http://www.cisco.com/go/cat3650_docs)

## Changes to Switch Stack Membership

If you replace a stack member with an identical model, the new switch functions with exactly the same configuration as the replaced switch, assuming that the new switch (referred to as the provisioned switch) is using the same member number as the replaced switch.

The operation of the switch stack continues uninterrupted during membership changes unless you remove the active switch or you add powered-on standalone switches or switch stacks.



**Note**

---

A switch stack always has one active switch and one standby switch. The active switch contains the saved and running configuration files for the switch stack. If the active switch becomes unavailable, the standby switch assumes the role of the active switch, and continues to keep the stack operational.

---

For powered-on switches:

- Adding powered-on switches (merging) causes all the switches to reload and elect a new active switch from among themselves. The newly elected active switch retains its role and configuration. All the other switches change their stack member numbers to the lowest available numbers and use the stack configuration of the newly elected active switch.

- Removing powered-on stack members causes the switch stack to divide (partition) into two or more switch stacks, each with the same configuration. This can cause an IP address configuration conflict in your network. If you want the switch stacks to remain separate, change the IP address or addresses of the newly created switch stacks.

If a newly created switch stack does not have an active switch or standby switch, the switch stack will reload and elect a new active switch.

**Note**

Make sure that you power off the switches that you add to or remove from the switch stack.

After adding or removing stack members, make sure that the switch stack is operating at full bandwidth. Press the **Mode** button on a stack member until the Stack mode LED is on. The last two right port LEDs on all the switches in the stack should be green. Depending on the switch model, the last two right ports are 10-Gigabit Ethernet ports or small form-factor pluggable (SFP) module ports (10/100/1000 ports). If one or both of these LEDs are not green on any of the switches, the stack is not operating at full bandwidth.

If you remove the powered-on members but do not want to partition the stack:

- Power off the switches in the newly created switch stacks.
- Reconnect them to the original switch stack through their stack ports.
- Power on the switches.

## Installing the Switch

The illustrations shown in this section show the Catalyst 3650-48 PoE+ switch as an example. You can install other Catalyst 3650 switches following the same procedures.

## Rack-Mounting a Switch

To install the switch in a 19-inch rack, follow the instructions described in this section.

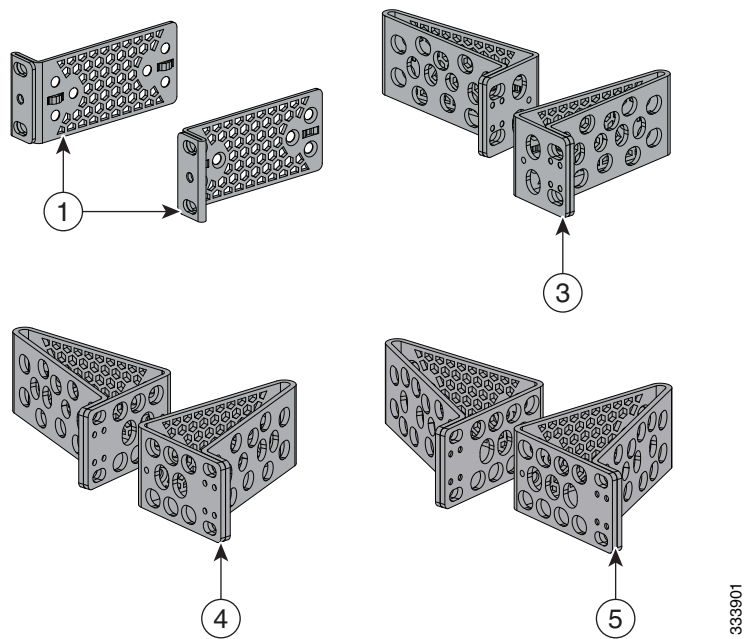
**Warning**

**To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**

- **This unit should be mounted at the bottom of the rack if it is the only unit in the rack.**
- **When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.**
- **If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.** Statement 1006

The 19-inch brackets are included with the switch. Installing the switch in other rack types requires an optional bracket kit that is not included with the switch. [Figure 2-7](#) shows the mounting brackets and part numbers.

Figure 2-7 Rack-Mounting Brackets

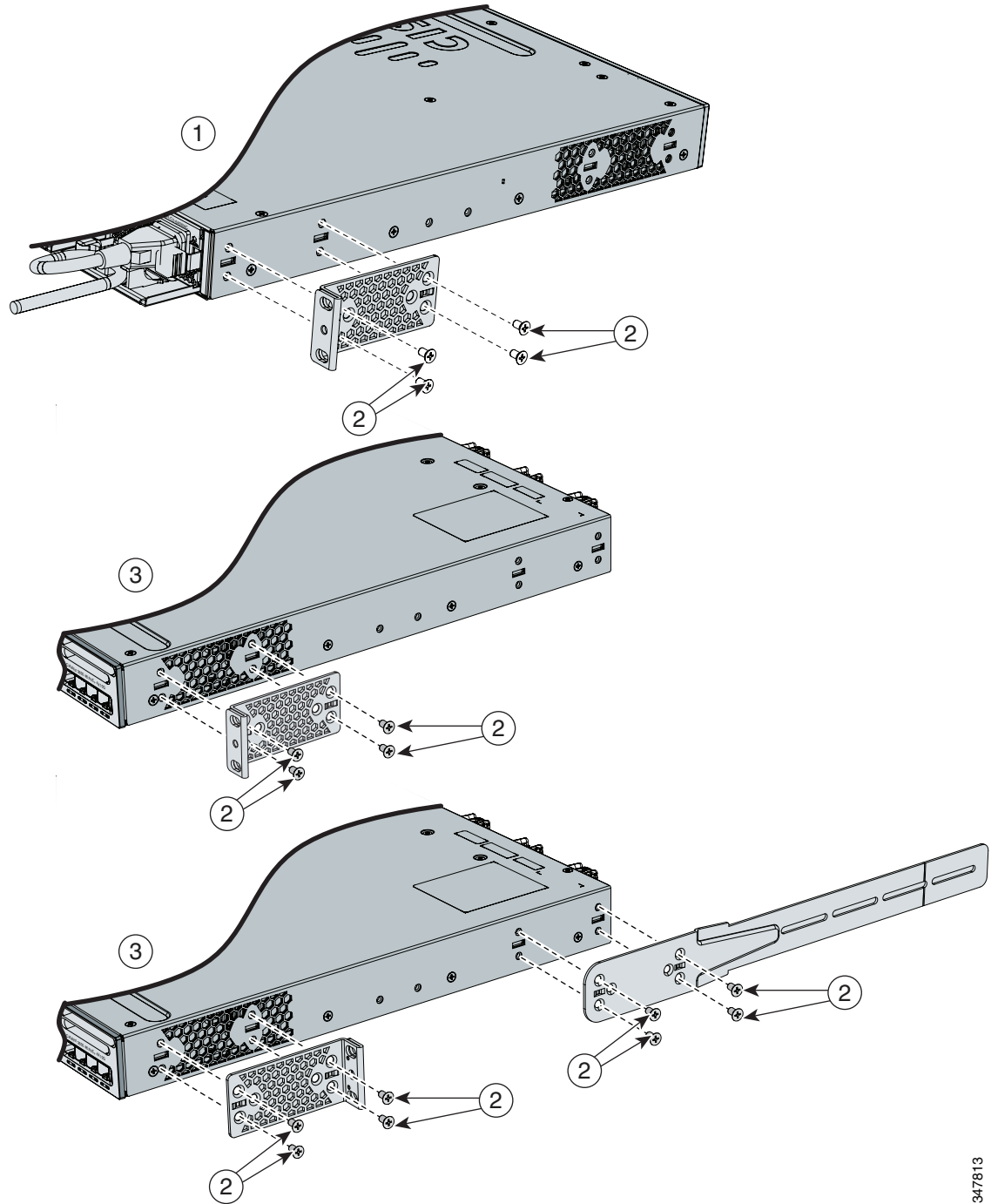


1	19-inch brackets (RACK-KIT-T1=)	4	23-inch brackets (RACK-KIT-T1=)
2	Extension rails and brackets for four-point mounting, includes 19-inch brackets. (4PT-KIT-T1=)	5	24-inch brackets (RACK-KIT-T1=)
3	ETSI brackets (RACK-KIT-T1=)		

## Attaching the Rack-Mount Brackets

To install the switch in a rack, use four No. 8 Phillips flat-head screws to attach the long side of the brackets to the switch for the front-mounting or rear-mounting positions (Figure 2-8). Use four screws to attach the brackets for the front-mounting position.

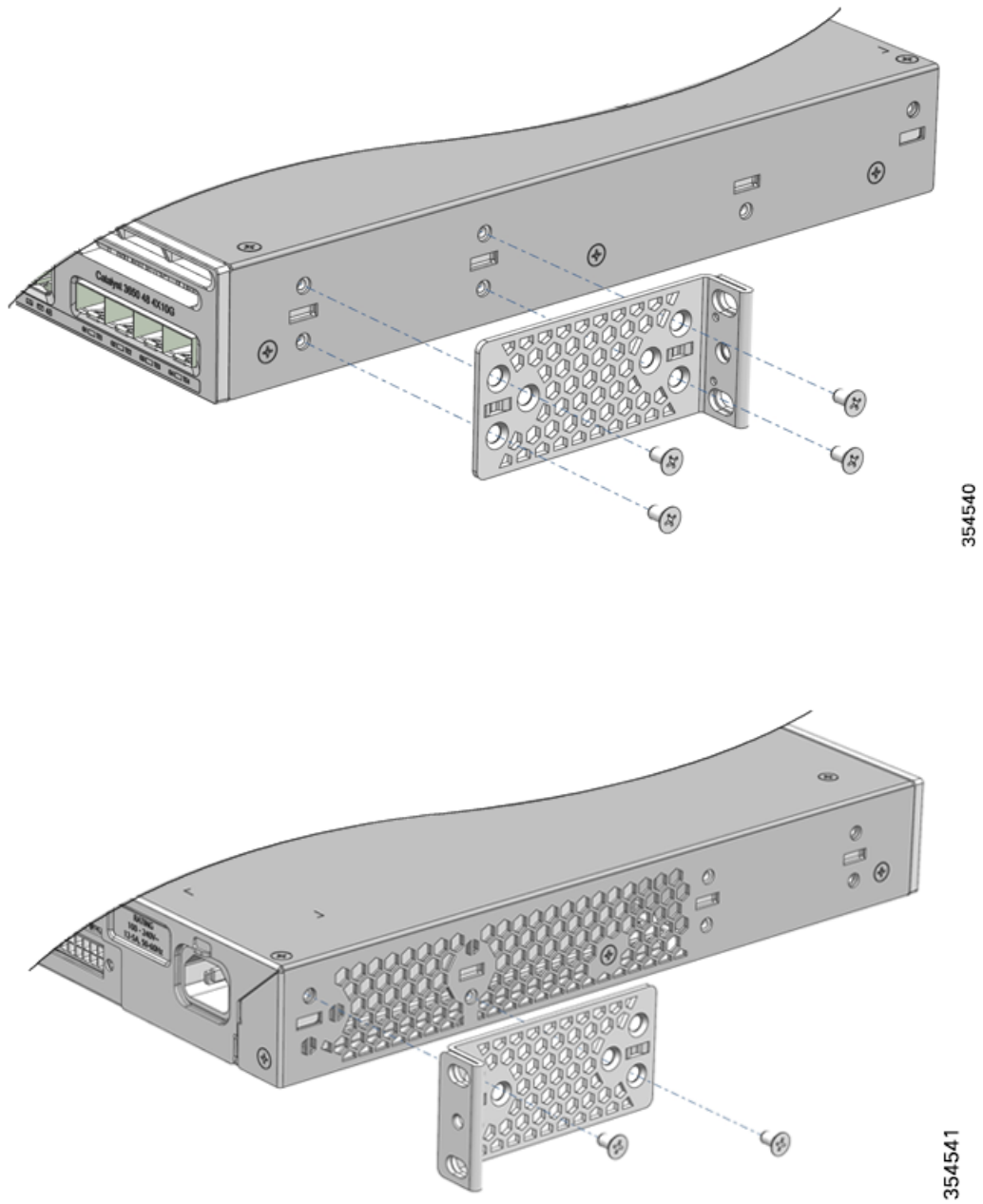
Figure 2-8 Attaching Brackets for 19-inch Racks



1	Rear-mounting position
2	Number-8 Phillips flat-head screws
3	Front-mounting position

347813

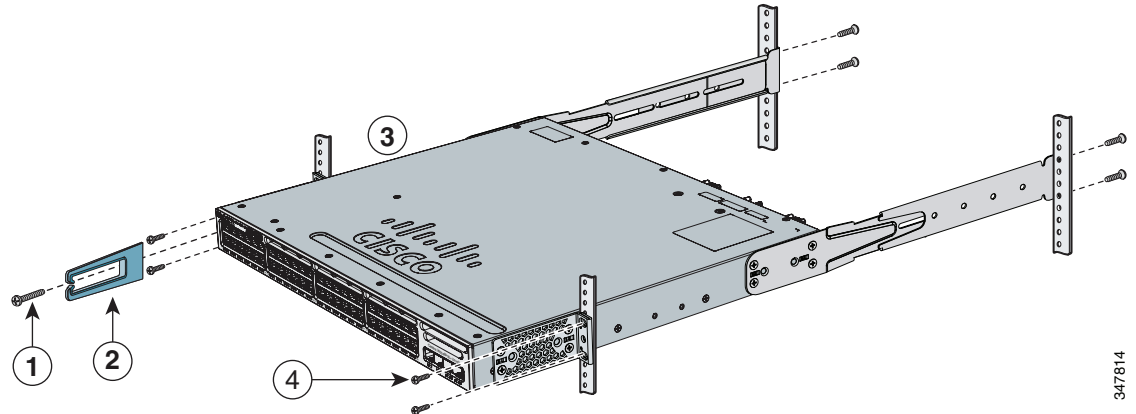
Figure 2-9 Attaching Brackets for Catalyst 3650-24PDM and Catalyst 3650-48FQM Switches



## Mounting the Switch in a Rack

After the brackets are attached to the switch, use the supplied Phillips machine screws to attach the brackets to the rack (Figure 2-10). Use the black Phillips machine screw to attach the cable guide to the left or right bracket.

**Figure 2-10** Mounting the Switch on a Rack



347814

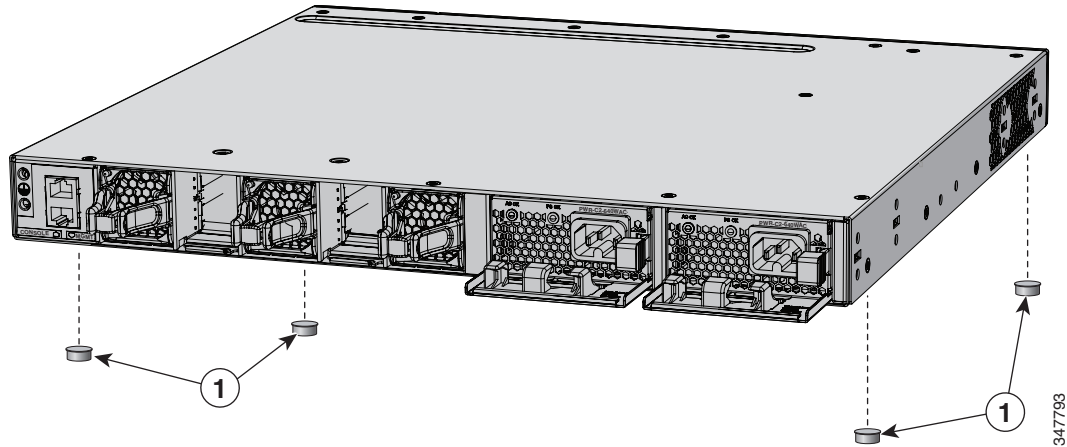
<b>1</b>	Phillips machine screw, black	<b>3</b>	Front-mounting position
<b>2</b>	Cable guide	<b>4</b>	Number 12 or Number 10 Phillips machine screws

After you complete the switch installation, see the “[After Installing the Switch](#)” section on page 2-14 for more information about switch configuration.

## Table-Mounting or Shelf-Mounting

To install the switch on a table or shelf, locate the adhesive strip with the rubber feet in the mounting-kit envelope. Attach the four rubber feet to the recessed areas at the bottom of the chassis (see [Figure 2-11](#)).

**Figure 2-11** Attaching the Adhesive Pads for Table-Mounting or Shelf-Mounting



<b>1</b>	Adhesive pads
----------	---------------

After you complete the switch installation, see the “[After Installing the Switch](#)” section on page 2-14 for more information about the switch configuration.

## After Installing the Switch

After the switch is installed, you can configure the switch using various options.

- Configure the switch by running the Express Setup to enter the initial switch configuration. For instructions, see the *Catalyst 3650 Switch Getting Started Guide* at [http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650\\_gs.html](http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650_gs.html).
- Use the CLI setup program to enter the initial switch configuration.
- Connect to the front-panel ports. See the “[Connecting a Device to an Ethernet Port](#)” section on page 2-19.



# Installing the StackWise Ports

Before connecting the StackWise cables, review the “[Planning a Switch Data Stack](#)” section on page 2-5. Always use a Cisco-approved StackWise cable to connect the switches.

**Caution**

Removing and installing a StackWise cable might shorten its useful life. Do not remove and install the cable more often than is absolutely necessary (removing and installing it up to 200 times is supported).

**Step 1**

Remove the dust covers from the StackWise cables and store them for future use.

A StackWise adapter must be installed in the StackWise port to enable stacking. In the default setup, the StackWise adapter blanks are installed in the StackWise ports. If StackWise stacking is ordered with the switch, StackWise adapters are already installed in the StackWise ports, and you can proceed to step 4.

**Step 2**

Remove the StackWise adapter blanks from each destination StackWise port using the Torx T15 Allen key provided in the stacking kit (or a Torx T15 screwdriver), as shown in [Figure 2-12](#). Store them for future use.

**Step 3**

Install a StackWise adapter in each destination StackWise port, and secure it in place using the supplied Torx T15 key, or a Torx T15 screwdriver, as shown in [Figure 2-13](#).

**Note**

It is not necessary to remove the fan modules before the removal or installation of the StackWise adapter. If the installation is performed with the system powered on, the fans must be left in the installed position at all times.

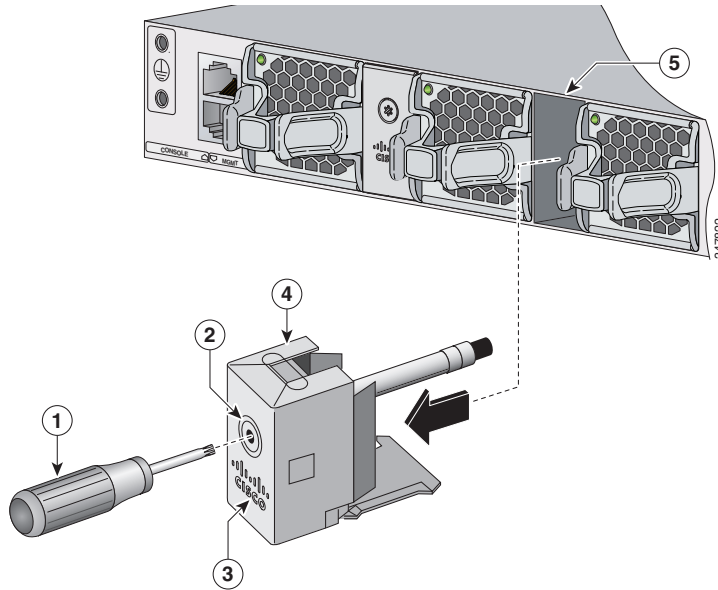
**Step 4**

Connect the StackWise cable to the StackWise port on the switch's rear panel:

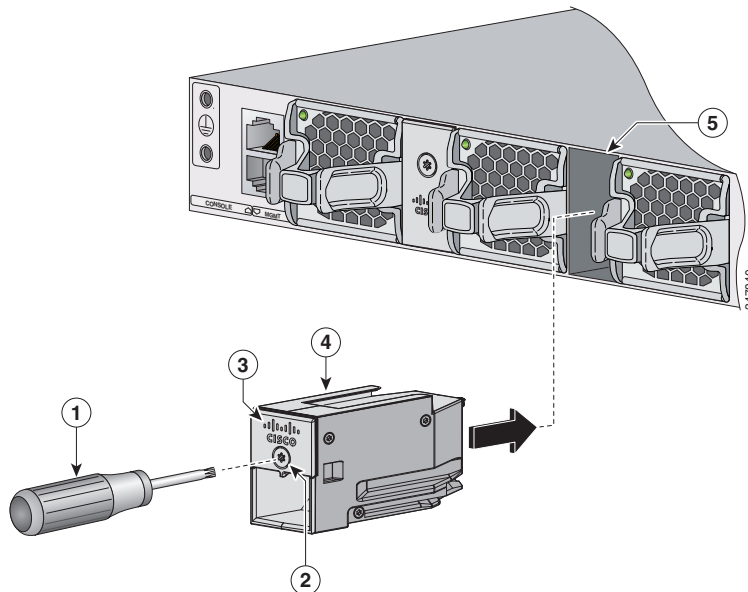
- a. Align the StackWise cable connector with the StackWise adapter in the StackWise port.
- b. Insert the StackWise cable connector into the StackWise port, as shown in [Figure 2-14](#). Make sure that the Cisco logo is on the top side of the connector.
- c. Finger-tighten the screws (clockwise direction).

**Step 5**

Connect the other end of the cable to the port on the other switch and finger-tighten the screws. Do not overtighten the screws.

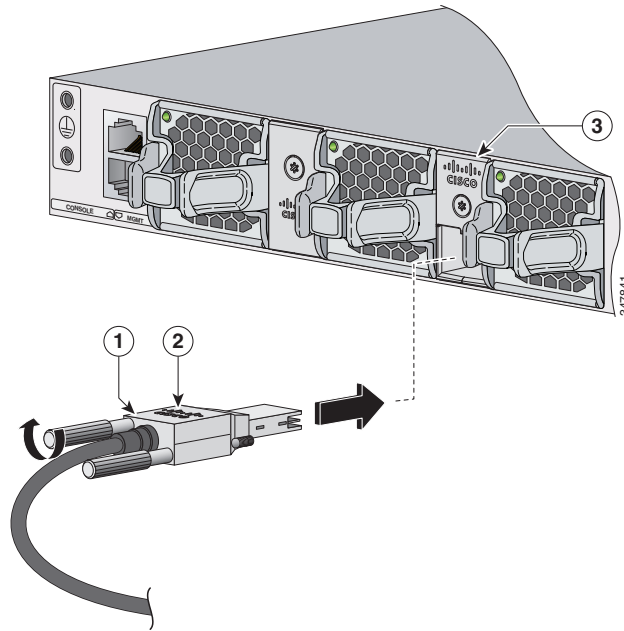
**Figure 2-12** Removing the StackWise Adapter Blank from a StackWise Port

1	Torx T15 screwdriver	4	StackWise adapter blank
2	Assembly screw	5	StackWise port
3	Cisco logo	6	

**Figure 2-13** Installing the StackWise Adapter in a StackWise Port

1	Torx T15 screwdriver	4	StackWise adapter
2	Assembly screw	5	StackWise port
3	Cisco logo		

**Figure 2-14** Connecting the StackWise Cable to the StackWise Adapter



1	StackWise cable	3	StackWise adapter installed in a StackWise port
2	Cisco logo		



**Note**

- When you have to remove the StackWise cable from the connector, make sure that you fully unscrew the correct screws. When the connectors are not being used, replace the dust covers.
- If the StackWise cable is difficult to remove, you can use a flat-blade screwdriver to assist with removing the cable screws. The screwdriver only works for cable removal and is designed to slip off if used for cable installation.

## Installing and Removing an SFP and SFP+ Module

This section explains how to install and remove SFP and SFP+ modules.

### Installing an SFP and SFP+ Module



**Warning**

**Class 1 laser product.** Statement 1008

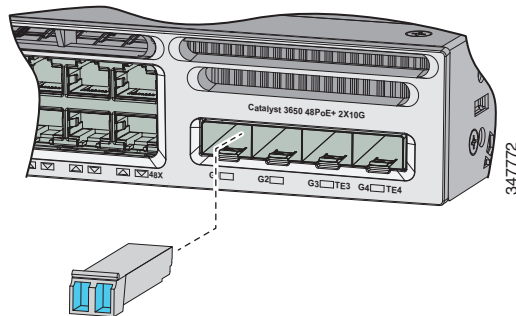
**Note**

- Do not remove the dust plugs from the SFP modules or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the module ports and cables from contamination and ambient light.
- Removing and installing an SFP module can shorten its useful life. Do not remove and insert any SFP module more often than is necessary.
- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.
- Use only supported SFP modules on the switch.
- When you insert several SFPs in multiple switch ports, wait for 5 seconds between inserting each SFP. This will prevent the ports from going into error disabled mode. Similarly, when you remove an SFP from a port, wait for 5 seconds before reinserting it.

To install an SFP or SFP+ module, follow the procedures given below:

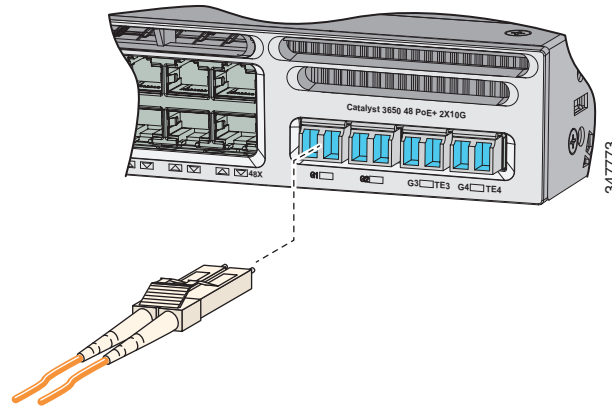
- Step 1** Attach an ESD-preventive wrist strap to your wrist and to an earth-ground surface.
- Step 2** Find the send (TX) and receive (RX) markings that identify the top of the SFP module.  
On some SFP modules, the send and receive (TX and RX) markings might be indicated by arrows that show the direction of the connection.
- Step 3** If the SFP module has a bale-clasp latch, move it to the open, unlocked position.
- Step 4** Align the module in front of the slot opening, and push until you feel the connector snap into place.

**Figure 2-15** *Aligning the Module in Front of the Slot Opening*



- Step 5** If the module has a bale-clasp latch, close it to lock the SFP module in place.
- Step 6** Remove the SFP dust plugs.
- Step 7** Connect the SFP cables.

**Figure 2-16** Connecting an SFP Cable to an SFP Module Installed in an Uplink Port



## Removing an SFP or SFP+ Module

To remove an SFP or SFP+ module, follow the procedures given below:

- 
- Step 1** Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.
  - Step 2** Disconnect the cable from the SFP module. For reattachment, note which cable connector plug is send (TX) and which is receive (RX).
  - Step 3** Insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.
  - Step 4** If the module has a bale-clasp latch, pull the bale out and down to eject the module. If you cannot use your finger to open the latch, use a small, flat-blade screwdriver or other long, narrow instrument to open it.
  - Step 5** Grasp the SFP module, and carefully remove it from the slot.
  - Step 6** Place the SFP module in an antistatic bag or other protective environment.
- 

## Connecting a Device to an Ethernet Port



**Caution**

Category 5e and Category 6 cables can store high levels of static electricity. Always ground the cables to a suitable and safe earth ground before connecting them to the switch or other devices.

## 10/100/1000 Ethernet Port Connections

The 10/100/1000 Ethernet ports use RJ-45 connectors with Ethernet pinouts. The maximum cable length is 328 feet (100 meters). The 100BASE-TX and 1000BASE-T traffic requires a Category 5, Category 5e, or Category 6 UTP cable. The 10BASE-T traffic can use a Category 3 or Category 4 cable.

The autonegotiation feature is enabled by default on the switch. In this setting, the switch ports configure themselves to operate at the speed of the attached device. If the attached device does not support autonegotiation, you can explicitly set the switch port speed and duplex parameters. To maximize performance, either let the ports autonegotiate both speed and duplex, or set the port speed and duplex parameters on both ends of the connection.

For simplified cabling, the automatic medium-dependent interface crossover (auto-MDIX) feature is enabled by default on the switch. With auto-MDIX enabled, the switch detects the required cable type for copper Ethernet connections and configures the interface accordingly. Therefore, you can use either a crossover or a straight-through cable for connections to a 10/100/1000 Ethernet port regardless of the type of device at the other end of the connection.

See the switch's software configuration guide or the switch command reference document on Cisco.com for more information about enabling or disabling autonegotiation and auto-MDIX.

If auto-MDIX is disabled, use the guidelines in [Table 2-1](#) to select the correct cable for connecting the switch 10/100/1000 Ethernet ports to other devices.

**Table 2-1 Recommended Ethernet Cables (When Auto-MDIX is Disabled)**

Device	Crossover Cable <sup>1</sup>	Straight-Through Cable <sup>1</sup>
Switch to switch	Yes	No
Switch to hub	Yes	No
Switch to computer or server	No	Yes
Switch to router	No	Yes
Switch to IP phone	No	Yes

1. 100BASE-TX and 1000BASE-T traffic requires a twisted four-pair, Category 5, Category 5e, or Category 6 cable. 10BASE-T traffic can use a Category 3 or Category 4 cable.

## 100M/1G/2.5G/5G/10G Ethernet Port Connections

The 100M/1G/2.5G/5G/10G Ethernet ports use RJ45 connectors with Ethernet pinouts. These ports do not support 10 Mbps speed. The 100 Mbps and 1 Gbps traffic require a Category 5/5e/6 unshielded twisted pair (UTP) cable at a maximum cable length of 100 m. The 2.5 Gbps traffic requires a Category 5e/6/6a UTP cable at a maximum cable length of 100 m. The 5 Gbps traffic requires a Category 5e UTP cable at a maximum cable length of 70 m and a Category 6/6a UTP cable at a maximum cable length of 100 m. The 10 Gbps traffic requires a Category 6 UTP cable at maximum cable length of 55 m and a Category 6a UTP cable at maximum cable length of 100 m.

## PoE+ Port and Cisco UPOE Connections

The 10/100/1000 PoE+ and Cisco UPOE ports have the same autonegotiation settings and cabling requirements that are described in the [“10/100/1000 Ethernet Port Connections”](#) section on page 2-19. These ports can provide PoE or PoE+ inline power.

PoE inline power supports devices compliant with the IEEE 802.3af standard, as well as prestandard Cisco IP phones and Cisco Aironet Access Points. Each port can deliver up to 15.4 W of PoE.

PoE+ inline power supports devices that are compliant with the IEEE 802.3at standard, by delivering up to 30 W of PoE+ power per port to all the switch ports.

Cisco UPOE ports provide up to 60 W power per port for connected devices.

**Note**

Many legacy-powered devices, including older Cisco IP phones and access points that do not fully support IEEE 802.3af, might not support PoE when connected to the switches by a crossover cable.

**Caution**

PoE faults are caused when noncompliant cabling or powered devices are connected to a PoE port. Use only standards-compliant cabling to connect Cisco prestandard IP phones, wireless access points, or IEEE 802.3af-compliant devices to PoE ports. A cable or device that causes a PoE fault must be removed from the network.

**Warning**

**Voice over IP (VoIP) service and the emergency calling service do not function if power fails or is disrupted. After power is restored, you might have to reset or reconfigure equipment to regain access to VoIP and the emergency calling service. In the USA, this emergency number is 911. You need to be aware of the emergency number in your country.** Statement 361

**Warning**

**Voltages that present a shock hazard may exist on Power over Ethernet (PoE) circuits if interconnections are made using uninsulated exposed metal contacts, conductors, or terminals. Avoid using such interconnection methods, unless the exposed metal parts are located within a restricted access location and users and service people who are authorized within the restricted access location are made aware of the hazard. A restricted access area can be accessed only through the use of a special tool, lock and key or other means of security.** Statement 1072

## Where To Go Next

If the default configuration is satisfactory, the switch does not need further configuration. You can use any of these management options to change the default configuration:

- Start the Network Assistant application, which is described in the *Cisco Network Assistant* guide at <http://www.cisco.com/c/en/us/support/cloud-systems-management/network-assistant/products-installation-guides-list.html>. Through this GUI, you can configure and monitor a switch cluster or an individual switch.
- Use the CLI to configure the switch as a member of a cluster or as an individual switch from the console. See the switch's command reference document on Cisco.com for information on using the CLI with the switch.
- Use the Cisco Prime Infrastructure application.







## Installing the Fan

---

This chapter describes how to install a fan module. The following topics are included in this chapter:

- [Overview of the Fan Modules, page 3-1](#)
- [Fan Module Installation, page 3-2](#)
- [Finding the Fan Module Serial Number, page 3-4](#)



**Note**

---

The contents of this chapter are not applicable to the Cisco Catalyst 3650-24PDM and Catalyst 3650-48FQM switches. These switches come with fixed fan modules and require no separate installation.

---

## Overview of the Fan Modules

The switch has three fan modules. Fan modules are hot-swappable. A powered switch should always have more than one operational fan. The switch can operate with two operational fans and one nonfunctional fan, but the failed fan should be replaced as soon as possible to avoid a service interruption due to a second fan fault.



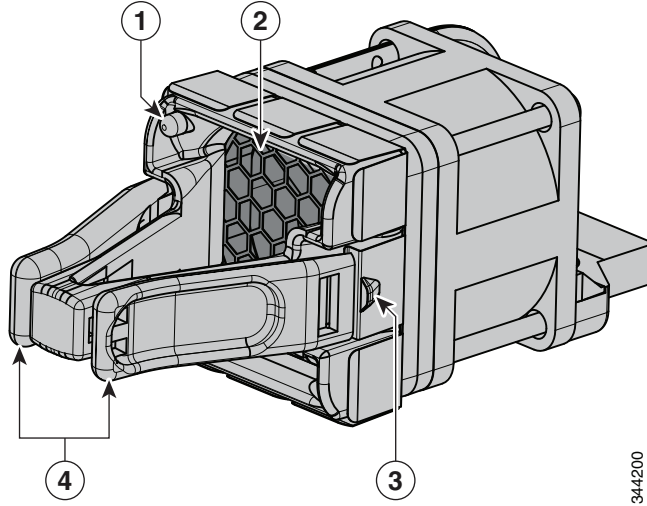
**Note**

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Three fans are required for proper cooling.

---

Figure 3-1 Fan Module



344200

1	Fan LED	3	Retainer clip
2	Exhaust vent	4	Extraction handles

## Fan Module Installation

### Installation Guidelines



#### Warning

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**  
Statement 1030



#### Note

Fans should be removed or installed only when StackWise adapters or StackWise adapter blanks are installed in each port.

Observe these guidelines when removing or installing a fan module:

- Do not force a fan module into a slot. This might damage the pins on the switch if they are not aligned with the module.
- A fan module that is only partially connected might disrupt the system operation.
- The switch supports hot swapping of the fan module. You can remove and replace the module without interrupting normal switch operation.

## Installing a Fan Module

**Step 1** Pinch the fan module release handle, and slide the module out.



**Caution**

You should replace the fan module within 5 minutes to avoid overheating the switch.

**Step 2**

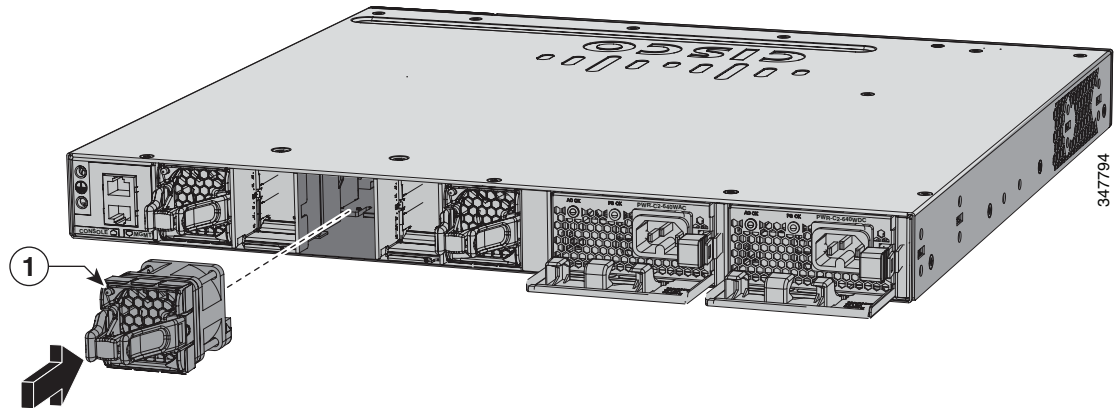
Install the fan module in the fan slot, and firmly push it into the slot, applying pressure to the end of the module, not the extraction handles. When correctly inserted, the fan module is flush with the switch rear panel. When the fan is operating, a green LED is on in the top left corner of the fan. See [Figure 3-2](#).



**Warning**

**Do not reach into a vacant slot when installing or removing a module. Exposed circuitry is an energy hazard.** Statement 206

**Figure 3-2** Installing the Fan Module

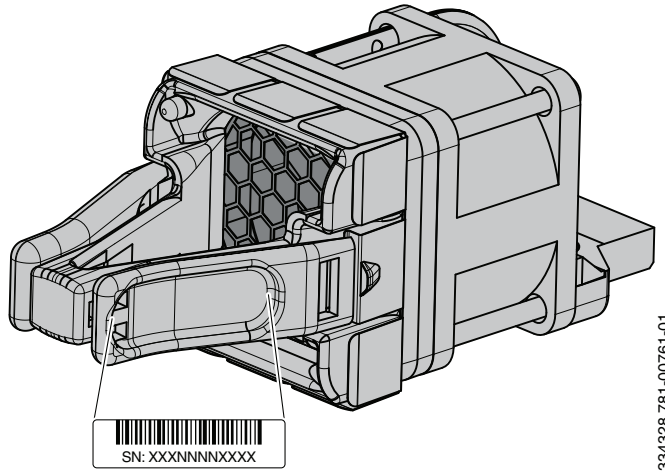


<b>1</b>	Fan LED
----------	---------

## Finding the Fan Module Serial Number

If you contact Cisco Technical Assistance regarding a fan module, you should know the fan module serial number. See [Figure 3-3](#) for the serial number location.

**Figure 3-3** Fan Module Serial Number





# Power Supply Installation

This chapter describes how to install the power supply modules. The following topics are included in this chapter:

- [Power Supply Module Overview, page 4-1](#)
- [Installation Guidelines, page 4-6](#)
- [Installing or Replacing an AC Power Supply, page 4-7](#)
- [Installing a DC Power Supply, page 4-8](#)
- [Finding the Power Supply Module Serial Number, page 4-13](#)



**Note**

The contents of this chapter are not applicable to the Cisco Catalyst 3650-24PDM and Catalyst 3650-48FQM switches. These switches come with fixed power supply modules and require no separate installation.

## Power Supply Module Overview

The switch operates with either one or two active power supply modules.

You can use two AC modules, two DC modules, one AC and one DC module, or one module and a blank cover.



**Note**

In a Network Equipment Building System (NEBS) installation, you can use two DC modules or one DC module and a blank cover.

All the switches ship with a blank cover in the second power supply slot if switches are configured with only one power supply.

[Table 4-1](#) describes the supported internal power supply modules.

**Table 4-1** Power Supply Module Part Numbers and Descriptions

Part Number	Description
PWR-C1-1100WAC	1100-W AC power supply module
PWR-C1-715WAC	715-W AC power supply module
PWR-C1-BLANK	Blank cover

**Table 4-1 Power Supply Module Part Numbers and Descriptions (continued)**

Part Number	Description
PWR-C2-1025WAC	1025-W AC power supply module
PWR-C2-640WAC	640-W AC power supply module
PWR-C2-250WAC	250-W AC power supply module
PWR-C2-640WDC	640-W DC power supply module
PWR-C2-BLANK	Blank cover

The input voltages of the power supplies are as follows:

- The 250-W, 640-W, and 715-W AC power supply modules are autoranging units that support input voltages between 100 and 240 VAC.
- The 1025-W and 1100-W AC power supply modules are autoranging units that support input voltages between 115 and 240 VAC.
- The 640-W DC power supply module has dual input feeds (A and B) and support input voltages between 36 and 72 VDC. The output voltage range is 51 to 57 V.

Each AC power supply module has a power cord for connection to an AC power outlet.

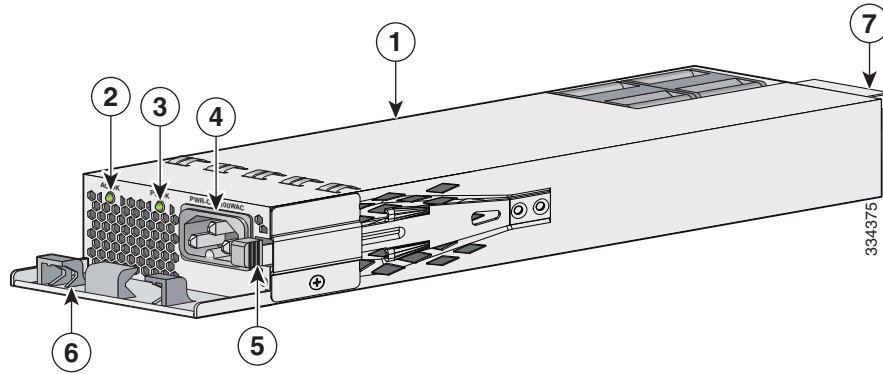
- The 640-W, 715-W, 1025-W, and 1100-W and modules use a 16-AWG cord (only North America). All the other modules use an 18-AWG cord.
- The DC power supply module must be wired to a DC power source.

**Note**

- For information on 250-W AC power supply support on the PoE-capable switch models, see the *Cisco Catalyst 3650 Series Switches Release Notes* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-release-notes-list.html>.
- **Only the DC power module is NEBS-compliant.**

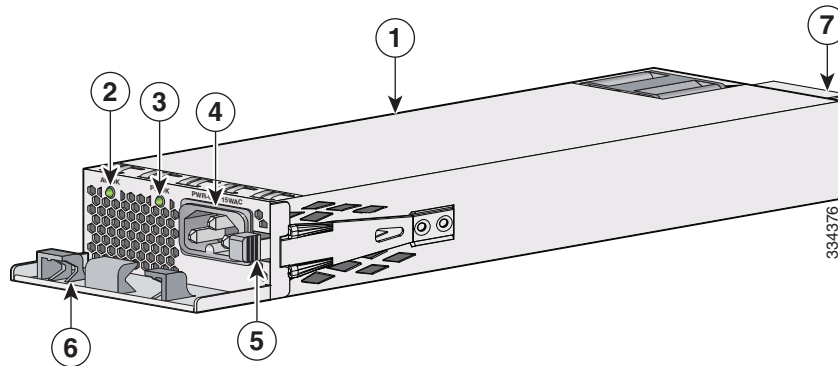
.Figure 4-1 to Figure 4-6 show the power supply modules.

**Figure 4-1 1100-W AC Power Supply**



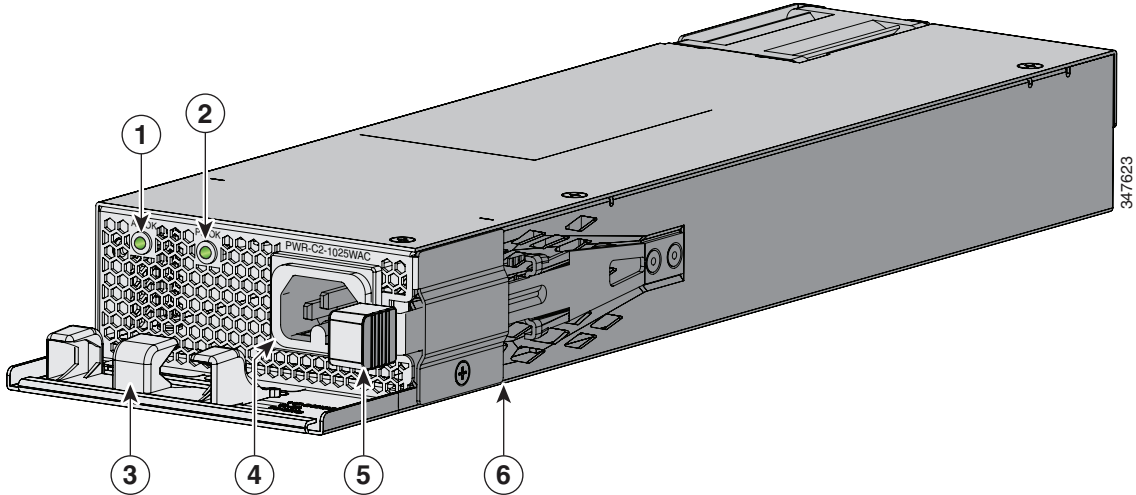
<b>1</b>	1100-W AC power supply module	<b>5</b>	Release latch
<b>2</b>	AC OK LED	<b>6</b>	Power cord retainer
<b>3</b>	PS OK LED	<b>7</b>	Keying feature
<b>4</b>	AC power cord connector		

**Figure 4-2 715-W AC Power Supply Module**



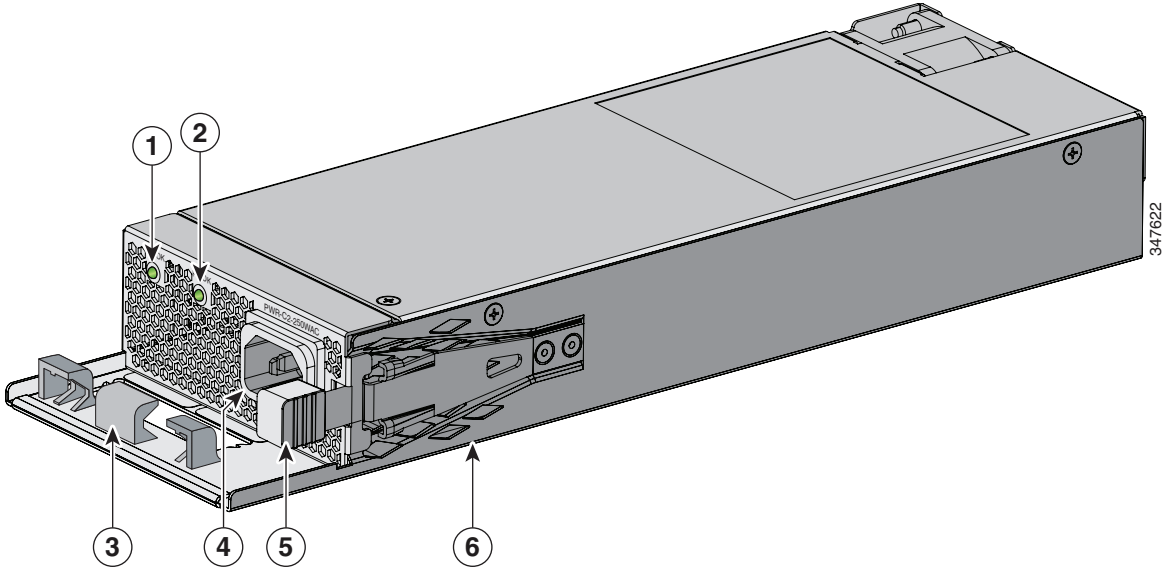
<b>1</b>	715-W AC power supply module	<b>5</b>	Release latch
<b>2</b>	AC OK LED	<b>6</b>	Power cord retainer
<b>3</b>	PS OK LED	<b>7</b>	Keying feature
<b>4</b>	AC power cord connector		

Figure 4-3 1025-W AC Power Supply



1	AC OK LED	4	AC power cord connector
2	PS OK LED	5	Release latch
3	AC power cord retainer	6	1025-W AC power supply module

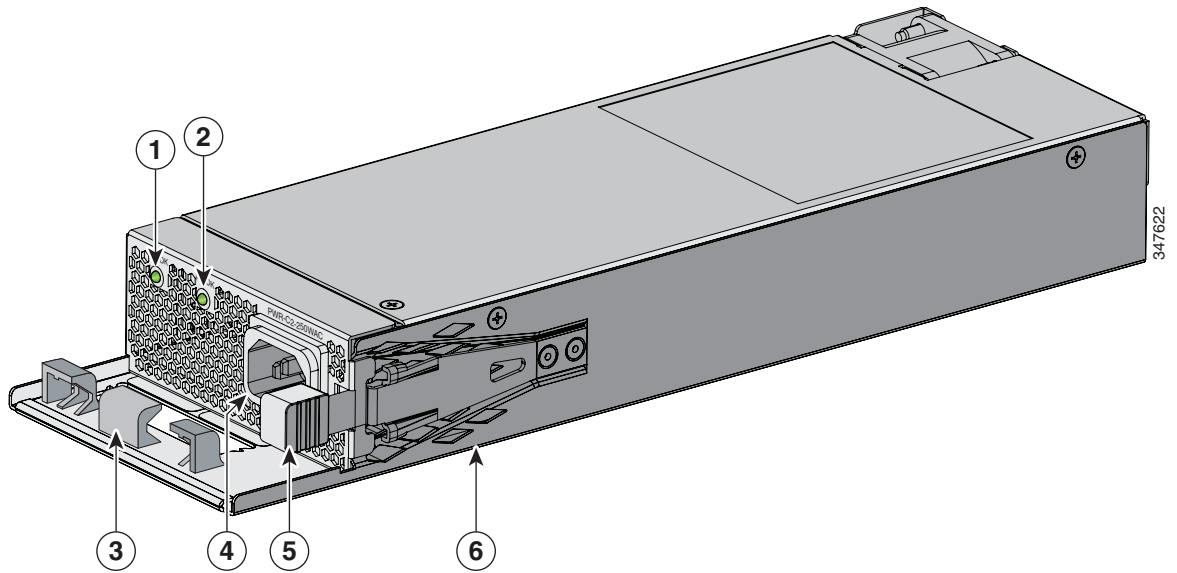
Figure 4-4 640-W AC Power Supply Module



1	AC OK LED	4	AC power cord connector
2	PS OK LED	5	Release latch
3	AC power cord retainer	6	640-W AC power supply module

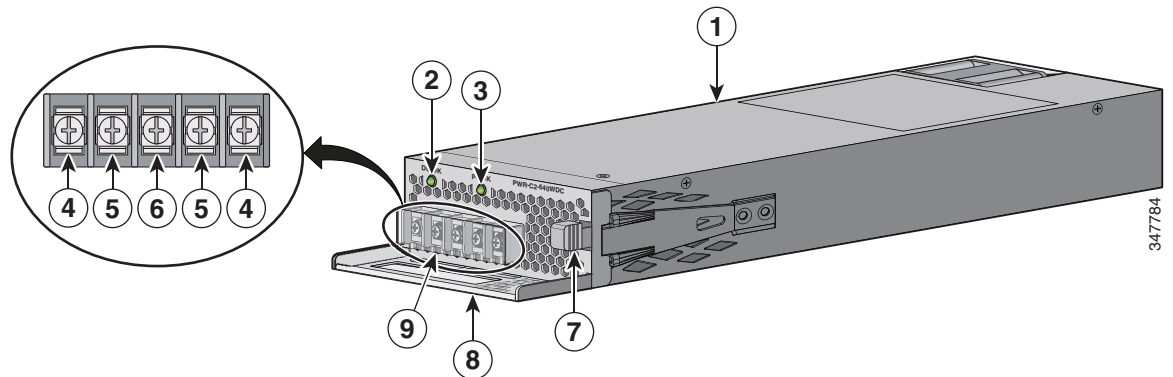


Figure 4-5 250-W AC Power Supply Module



1	AC OK LED	4	AC power cord connector
2	PS OK LED	5	Release latch
3	AC power cord retainer	6	250-W AC power supply module

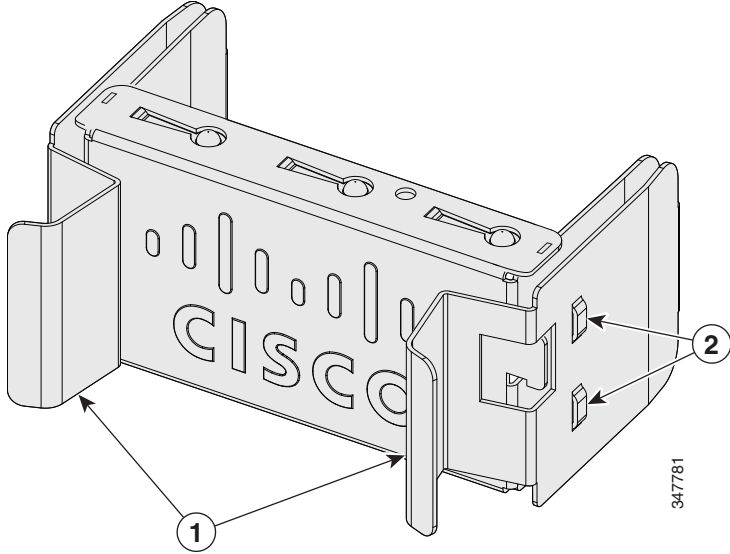
Figure 4-6 640-W DC Power Supply Module



1	640-W DC power supply module	6	Grounding terminal
2	DC OK LED	7	Release latch
3	PS OK LED	8	Extraction handle
4	Input power terminals (positive polarity)	9	Terminal block safety cover
5	Input power terminals (negative polarity)		

If no power supply is installed in a power supply slot, install a power supply slot blank cover (Figure 4-7).

Figure 4-7 Power Supply Slot Blank Cover



<b>1</b>	Release handles	<b>2</b>	Retainer clips
----------	-----------------	----------	----------------

The power supply modules have two status LEDs:

Table 4-2 Switch Power Supply Module LEDs

<b>AC Power Supply Module LEDs</b>			
<b>AC OK</b>	<b>Description</b>	<b>PS OK</b>	<b>Description</b>
Off (AC LED is off)	No AC input power.	Off	Output is disabled, or input is outside operating range.
Green	AC input power present.	Green	Power output to switch.
		Red	Output has failed.
<b>DC Power Supply Module LEDs</b>			
<b>DC OK</b>	<b>Description</b>	<b>PS OK</b>	<b>Description</b>
Off (DC LED is off)	No DC input power.	Off	Output is disabled, or input is outside operating range.
Green	DC input power present.	Green	Power output to switch.
		Red	Output has failed.

# Installation Guidelines

Table 4-1 lists the switches and the compatible power supply modules. Observe these guidelines when removing or installing a power supply or fan module:

- Do not force the power supply or fan module into a slot. This might damage the pins on the switch if they are not aligned with the module.
- A power supply that is only partially connected to the switch can disrupt the system operation.
- Remove power from the power supply module before removing or installing the module.
- The power supply is hot-swappable. In some configurations, such as full PoE+ or power-sharing mode, removing a power supply causes powered devices to shut down until the power budget matches the input power of a single power supply. To minimize network interruption, hot swap the power supply, ensuring that the remaining supply has sufficient PoE power for all powered ports.

For information about the switch commands that display the available power budget, see the *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

**Note**

For information on 250-W AC power supply support on the PoE-capable switch models, see the *Cisco Catalyst 3650 Series Switches Release Notes* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-release-notes-list.html>.

**Caution**

Do not operate the switch with one power supply module slot empty. For effective chassis cooling, both the module slots must be populated with either a power supply or a blank cover.

**Warning**

**Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

Statement 1029

**Warning**

**Do not reach into a vacant slot or chassis while you install or remove a module. Exposed circuitry could constitute an energy hazard.** Statement 206

**Warning**

**Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

## Installing or Replacing an AC Power Supply

- Step 1** Turn off the power at its source.
- Step 2** Remove the power cord from the power cord retainer.
- Step 3** Remove the power cord from the power connector.
- Step 4** Press the release latch at the right side of the power supply module inward and slide the power supply out (Figure 4-8).

**Caution**

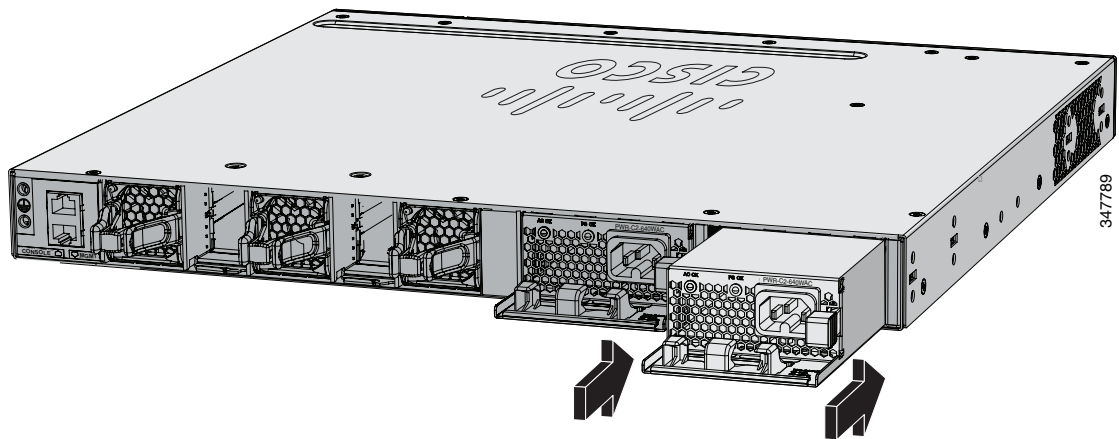
Do not leave the power supply slot open for more than 90 seconds while the switch is operating.

**Warning**

**This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028

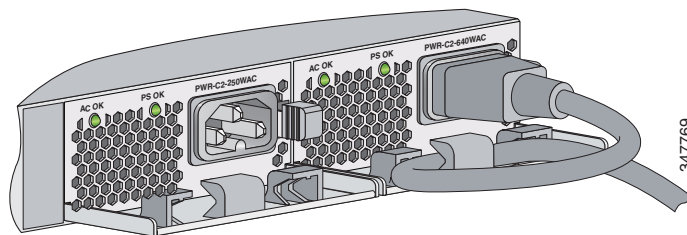
- Step 5** Insert the new power supply into the power supply slot, and gently push it into the slot (Figure 4-8). When correctly inserted, the 250-W, 640-W, and 715-W power supply modules (excluding the power cord retainer) are flush with the switch's rear panel. The 1025-W and 1100-W power supply modules extend 1.5 inches from the switch's rear panel.

**Figure 4-8** Inserting the AC Power Supply in the Switch



- Step 6** (Optional) Make a loop in the power cord and thread it through the power cord retainer (Figure 4-9).

**Figure 4-9** AC Power Supply with Power Cord Retainer



- Step 7** Connect the power cord to the power supply and to an AC power outlet. Turn on the power at the power source.
- Step 8** Confirm that the power supply AC OK and PS OK LEDs are green.

## Installing a DC Power Supply

- [Equipment That You Need, page 4-9](#)

- [Grounding the Switch, page 4-10](#)
- [Installing the DC Power Supply in the Switch, page 4-12](#)
- [Wiring the DC Input Power Source, page 4-12](#)

**Warning**

**An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.**

Statement 122

**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.**

Statement 1003

**Warning**

**This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 25 A.** Statement 1005

**Warning**

**A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.**

Statement 1022

**Warning**

**Hazardous voltage or energy may be present on power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place.** Statement 1086

**Note**

The grounding architecture of this product is DC-isolated (DC-I).

## Equipment That You Need

- Ratcheting torque screwdriver with a Number-2 Phillips head that exerts up to 15 pound-force inches (lbf-in.) of pressure.
- Panduit crimping tool with optional controlled-cycle mechanism (model CT-720, CT-920, CT-920CH, CT-930, or CT-940CH).
- Wire-stripping tools.
- 12-gauge copper ground wire (insulated or not insulated) for the single-hole ground connection.
- 8-gauge copper ground wire (insulated or not insulated) for the dual-hole ground connection.
- Dual-hole ground lug and two screws (included in the DC Power Supply Accessory Kit) and single-hole ground lug and screw (included in the Switch Accessory Kit). The dual-hole lug is required for the grounding of the switch in an NEBS installation where the DC supply is the only NEBS-compliant power supply option.
- Four leads of 12-gauge copper wire.
- Four fork-type terminals from the DC power supply accessory kit. The terminals must be the proper size for M3 screws in a Dinkle DT-35-B25-style terminal block.

## Grounding the Switch

Follow the grounding procedures at your site and observe these warnings:



### Warning

**This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.** Statement 1024



### Warning

**When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046



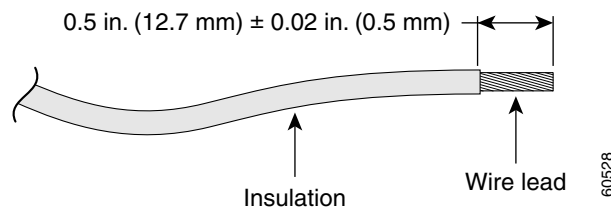
### Caution

Follow the grounding procedure instructions, and use a UL-listed lug (included in the accessory kit).

Follow these steps to install either a single-hole ground lug or a dual-hole ground lug on the switch. Make sure that you follow grounding requirements, if any, at your site.

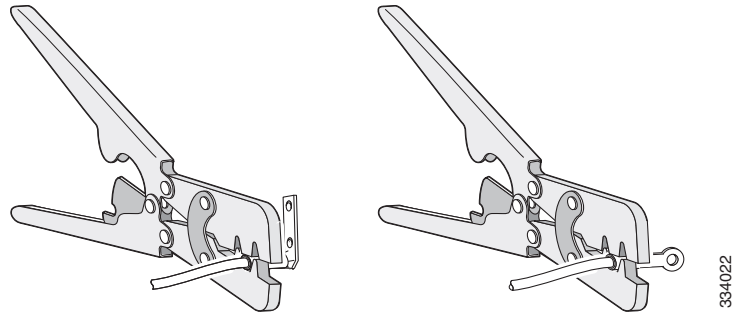
- Step 1** Use the ground lug screw and the lug ring for a single-hole ground connection. Use the dual-hole lug for a ground connection in an NEBS installation.
- Step 2** Strip the 12-gauge or 8-gauge ground wire to 0.5 inch (12.7 mm)  $\pm$  0.02 inch (0.5 mm) (Figure 4-10). Stripping more than the recommended amount of wire can leave exposed wire from the connector. Use 12-gauge copper ground wire for the single-hole ground connection. Use 8-gauge copper ground wire for the dual-hole ground connection.

**Figure 4-10 Stripping the Ground Wire**



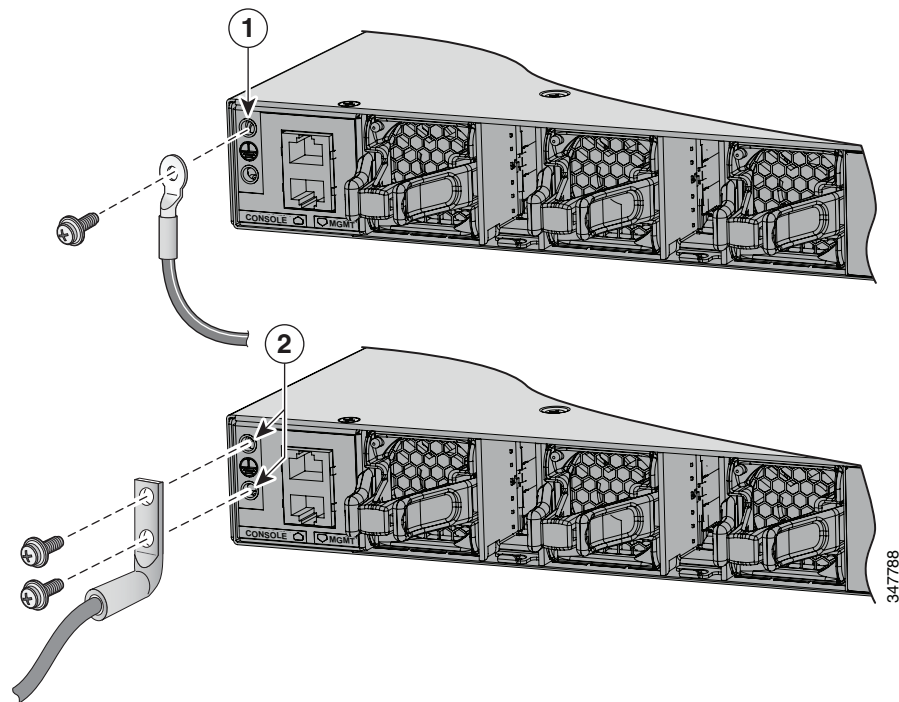
- Step 3** Slide the open end of the ground lug over the exposed area of the wire.
- Step 4** Using a Panduit crimping tool, crimp the ground lug to the wire (Figure 4-11).

**Figure 4-11 Crimping the Ground Lug**



- Step 5** Use the ground screw to attach the single-hole ground lug to the switch’s rear panel. Use two ground screws to attach the dual-hole lug to the switch’s rear panel (Figure 4-12).
- Step 6** Using a ratcheting torque screwdriver, torque the ground-lug screws to 60 lbf-in. (960 ozf-in.).
- Step 7** Connect the other end of the grounding wire to an appropriate grounding point at your site or to the rack.

**Figure 4-12 Attaching the Ground Lug and Wire Assembly**



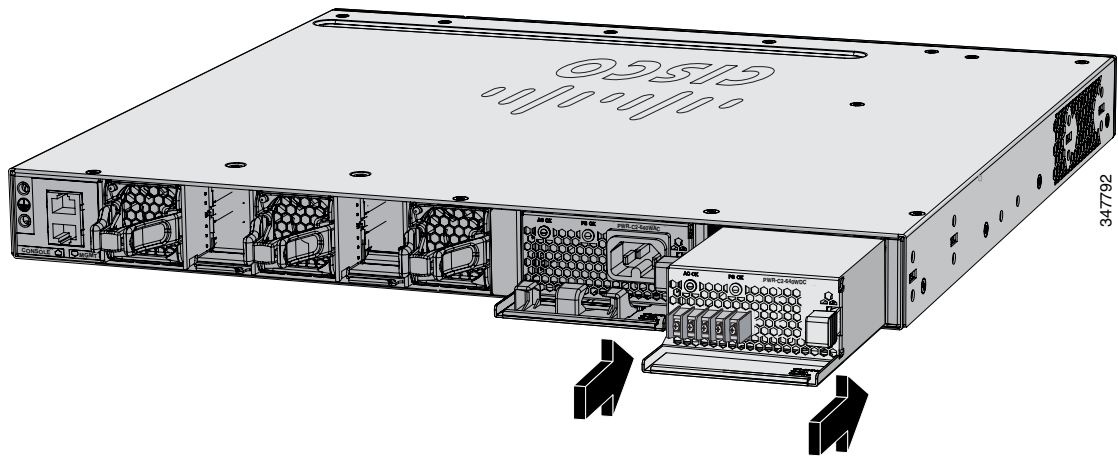
<b>1</b>	Single-hole ground screw and lug ring	<b>2</b>	Dual-hole ground adapter and dual-hole lug
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## Installing the DC Power Supply in the Switch

Before installing the power supply, see the “[Installation Guidelines](#)” section on page 4-6.

- Step 1** Turn off DC power. To ensure that power is off, change the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.
- Step 2** Remove the plastic safety cover from the power supply terminal blocks ([Figure 4-6](#)). If you are not replacing a DC power supply, go to [Step 5](#).
- Step 3** Use a number-2 Phillips screwdriver to remove the DC-input power wires from the power terminals.
- Step 4** Press the release latch at the right side of the power supply module inward, and pull the power supply out.
- Step 5** Insert the power supply in the power supply slot, and gently push it into the slot ([Figure 4-13](#)). When correctly installed, the DC power supply (excluding the extraction handle) is flush with the switch’s rear panel.

**Figure 4-13** Inserting the DC Power Supply in the Switch



- Step 6** Connect the input power, as described in the “[Wiring the DC Input Power Source](#)” section on page 4-12.

## Wiring the DC Input Power Source

- Step 1** Using a wire-stripping tool, strip each of the four wires from the DC-input power source to the appropriate length for the terminals.

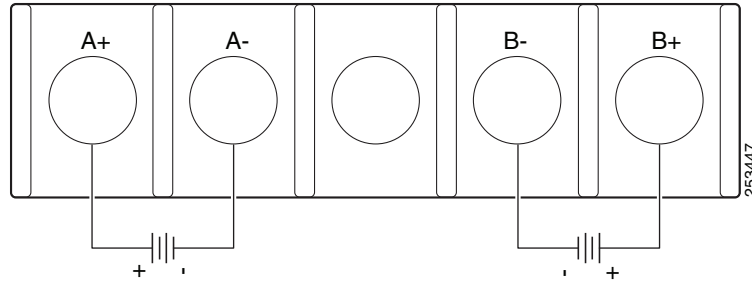
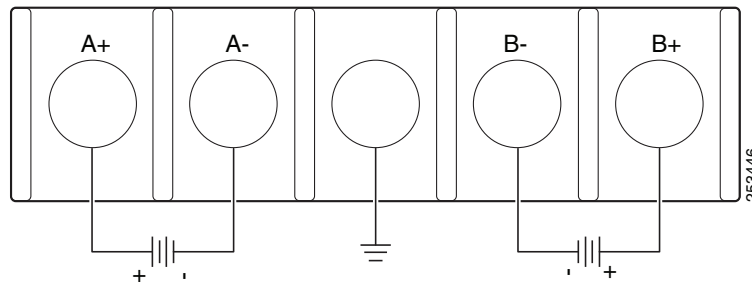


### Warning

**Use copper conductors only.** Statement 1025

- Step 2** Using a Panduit crimping tool, crimp the fork-type terminals to the copper conductor, 90C, 12-AWG DC power input wires.
- Step 3** Connect the DC-input power terminals to the terminal blocks. See [Figure 4-14](#) or [Figure 4-15](#). Make sure that you match the polarity (negative to negative, positive to positive) when connecting the wires to the terminal blocks. Connect the ground wire to a grounded metal rack or to earth ground if the switch is not in a grounded rack.



**Figure 4-14** DC Source A Isolated from Source B with No Common Ground**Figure 4-15** DC Source A and Source B Connections with Common Ground

- Step 4** Torque all the terminal block screws to 11 lbf-in.
- Step 5** Replace the terminal block safety cover.
- Step 6** Move the DC power source circuit-breakers to the ON position.
- Step 7** Confirm that the power supply DC OK and PS OK LEDs are green. See [Table 4-2](#) for a description of the module LEDs.

## Finding the Power Supply Module Serial Number

If you contact Cisco Technical Assistance regarding a power supply module, you should know the serial number. See [Figure 4-16](#) to [Figure 4-20](#) to find the serial number.

Figure 4-16 1100-W AC Power Supply Serial Number

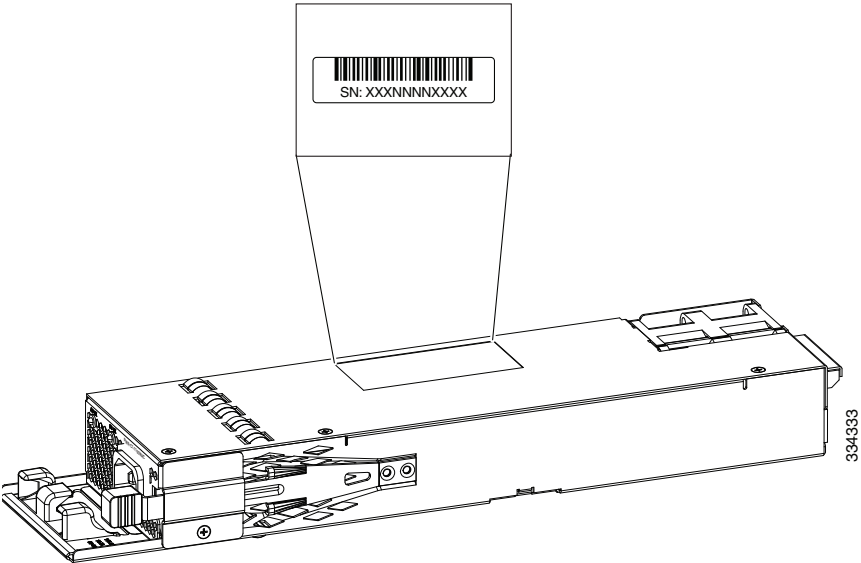


Figure 4-17 1025-W AC Power Supply Serial Number

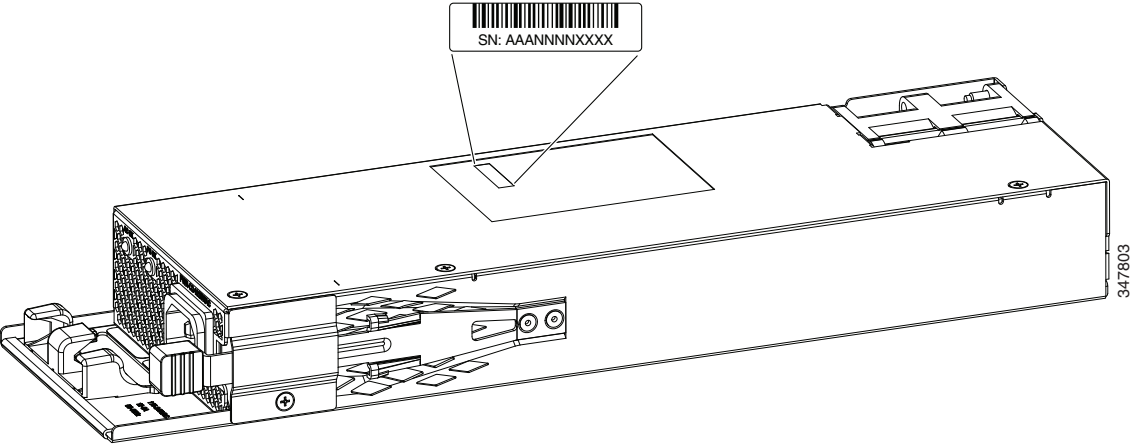


Figure 4-18 715-W AC Power Supply Serial Number

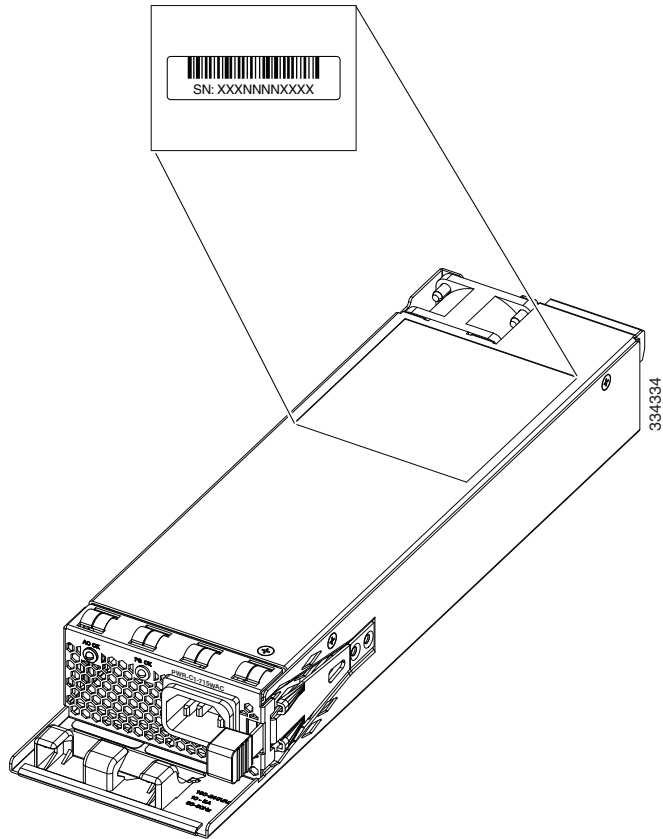


Figure 4-19 640-W and 250-W AC Power Supply Module Serial Number

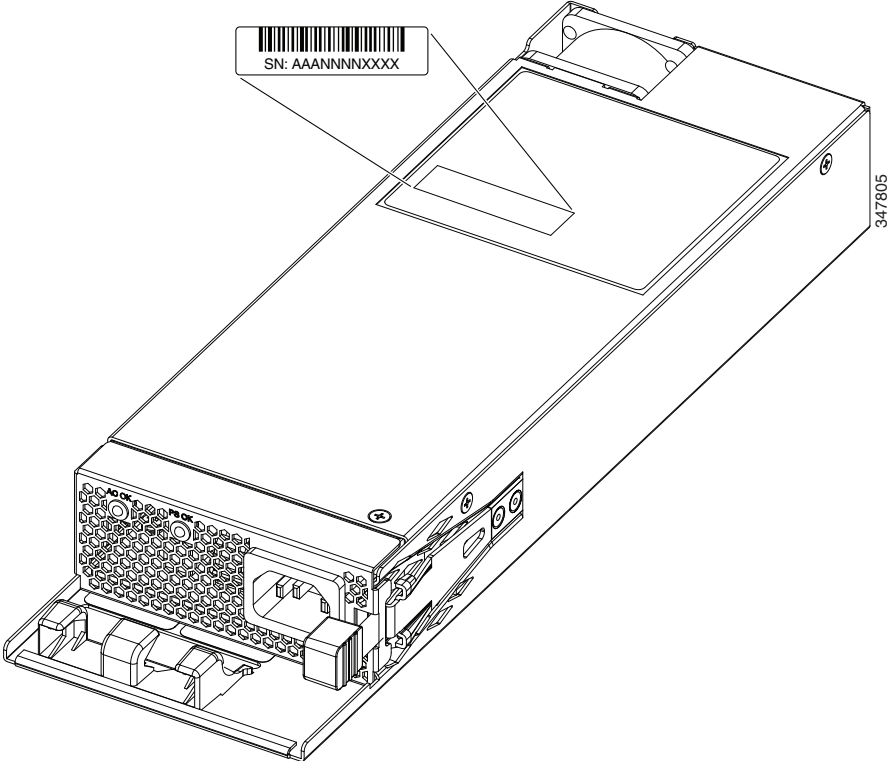
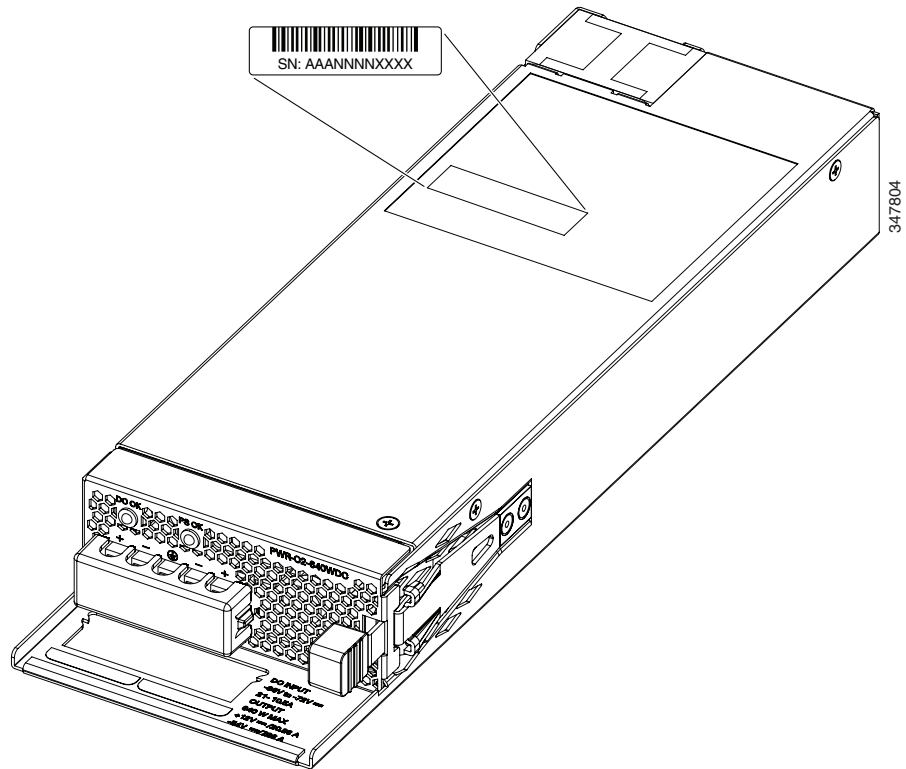


Figure 4-20 640-W DC Power Supply Module Serial Number



■ Finding the Power Supply Module Serial Number



# Troubleshooting

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This chapter includes the following topics:

- [Diagnosing Problems, page 5-1](#)
- [Resetting the Switch, page 5-5](#)
- [Finding the Switch's Serial Number, page 5-6](#)
- [Replacing a Failed Data Stack Member, page 5-6](#)

## Diagnosing Problems

The switch LEDs provide troubleshooting information about the switch. They show power-on self-test (POST) failures, port-connectivity problems, and overall switch performance. You can also get statistics from the CLI, or a Simple Network Management Protocol (SNMP) workstation. For details, refer to one of the following guides:

- *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>
- *Cisco Catalyst 3650 Series Switches Command Reference Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-command-reference-list.html>
- The documentation that came with your SNMP application

## Switch POST Results

Approximately 30 seconds after the switch powers on, it begins the POST, which can take up to 5 minutes to complete. During POST, the SYSTEM LED blinks green. After POST is complete, the SYSTEM LED turns solid green. The ACTV LED is green if the switch is acting as the active switch.



**Caution**

---

POST failures are usually fatal. Contact your Cisco technical support representative if your switch does not pass POST.

---

## Switch LEDs

Look at the port LEDs for information when troubleshooting the switch. See the descriptions of the LED colors and their meanings in the [“Ethernet Management Port” section on page 1-37](#).

## Switch Connections

The following are some of the scenarios relating to switch connections that might require troubleshooting.

### Bad or Damaged Cable

Always examine a cable for marginal damage or failure. A cable might be just good enough to connect at the physical layer, but it could corrupt packets as a result of subtle damage to the wiring or connectors. You can identify this situation because the port has many packet errors or the port constantly flaps (loses and regains link).

- Ensure that the cables are recommended by Cisco.
- Look for broken or missing pins on cable connectors.
- Rule out bad patch panel connections or media convertors, if any, between the source and destination. If possible, bypass the patch panel or eliminate media convertors (fiber-optic-to-copper).
- Try the cable in another port to see if the problem is caused by the cable.
- For a Catalyst 3650 switch StackWise cable, remove and inspect the cable and StackWise port for bent pins or damaged connectors. If the StackWise cable is bad, replace the cable.

### Ethernet and Fiber Cables

Make sure that you have the correct cable:

- For Ethernet, use Category 3 copper cable for 10 Mbps UTP connections. Use either Category 5, Category 5e, or Category 6 UTP for 10/100 or 10/100/1000 Mbps connections.
- Verify that you have the correct fiber-optic cable for the distance (100 meters or less) and port type. Make sure that the connected device ports match and use the same type encoding, optical frequency, and fiber type. For more information, see the [“Connector Specifications” section on page 2-1](#).
- Determine if a copper crossover cable was used when a straight-through cable was required, or the reverse. Enable automatic medium-dependent interface crossover (auto-MDIX) on the switch, or replace the cable. For more information, see the [“Connector Specifications” section on page 2-1](#).

### Link Status

Verify that both sides have a link. A broken wire or a shut-down port might cause one side to show a link even though the other side does not have a link.

A port LED that is on does not guarantee that the cable is functional. It might have encountered physical stress, causing it to function at a marginal level. If the port LED does not turn on:

- Connect the cable from the switch to a known functional device.
- Make sure that both ends of the cable are connected to the correct ports.



- Verify that both the devices have power.
- Verify that you are using the correct cable type. For more information, see the [“Connector Specifications” section on page 2-1](#).
- Look for loose connections. Sometimes a cable appears to be seated but is not. Disconnect the cable and then reconnect it.

## 10/100/1000 Port Connections

If a port appears to malfunction:

- Verify the status of all the ports. For more information, see the [“Port LEDs and Modes” section on page 1-21](#).
- Use the **show interfaces** privileged EXEC command to see if the port is error-disabled, disabled, or shut down. Re-enable the port if necessary.
- Verify the cable type. For more information, see the [“Connector Specifications” section on page 2-1](#).

## PoE and PoE+ Port Connections

If a powered device connected to a PoE port does not receive power:

- Verify the status of all the ports. For more information, see the [“Port LEDs and Modes” section on page 1-21](#).
- Use the **show interfaces** privileged EXEC command to see if the port is error-disabled, disabled, or shut down. Re-enable the port, if necessary.
- Verify that the power supply installed in the switch meets the power requirements of your connected devices.
- Verify the cable type. Many legacy-powered devices, including older Cisco IP phones and access points that do not fully support IEEE 802.3af might not support PoE when connected to the switch by a crossover cable. Replace the crossover cable with a straight-through cable.



### Caution

---

Noncompliant cabling or powered devices might cause a PoE port fault. Use only compliant cabling to connect Cisco prestandard IP phones, wireless access points, or IEEE 802.3af-compliant devices.

---



### Note

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Ensure that the output of the PoE circuit has been evaluated as a limited power source (LPS) per IEC 60950.

---

## SFP Modules

If SFP modules do not function correctly:

- Use only Cisco SFP modules.
- Inspect the uplink port and SFP module. If the module is faulty, replace the module.

- Verify that the module is supported on Cisco Catalyst 3650 switches. (The switch's release note on Cisco.com lists the SFP and SFP+ modules that the switch supports.) See the *Cisco Catalyst 3650 Series Switches Release Notes* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-release-notes-list.html>.
- Use the **show interfaces** privileged EXEC command to see if the port or module is error-disabled, disabled, or shut down. Re-enable the port, if needed.
- Make sure that all the fiber connections are clean and securely connected.
- For CX1 module connections and fiber connections, make sure that cable routing does not violate the minimum allowed cable bend radius. See the documentation pertaining to the corresponding module for specific cabling requirements.




---

**Note** When ordering or using CX1 cables, ensure that the version identifier is 2 or higher.

---

- For long-wave SFP+ modules, a mode conditioning patch might improve performance over maximum link distances with MMF connections.
- When you insert several SFPs in multiple switch ports, wait for 5 seconds between inserting each SFP. This will prevent the ports from going into error disabled mode. Similarly, when you remove an SFP from a port, wait for 5 seconds before reinserting it.

## Interface Settings

Verify that the port or interface is not disabled or powered off. If a port or interface is manually shut down on either side of the link, it does not come up until you re-enable the interface. Use the **show interfaces** privileged EXEC command to see if the interface is error-disabled, disabled, or shut down on either side of the connection. If needed, re-enable the interface.

## Ping End Device

Ping from the directly connected switch first, and then work your way back port by port, interface by interface, trunk by trunk, until you find the source of the connectivity issue. Make sure that each switch can identify the end device's MAC address in its content-addressable memory (CAM) table.

## Spanning Tree Protocol Loops

Spanning Tree Protocol (STP) loops might cause serious performance issues that resemble port or interface problems.

A unidirectional link might cause loops. A loop occurs when the traffic sent by a switch is received by the neighbor, but the traffic from the neighbor is not received by the switch. A broken cable, other cabling problems, or a port issue could cause this one-way communication.

You can enable UniDirectional Link Detection (UDLD) on the switch to help identify unidirectional link problems. For information about enabling UDLD on the switch, see the "Understanding UDLD" section in the *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.

## Switch Performance

The following are some of the scenarios relating to switch performance that might require troubleshooting.

### Speed, Duplex, and Autonegotiation

Port statistics that show a large amount of alignment errors, frame check sequences (FCS), or late-collisions errors, might indicate a speed or duplex mismatch.

A common issue occurs when duplex and speed settings are mismatched between two switches, between a switch and a router, or between a switch and a workstation or server. Mismatches might occur when manually setting the speed and duplex, or from autonegotiation issues between the two devices.

To maximize switch performance and to ensure a link, follow one of these guidelines when changing the duplex or speed settings:

- Let both the ports autonegotiate both the speed and the duplex.
- Manually set the speed and duplex parameters for the interfaces on both ends of the connection.
- If a remote device does not autonegotiate, use the same duplex settings on the two ports. The speed parameter adjusts itself even if the connected port does not autonegotiate.

### Autonegotiation and Network Interface Cards

Sometimes, problems occur between the switch and third-party network interface cards (NICs). By default, the switch ports and interfaces autonegotiate. Laptops or other devices are commonly set to autonegotiate; yet, sometimes, issues occur.

To troubleshoot autonegotiation problems, try setting both sides of the connection manually. If this does not solve the problem, there could be a problem with the firmware or software on the NIC. You can resolve this by upgrading the NIC driver to the latest version.

### Cabling Distance

If the port statistics show excessive frame check sequences, late-collisions or alignment errors, verify that the cable distance from the switch to the connected device meets the recommended guidelines..

## Resetting the Switch

If you have configured a new switch with a wrong IP address, or if all of the switch LEDs start blinking when you try to enter Express Setup mode, you can clear the IP address that is configured on the switch.

**Note**

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Resetting the switch reboots the switch.

---

To reset the switch

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**Step 1** Press and hold the **Mode** button.

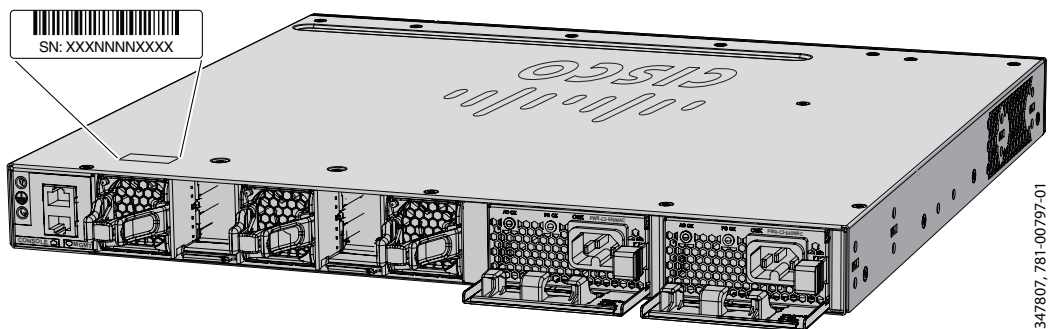
- Step 2** Start the terminal emulation program on the PC or the terminal. The program, frequently a PC application, such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.
- The switch LEDs begin blinking after about 2 seconds. If the LEDs above the mode button turn solid green, you can release the Mode button and run Express Setup to configure the switch. If the LEDs do not turn solid green, continue with the next step.
- Step 3** Continue holding down the Mode button. The LEDs stop blinking after an additional 8 seconds, and then the switch reboots

You can also configure the switch by using the CLI setup procedure.

## Finding the Switch's Serial Number

If you contact Cisco Technical Assistance, you should know the switch's serial number. [Figure 5-1](#) shows the serial number location. You can also use the **show version** privileged EXEC command to see the switch's serial number.

**Figure 5-1** Switch Serial Number Location



## Replacing a Failed Data Stack Member

To replace a failed data stack member:

- Step 1** Power down the failed switch. Remove the AC or DC input power.
- Step 2** Make sure the replacement switch is powered off, and then connect it to the stack.
- If you had manually set the member numbers for the switch stack, manually assign the member number of the failed switch to the replacement switch. To manually assign the stack member number, see the *Cisco Catalyst 3650 Series Switches Software Configuration Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-installation-and-configuration-guides-list.html>.
- Step 3** Make the same Gigabit Ethernet connections on the replacement switch as those that were on the failed switch.
- Step 4** Reinstall modules and cable connections, if any.

**Step 5** Power on the replacement switch

---

The replacement switch will have the same configuration for all the interfaces as the failed switch, and will function the same way as the failed switch.

**Note**

---

The replacement switch must be a Cisco Catalyst 3650 switch.

---





# Technical Specifications

This chapter includes the following topics:

- [Switch Specifications, page 1-1](#)
- [Power Supply Module Specifications, page 1-4](#)
- [Fan Module Specifications, page 1-6](#)

## Switch Specifications

**Table 1-1** *Environmental and Physical Specifications*

<b>Environmental Ranges</b>	
Operating temperature ranges and altitude (AC power supply installed)	Normal operating temperature <sup>1</sup> and altitude: -5°C to +45°C, up to 5000 feet (1500 m) -5°C to +40°C, up to 10,000 feet (3000 m) -5°C to +35°C, up to 13,000 feet (4000 m) -5°C to +30°C, up to 16,400 feet (5000 m)
	Short-term exceptional conditions <sup>1 2</sup> : -5°C to +50°C, up to 5000 feet (1500 m) -5°C to +45°C, up to 10,000 feet (3000 m) -5°C to +40°C, up to 13,000 feet (4000 m) -5°C to +35°C, up to 16,400 feet (5000 m) -5°C to +45°C, at sea level with single fan failure
Operating temperature ranges and altitude for Catalyst WS-C3650-24PDM and WS-C3650-48FQM switches (AC power supply installed)	Normal operating temperature <sup>3</sup> and altitude: -5°C to +45°C, up to 5000 feet (1500 m) -5°C to +45°C, up to 10,000 feet (3000 m)
	Short-term exceptional conditions <sup>1 4</sup> : -5°C to +50°C, up to 5000 feet (1500 m) -5°C to +50°C, up to 10,000 feet (3000 m)

**Table 1-1 Environmental and Physical Specifications**

Operating temperature ranges and altitude (DC power supply installed)	Normal operating temperature <sup>1</sup> and altitudes: –5°C to +45°C, up to 6000 feet (1800 m) –5°C to +40°C, up to 10,000 feet (3000 m) –5°C to +35°C, up to 13,000 feet (4000 m) –5°C to +30°C, up to 16,400 feet (5000 m) Short-term exceptional conditions <sup>1 2</sup> : –5°C to +55°C, up to 6000 feet (1800 m) –5°C to +50°C, up to 10,000 feet (3000 m) –5°C to +45°C, up to 13,000 feet (4000 m) –5°C to +40°C, up to 16,400 feet (5000 m) –5°C to +45°C, at sea level with single fan failure
Relative humidity	5 to 96% (noncondensing)
Storage temperature	–40 to 158° F (–40 to 70° C)
Storage altitude	Up to 16,400 feet (5000 m)
<b>Physical Specifications: Dimensions</b>	
Dimensions (H x W x D)	Dimensions include the chassis assembly as it is shipped: three fans, two StackWise adapter blanks, one power supply blank, and the default power supply shipped with the unit.
Catalyst 3650 24-port non PoE switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 24-port PoE+ switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 48-port non PoE switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 48-port PoE+ switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 48-port Full PoE switches	1.73 x 17.5 x 19.125 in. (4.4 x 44.5 x 48.6 cm)
Catalyst 3650-24PDM and 3650-48FQM switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 24-port mGig Cisco UPOE switches	1.73 x 17.5 x 19.125 in. (4.4 x 44.5 x 48.6 cm)
Catalyst 3650 24-port mGig PoE+ switches	1.73 x 17.5 x 17.625 in. (4.4 x 44.5 x 44.8 cm)
Catalyst 3650 48-port mGig Full PoE and Cisco UPOE switches	1.73 x 17.5 x 19.125 in. (4.4 x 44.5 x 48.6 cm)
<b>Physical Specifications: Weight</b>	
Weight	Weight includes the chassis assembly as it is shipped: three fans, two StackWise adapter blanks, one power supply blank, and the default power supply shipped with the unit.
Catalyst 3650 24-port non PoE switches	15.15 lbs (6.87 kg)
Catalyst 3650 24-port PoE switches	16.00 lbs (7.26 kg)
Catalyst 3650 48-port non PoE switches	15.90 lbs (7.21 kg)



**Table 1-1 Environmental and Physical Specifications**

Catalyst 3650 48-port PoE switches	16.75 lbs (7.6 kg)
Catalyst 3650 48-port Full PoE switches	17.20 lbs (7.8 kg)
Catalyst 3650-24PDM switches	12.26 lbs. (5.56 kg)
Catalyst 3650-48FQM switches	12.65 lbs. (5.74 kg)
Catalyst 3650 24-port mGig switch WS-C3650-8X24UQ	16.71 lbs (7.6 kg)
Catalyst 3650 24-port mGig switch WS-C3650-8X24PD	16.60 lbs (7.5 kg)
Catalyst 3650 48-port mGig switch WS-C3650-12X48UQ	17.75 lbs (8 kg)
Catalyst 3650 48-port mGig switch WS-C3650-12X48UR	17.80 lbs (8 kg)
Catalyst 3650 48-port mGig switch WS-C3650-12X48UZ	17.80 lbs (8 kg)
Catalyst 3650 48-port mGig switch WS-C3650-12X48FD	17.75 lbs (8 kg)
StackWise stacking adapter	0.25 lbs (0.11 kg)
StackWise adapter blank	0.1 lbs (0.05 kg)

1. Minimum ambient temperature for cold start is 32°F (0°C).
2. Occurring not more than this in one-year period: 96 consecutive hours, 360 hours in total, or 15 occurrences.
3. Minimum ambient temperature for cold start is 32°F (0°C).
4. Occurring not more than this in one-year period: 96 consecutive hours, 360 hours in total, or 15 occurrences.

# Power Supply Module Specifications

**Table 1-2 Environmental and Physical Specifications for AC-and DC Power Supply Modules**

<b>Environmental Ranges</b>	
Operating temperature	For the operating temperature ranges at various altitudes of AC and DC power supply module-powered switches, see <a href="#">Table 1-1</a> .
Storage temperature	–40 to 158° F (–40 to 70° C)
Relative humidity	5 to 96% (noncondensing)
Altitude	AC power supply: Up to 16,400 feet (5,000 m) DC power supply: Up to 16,400 feet (5,000 m)
<b>Physical Specifications: Weight</b>	
PWR-C1-715WAC	2.8 lb (1.3 kg)
PWR-C1-1100WAC	3 lb (1.4 kg)
PWR-C1-BLANK	0.2 lb (0.09 kg)
PWR-C2-1025WAC	3.55 lb (1.61 kg)
PWR-C2-640WAC	3.1 lb (1.41 kg)
PWR-C2-250WAC	2.55 lb (1.16 kg)
PWR-C2-640WDC	2.75 lb (1.25 kg)
PWR-C2-BLANK	0.2 lb (0.09 kg)
<b>Physical Specifications: Dimensions (H x W x D)</b>	
PWR-C1-715WAC	1.58 x 3.25 x 12.21 in. (4.0 x 8.3 x 31.0 cm)
PWR-C1-1100WAC	1.58 x 3.25 x 13.71 in. (4.0 x 8.3 x 34.9 cm)
PWR-C2-1025WAC	1.58 x 3.75 x 13.25 in. (4.0 x 9.5 x 33.7 cm)
PWR-C2-640WAC	1.58 x 3.75 x 11.75 in. (4.0 x 9.5 x 29.8 cm)
PWR-C2-250WAC	1.58 x 3.75 x 11.75 in. (4.0 x 9.5 x 29.8 cm)
PWR-C2-640WDC	1.58 x 3.75 x 11.75 in. (4.0 x 9.5 x 29.8 cm)

**Table 1-3 Power Specifications for AC Power 24-Port and 48-Port Switches**

<b>Power Specifications</b>	
Maximum output power	PWR-C1-1100WAC: 1100 W PWR-C1-715WAC: 715 W PWR-C2-1025WAC: 1025 W PWR-C2-640WAC: 640 W PWR-C2-250WAC: 250 W

**Table 1-3 Power Specifications for AC Power 24-Port and 48-Port Switches (continued)**

Input voltage range and frequency	PWR-C1-1100WAC: 1100-W, 115 to 240 VAC (autoranging) 50-60 Hz PWR-C1-715WAC: 715 W, 100 to 240 VAC (autoranging) 50-60 Hz PWR-C2-1025WAC: 1025-W, 115 to 240 VAC (autoranging) 50 to 60 Hz PWR-C2-640WAC: 640-W, PWR-C2-250WAC: 250 W, 100 to 240 VAC (autoranging), 50 to 60 Hz
Input current	PWR-C1-1100WAC: 12–6 A PWR-C1-715WAC: 10–5 A PWR-C2-1025WAC: 12–6 A PWR-C2-640WAC: 8–4 A PWR-C2-250WAC: 4–2 A
Output ratings	PWR-C1-1100WAC: –56 V@19.64 A PWR-C1-715WAC: –56 V@12.8 A PWR-C2-1025WAC: +12 V @ 20.83 A, –54 V@14.6 A PWR-C2-640WAC: +12 V @ 20.83 A, –54 V@7.36 A PWR-C2-250WAC: +12 V @ 20.83 A
Total input BTU <sup>1</sup>	PWR-C1-1100WAC: 4263 BTUs per hour, 1250 W PWR-C1-715WAC: 2742 BTUs per hour, 804 W PWR-C2-1025WAC: 3801 BTUs per hour, 1114 W PWR-C2-640WAC: 2371 BTUs per hour, 695 W PWR-C2-250WAC: 945 BTUs per hour, 277 W
Total output BTU <sup>1</sup>	PWR-C1-1100WAC: 3751 BTUs per hour, 1100 W PWR-C1-715WAC: 2438 BTUs per hour, 715 W PWR-C2-1025WAC: 3497 BTUs per hour, 1025 W PWR-C2-640WAC: 2183 BTUs per hour, 640 W PWR-C2-250WAC: 853 BTUs per hour, 250 W

1. The total input and total output BTU ratings refer to input power to the power supply and output power to the switch. The BTU ratings are based on 100 VAC for the 250-W and 640-W power supplies and 115 VAC for the 1100-W power supply.

**Table 1-4 Power Specifications for DC Power 24-Port and 48-Port Switches**

<b>Power Specifications</b>	
Maximum output power	PWR-C2-640WDC: 640 W
Input current	PWR-C2-640WDC: 21–10.5 A
DC input voltage	PWR-C2-640WDC: –36 to –72 VDC
Output ratings	PWR-C2-640WDC: +12 V @ 20.83 A, –54 V@7.36 A
Voltage range domestic	PWR-C2-640WDC: –36 VDC (minimum) –48 VDC (nominal), –72 VDC (maximum)
Voltage range international	PWR-C2-640WDC: –36 VDC (minimum) –60 VDC (nominal), –72 VDC (maximum)
Total input BTU <sup>1</sup>	PWR-C2-640WDC 2444 BTUs per hour, 719 W
Total output BTU <sup>1</sup>	PWR-C2-640WDC: 2188 BTUs per hour, 640 W

**Table 1-4 Power Specifications for DC Power 24-Port and 48-Port Switches (continued)**

Wire gauge for ground connection	PWR-C2-640WDC: 12 AWG or 8 AWG
Branch circuit protection	PWR-C2-640WDC: 25 A

1. The total input and total output BTU ratings refer to input power to the power supply and output power to the switch. The BTU ratings are based on -48 VDC (nominal).

## Fan Module Specifications

**Table 1-5 Fan Module Environmental and Physical Specifications**

<b>Environmental Ranges</b>	
Operating temperature	23 to 176°F (-5 to 80°C)
Storage temperature	-40 to 185°F (-40 to 85°C)
Relative humidity	5 to 96% (non-condensing)
Altitude	Up to 16,400 feet (5,000 m)
<b>Physical Specifications</b>	
Dimensions (H x D x W)	1.62 x 1.73 x 4.24 in. (4.11 x 4.39 x 10.76 cm)
Weight	0.2 lb (0.07 kg)
<b>Operating Specification</b>	
Airflow	20 cfm



# Connector and Cable Specifications

This chapter describes the connector and cable specifications.

The following topics are included in this chapter:

- [Connector Specifications, page 2-11](#)
- [Cable and Adapter Specifications, page 2-5](#)

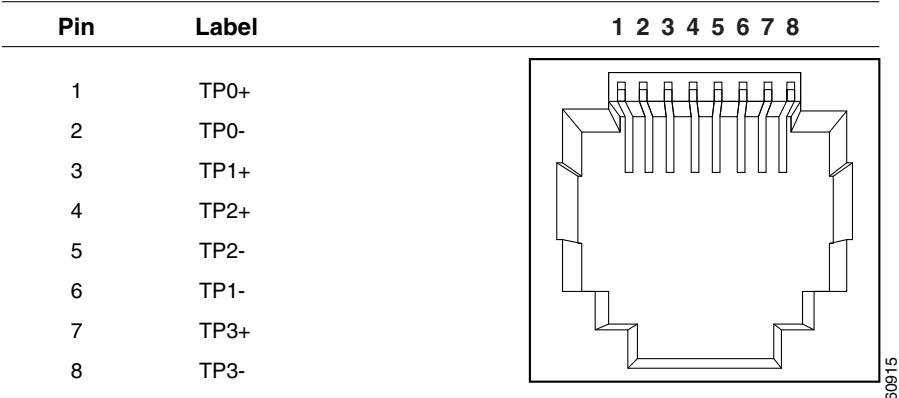
## Connector Specifications

- [10/100/1000 Ports, page 2-1](#)
- [100M/1G/2.5G/5G/10G Ports, page 2-2](#)
- [10-Gigabit Ethernet CX1 \(SFP+ Copper\) Connectors, page 2-2](#)
- [SFP and SFP+ Modules, page 2-3](#)
- [10/100/1000 Ethernet Management Port, page 2-4](#)
- [Console Port, page 2-4](#)

### 10/100/1000 Ports

The 10/100/1000 Ethernet ports on switches use RJ-45 connectors and Ethernet pinouts.

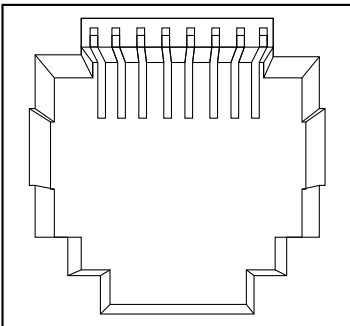
**Figure 2-1** 10/100/1000 Port Pinouts



## 100M/1G/2.5G/5G/10G Ports

The 100M/1G/2.5G/5G/10G multi-Gigabit Ethernet ports on switches use RJ-45 connectors and Ethernet pinouts.

**Figure 2-2** 100M/1G/2.5G/5G/10G Port Pinouts

Pin	Label	1	2	3	4	5	6	7	8
1	TP0+								
2	TP0-								
3	TP1+								
4	TP2+								
5	TP2-								
6	TP1-								
7	TP3+								
8	TP3-								

## 10-Gigabit Ethernet CX1 (SFP+ Copper) Connectors

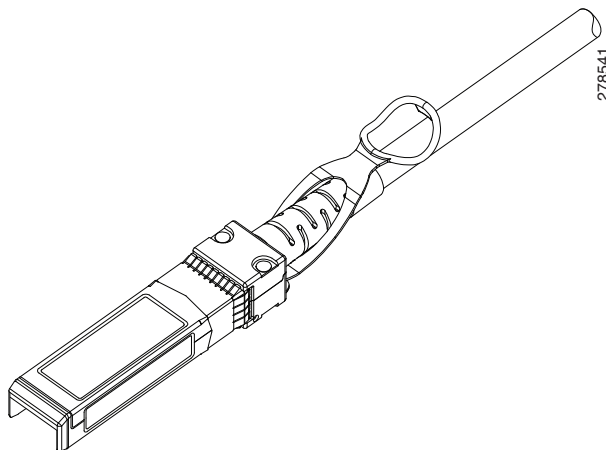
The 10-Gigabit Ethernet electrical modules use CX1 copper connectors similar to the one shown in [Figure 2-3](#).



**Note** When ordering or using CX1 cables, ensure that the version identifier is 2 or higher.

The 10-Gigabit Ethernet optical modules use the connectors shown in [Figure 2-4](#) and [Figure 2-5](#).

**Figure 2-3** 10-Gigabit Ethernet CX1 Copper Connector

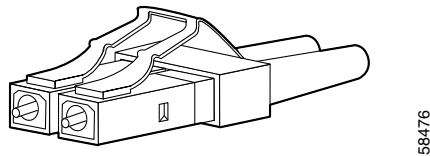


# SFP and SFP+ Modules

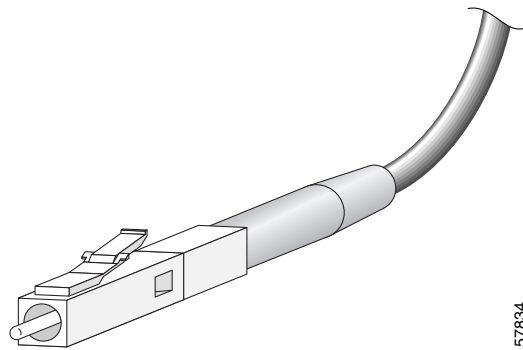
Figure 2-4, Figure 2-5, and Figure 2-6 show the SFP module connectors.

The switch supports the SFP module patch cable, a 0.5-meter, copper, passive cable with SFP module connectors at each end (Figure 2-7). This cable can be used (only with 1-Gigabit Ethernet SFP ports) to connect two Catalyst 3650 switches in a cascaded configuration.

**Figure 2-4 Duplex LC Cable Connector**

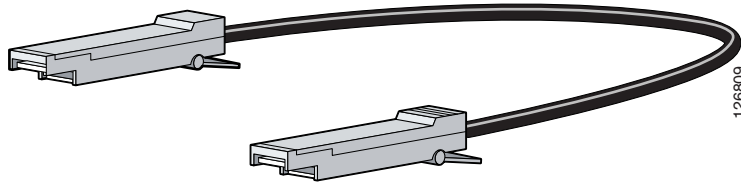


**Figure 2-5 Simplex LC Cable Connector**



**Figure 2-6 Copper SFP Module RJ-45 Connector**

Pin	Label	1	2	3	4	5	6	7	8
1	TP0+								
2	TP0-								
3	TP1+								
4	TP2+								
5	TP2-								
6	TP1-								
7	TP3+								
8	TP3-								

**Figure 2-7 SFP Module Patch Cable**

## 10/100/1000 Ethernet Management Port

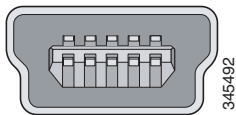
The 10/100/1000 Ethernet management port uses RJ-45 connectors with Ethernet pinouts. [Figure 2-8](#) shows the pinouts.

**Figure 2-8 10/100/1000 Port Pinouts**

Pin	Label	1	2	3	4	5	6	7	8
1	TP0+								
2	TP0-								
3	TP1+								
4	TP2+								
5	TP2-								
6	TP1-								
7	TP3+								
8	TP3-								

## Console Port

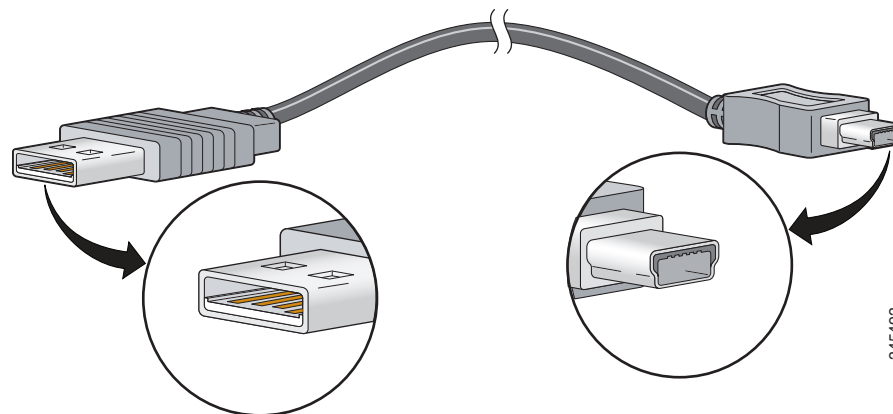
The switch has two console ports: a USB 5-pin mini-Type B port on the front panel (see [Figure 2-9](#)) and an RJ-45 console port on the rear panel.

**Figure 2-9 USB Mini-Type B Port**

The USB console port uses a USB Type A to 5-pin mini-Type B cable, shown in [Figure 2-10](#). The USB Type A-to-USB mini-Type B cable is not supplied. You can order an accessory kit (part number 800-33434) that contains this cable.



**Figure 2-10** USB Type A-to-USB 5-Pin Mini-Type B Cable



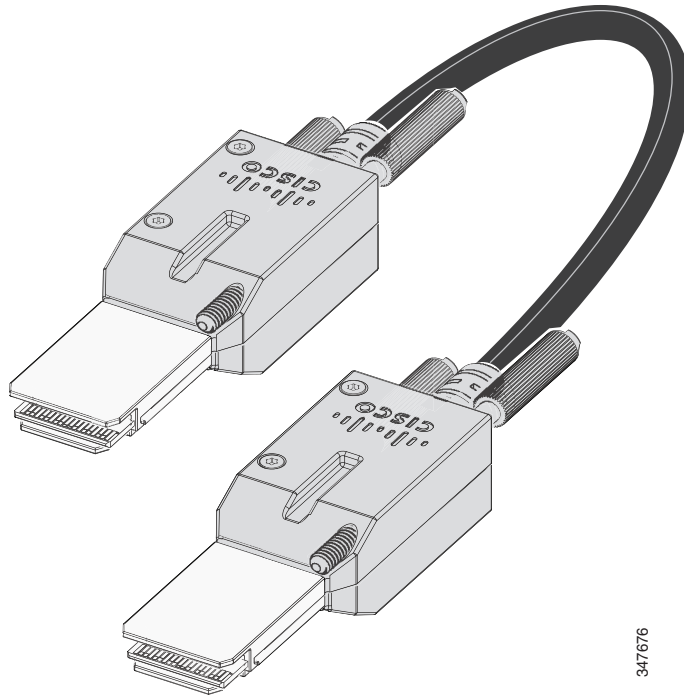
The RJ-45 console port uses an 8-pin RJ-45 connector (See [Table 2-2](#) and [Table 2-3](#).) The supplied RJ-45-to-DB-9 adapter cable is used to connect the console port of the switch to a console PC. Provide an RJ-45-to-DB-25 female DTE adapter if you want to connect the switch console port to a terminal. You can order a kit (part number ACS-DSBUASYN=) containing that adapter. For console port and adapter pinout information, see [Table 2-2](#) and [Table 2-3](#).

## Cable and Adapter Specifications

- [StackWise Cables](#), page 2-5
- [StackWise Adapters](#), page 2-6
- [StackWise Adapter Blanks](#), page 2-7
- [SFP and SFP+ Module Cable Specifications](#), page 2-8
- [Four Twisted-Pair Cable Pinouts](#), page 2-8
- [Two Twisted-Pair Cable Pinouts](#), page 2-9
- [Identifying a Crossover Cable](#), page 2-9
- [Console Port Adapter Pinouts](#), page 2-9

## StackWise Cables

[Figure 2-11](#) shows a StackWise stacking cable.

**Figure 2-11 StackWise Stacking Cable**

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You can order these StackWise cables (nonhalogen) from your Cisco sales representative:

- STACK-T2-50CM= (0.5-meter cable)
- STACK-T2-1M= (1-meter cable)
- STACK-T2-3M= (3-meter cable)

## StackWise Cables Minimum Bend Radius and Coiled Diameter

Table 2-1 specifies the minimum bend radius and coiled diameter for each StackWise cable.

**Table 2-1 StackWise Cables Minimum Bend Radius and Coiled Diameter**

Cable Part Number	Cable Length	Minimum Bend Radius	Minimum Coiled Diameter
STACK-T2-50CM	1.64 feet (0.5 m)	2.60 in. (66 mm)	5.20 in. (132 mm)
STACK-T2-1M	3.28 feet (1.0 m)	2.60 in. (66 mm)	5.20 in. (132 mm)
STACK-T2-3M	9.84 feet (3.0 m)	3.58 in. (91 mm)	7.17 in. (182 mm)

## StackWise Adapters

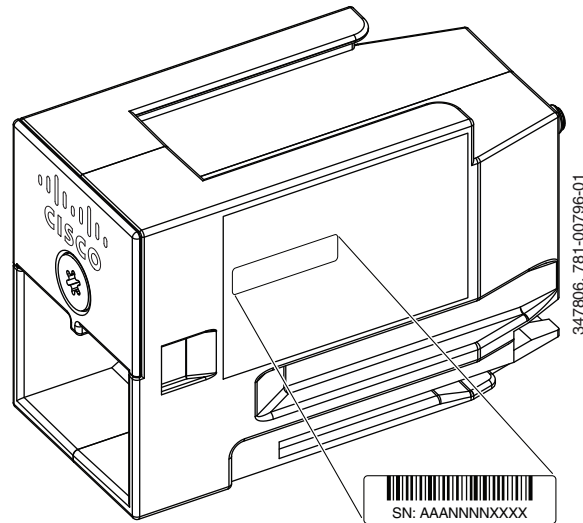
A StackWise adapter must be installed in the stacking port to enable stacking. The StackWise cable connects to the StackWise adapter in the stacking port. For switches ordered with stacking, the StackWise adapters are preinstalled.

If the switches are not ordered with stacking, the adapters must be ordered separately and installed. You can order a StackWise adapter as part of a StackWise stacking upgrade kit (part number C3650-STACK-KIT=) that contains two adapters and a 0.5-m StackWise cable.

## Locating the StackWise Adapter Serial Number

If you contact Cisco Technical Assistance regarding a StackWise adapter, you should know the serial number. See [Figure 2-12](#) to find out about how to locate the serial number.

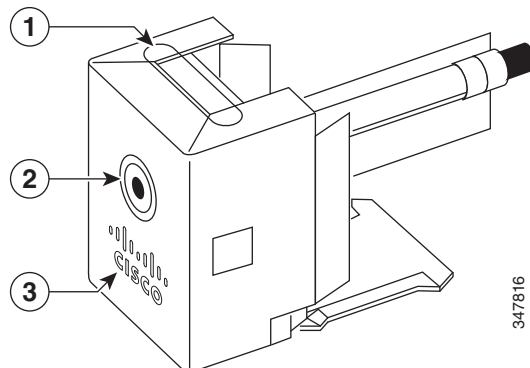
**Figure 2-12** Location of the Serial Number on the StackWise Adapter



## StackWise Adapter Blanks

A StackWise adapter blank is installed in the stacking port if stacking is not specified at the time of ordering the switch. The StackWise adapter blank is screwed into the stacking port and must be removed and replaced by a StackWise adapter if the port is to be used for stacking. [Figure 2-13](#) shows a StackWise adapter blank.

**Figure 2-13** StackWise Adapter Blank



<b>1</b>	StackWise adapter blank	<b>3</b>	Cisco label
<b>2</b>	Assembly screw		

## SFP and SFP+ Module Cable Specifications

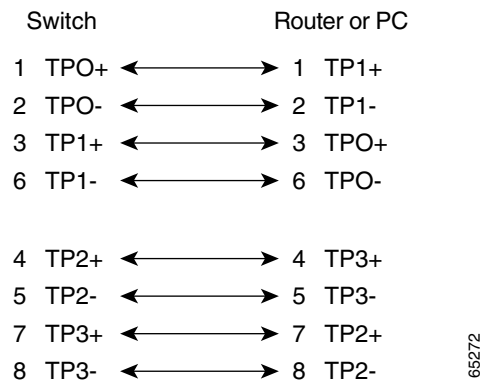
Each port must match the wave-length specifications on each end of the cable, and the cable must not exceed the stipulated cable length. Copper 1000BASE-T SFP module transceivers use standard four twisted-pair, Category 5 cable at lengths up to 328 feet (100 meters).

For cabling specifications, refer to the Cisco Transceiver Modules data sheet at:

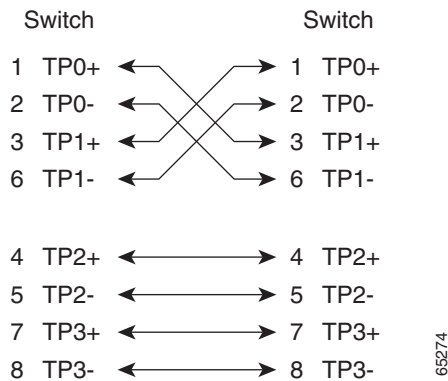
[http://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_data\\_sheets\\_list.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_data_sheets_list.html)

## Four Twisted-Pair Cable Pinouts

**Figure 2-14** Four Twisted-Pair Straight-Through Cable Schematic

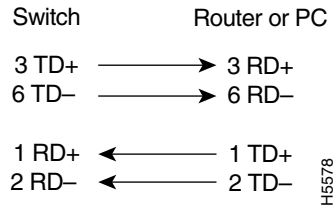


**Figure 2-15** Four Twisted-Pair Crossover Cable Schematic

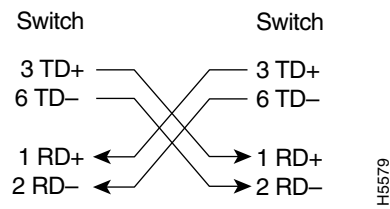


## Two Twisted-Pair Cable Pinouts

**Figure 2-16** Two Twisted-Pair Straight-Through Cable Schematic



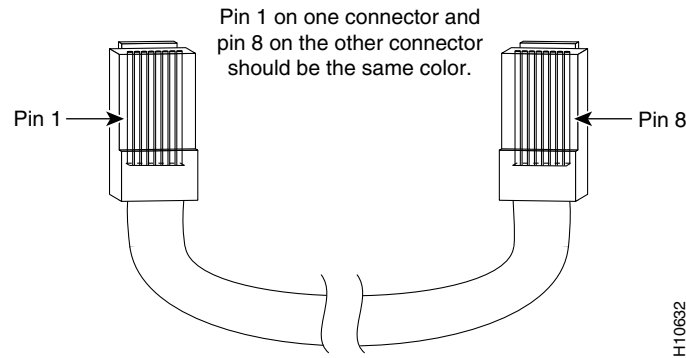
**Figure 2-17** Two Twisted-Pair Crossover Cable Schematic



## Identifying a Crossover Cable

To identify a crossover cable, hold the cable ends side-by-side, with the tab at the back. The wire connected to the pin on the outside of the left plug should be the same color as the wire connected to the pin on the outside of the right plug. (See [Figure 2-18](#).)

**Figure 2-18** Identifying a Crossover Cable



## Console Port Adapter Pinouts

The console port uses an 8-pin RJ-45 connector, which is described in [Table 2-2](#) and [Table 2-3](#). If you did not order a console cable, you should provide an RJ-45-to-DB-9 adapter cable to connect the switch console port to a PC console port. You should provide an RJ-45-to-DB-25 female DTE adapter if you want to connect the switch console port to a terminal. You can order a kit with an adapter (part

number ACS-DSBUASYN=). For console port and adapter pinout information, see [Table 2-2](#) and [Table 2-3](#).

[Table 2-2](#) lists the pinouts for the console port, the RJ-45-to-DB-9 adapter cable, and the console device.

**Table 2-2 Console Port Signaling Using a DB-9 Adapter**

Switch Console Port (DTE)	RJ-45-to-DB-9 Terminal Adapter	Console Device
Signal	DB-9 Pin	Signal
RTS	8	CTS
DTR	6	DSR
TxD	2	RxD
GND	5	GND
GND	5	GND
RxD	3	TxD
DSR	4	DTR
CTS	7	RTS

[Table 2-3](#) lists the pinouts for the console port, RJ-45-to-DB-25 female DTE adapter, and the console device.



**Note**

The RJ-45-to-DB-25 female DTE adapter is not supplied with the switch. You can order a kit with the adapter (part number ACS-DSBUASYN=) from Cisco.

**Table 2-3 Console Port Signaling Using a DB-25 Adapter**

Switch Console Port (DTE)	RJ-45-to-DB-25 Terminal Adapter	Console Device
Signal	DB-25 Pin	Signal
RTS	5	CTS
DTR	6	DSR
TxD	3	RxD
GND	7	GND
GND	7	GND
RxD	2	TxD
DSR	20	DTR
CTS	4	RTS



## Configuring the Switch with the CLI-Based Setup Program

This appendix provides a CLI-based setup procedure for a Catalyst 3650 standalone switch or a switch stack. To set up the switch by using Express Setup, see the *Catalyst 3650 Switch Getting Started Guide*. Before connecting the switch to a power source, review the safety warnings thoroughly.

This chapter includes the following topics:

- [Accessing the CLI, page 3-1](#)
- [Entering the Initial Configuration Information, page 3-6](#)

### Accessing the CLI

The following are the various ways in which the CLI can be accessed.

#### Accessing the CLI Through Express Setup

You can access the CLI on an unconfigured switch by placing the switch in Express Setup mode and then connecting a switch Ethernet port or the Ethernet management port to the Ethernet port of your PC or workstation. To put the switch into Express Setup mode, follow the steps described in the *Catalyst 3650 Switch Getting Started Guide* at

[http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650\\_gsg.html](http://www.cisco.com/c/en/us/td/docs/switches/lan/catalyst3650/hardware/quick/guide/cat3650_gsg.html).

When the switch is in Express Setup mode, open a Telnet session to the switch by entering the IP address 10.0.0.1. Enter the **setup** user EXEC command. Enter the information described in the “[Entering the Initial Configuration Information](#)” section on page 3-6.

After you have entered the configuration information for the switch, save it to flash memory by using the **write memory** privileged EXEC command.



#### Note

While in Express Setup mode, the IP address 10.0.0.1 remains active on the switch until you enter the **write memory** command. However, you lose the Telnet connection after entering the **write memory** command.

For more information about using the CLI, see the *Cisco Catalyst 3650 Series Switches Command Reference Guides* at <http://www.cisco.com/c/en/us/support/switches/catalyst-3650-series-switches/products-command-reference-list.html>.



## Accessing the CLI Through a Console Port

You can enter Cisco IOS commands and parameters through the CLI.

**Note**

If you have stacked Catalyst 3650 switches, connect to the 10/100/1000 Ethernet management port or console port of one of the stack switches. You can perform the initial configuration for the entire stack on any switch in the stack.

Use one of these options to access the CLI:

- RJ-45 Console Port
- USB Console Port

### RJ-45 Console Port

The RJ-45 console port is on the rear panel of the switch.

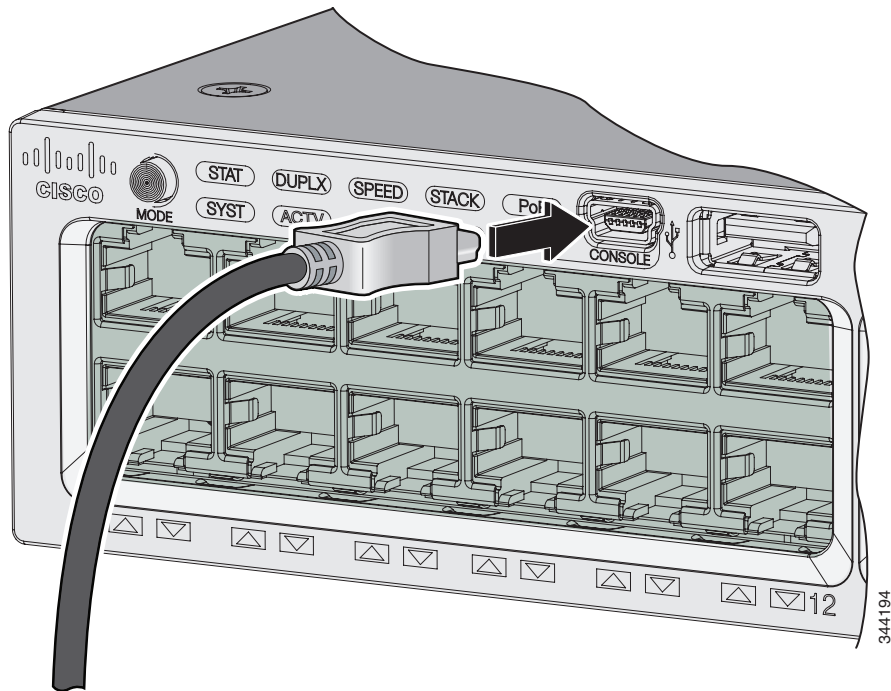
- 
- Step 1** Connect the RJ-45-to-DB-9 adapter cable to the 9-pin serial port on the PC. Connect the other end of the cable to the switch console port.
- Step 2** Start the terminal emulation program on the PC or the terminal. The program, frequently a PC application, such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.
- Step 3** Configure the baud rate and character format of the PC or terminal to match the console port characteristics:
- 9600 baud
  - 8 data bits
  - 1 stop bit
  - No parity
  - None (flow control)
- Step 4** Connect the power to the switch.
- Step 5** The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Follow the steps in the “[Configuring the Setup Program](#)” section on page 3-6.
- 

### USB Console Port

The USB mini-Type B port is on the front panel of the switch.

- 
- Step 1** If you are connecting the switch’s USB console port (see [Figure 3-1](#)) to a Windows-based PC for the first time, install the USB driver. See these sections for installation instructions:
- “[Installing the Cisco Microsoft Windows USB Device Driver](#)” section on page 3-4
  - “[Uninstalling the Cisco USB Driver for Microsoft Windows](#)” section on page 3-5

**Figure 3-1** Connecting the USB Console Cable to the Catalyst 3650 Switch



- Step 2** Connect a USB cable to the PC USB port. Connect the other end of the cable to the switch's mini-B (5-pin-connector) USB console port. See [Figure 3-1](#).
- Step 3** Start the terminal-emulation program on the PC or the terminal. The program, frequently a PC application such as HyperTerminal or ProcommPlus, makes communication between the switch and your PC or terminal possible.
- Step 4** Configure the baud rate and character format of the PC or terminal to match the console port default characteristics:
- 9600 baud
  - 8 data bits
  - 1 stop bit
  - No parity
  - None (flow control)
- Step 5** Connect the power to the switch.
- Step 6** The PC or terminal displays the bootloader sequence. Press **Enter** to display the setup prompt. Follow the steps in the [“Configuring the Setup Program”](#) section on page 3-6.

## Installing the Cisco Microsoft Windows USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB console port on the switch.

To install the Microsoft Windows USB Device Driver:

- 
- Step 1** Obtain the Cisco USB console driver file from the Cisco.com web site and unzip it.
- Step 2** Connect the USB cable to the PC and the switch console port. The USB console port LED turns green, and the Found New Hardware wizard is displayed. Follow the instructions to complete the driver installation.
- 

## Uninstalling the Cisco USB Driver for Microsoft Windows

Use the Windows Add or Remove Programs utility or the setup.exe file:

- [Uninstalling the Cisco USB Driver for Microsoft Windows Using the Add or Remove Programs Utility](#)
- [Uninstalling the Cisco USB Driver for Microsoft Windows Using the Setup.exe Program](#)

### Uninstalling the Cisco USB Driver for Microsoft Windows Using the Add or Remove Programs Utility

- [Uninstalling the Cisco Microsoft Windows XP USB Driver](#)
- [Uninstalling the Cisco Microsoft Windows Vista and Microsoft 7 USB Driver](#)

#### Uninstalling the Cisco Microsoft Windows XP USB Driver



---

**Note** Disconnect the switch console terminal before uninstalling the driver.

---

- Step 1** Choose **Start > Control Panel > Add or Remove Programs**.
- Step 2** Select **Cisco Virtual Com** and click **Remove**.
- Step 3** When the **Program Maintenance** window is displayed, click the **Remove** radio button. Click **Next**.
- 

#### Uninstalling the Cisco Microsoft Windows Vista and Microsoft 7 USB Driver



---

**Note** Disconnect the switch console terminal before uninstalling the driver.

---

- Step 1** Choose **Start > Control Panel > Uninstall or change a program**.
- Step 2** Select **Cisco Virtual Com** and click **Uninstall**.
- Step 3** When the **Programs and Features** window is displayed, click **Yes** to confirm.
-

## Uninstalling the Cisco USB Driver for Microsoft Windows Using the Setup.exe Program




---

**Note** Disconnect the switch console terminal before uninstalling the driver.

---

- Step 1** Run setup.exe for Windows 32-bit, or setup(x64).exe for Windows 64-bit, and click **Next**.
- Step 2** In the **InstallShield** wizard for Cisco Virtual Com that is displayed, click **Next**.
- Step 3** In the **Program Maintenance** window that is displayed, click the **Remove** radio button, and click **Next**.
- Step 4** In the **Remove the Program** window that is displayed, click **Remove**.




---

**Note** For Windows Vista or Windows 7, if a User Account Control warning is displayed, click **Allow - I trust this program to proceed**.

---

- Step 5** In the **InstallShield Wizard Completed** window that is displayed, click **Finish**.
- 

## Entering the Initial Configuration Information

To set up the switch, complete the setup program, which runs automatically after the switch is powered on. You must assign an IP address and other configuration information necessary for the switch to communicate with the local routers and the Internet. This information is also needed to use Device Manager or Cisco Network Assistant to configure and manage the switch.

### IP Settings

You require the following information from your network administrator to configure the switch:

- Switch IP address
- Subnet mask (IP netmask)
- Default gateway (router)
- Enable secret password
- Enable password
- Telnet password

### Configuring the Setup Program

If your switches are stacked and there are multiple console connections to individual switches in the stack, the initial setup dialog box is displayed on the console where you first press **Enter**.

To complete the setup program and the initial configuration for the switch:

- 
- Step 1** Enter **Yes** at the following two prompts:

Would you like to enter the initial configuration dialog? [yes/no]: **yes**

At any point you may enter a question mark '?' for help.  
Use ctrl-c to abort configuration dialog at any prompt.  
Default settings are in square brackets '['].

Basic management setup configures only enough connectivity  
for management of the system, extended setup will ask you  
to configure each interface on the system.

Would you like to enter basic management setup? [yes/no]: **yes**

**Step 2** Enter a host name for the switch, and press **Return**.

On a command switch, the host name is limited to 28 characters, and to 31 characters on a member switch. Do not use *-n*, where *n* is a number, as the last character in a host name for any switch.

Enter host name [Switch]: *host\_name*

**Step 3** Enter a secret password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, can start with a number, is case sensitive, allows spaces, but ignores leading spaces. The secret password is encrypted, and the enable password is in plain text.

Enter enable secret: *secret\_password*

**Step 4** Enter an enable password, and press **Return**.

Enter enable password: *enable\_password*

**Step 5** Enter a virtual terminal (Telnet) password, and press **Return**.

The password can be from 1 to 25 alphanumeric characters, is case sensitive, allows spaces, but ignores leading spaces.

Enter virtual terminal password: *terminal-password*

**Step 6** To configure the country code, enter **yes** and press **Return**.

Do you want to configure country code? [no]: **yes**

**Step 7** Enter the country code, and press **Return**.

Enter the country code[US]: **us**

**Step 8** (Optional) Configure Simple Network Management Protocol (SNMP) by responding to the prompts. You can also configure SNMP later through the CLI, Device Manager, or the Cisco Network Assistant application. To configure SNMP later, enter **no**.

Configure SNMP Network Management? [no]: **no**

**Step 9** Enter the interface name (physical interface or VLAN name) of the interface that connects to the management network, and press **Return**.

Enter interface name used to connect to the  
management network from the above interface summary: **vlan1**

**Step 10** Configure the interface by entering the switch IP address and subnet mask and pressing **Return**. (The IP address and subnet masks shown here are examples.)

Configuring interface vlan1:  
Configure IP on this interface? [yes]: **yes**  
IP address for this interface: *10.4.120.106*  
Subnet mask for this interface [255.0.0.0]: *255.0.0.0*

You have completed the initial configuration of the switch, and the switch displays its configuration. This is an example of the configuration output:

```
The following configuration command script was created:
hostname switch1
enable secret 5 $1$U1q8$D1A/OiaEbl90WcBPd9cOn1
enable password enable_password
line vty 0 15
password terminal-password
no snmp-server
!
no ip routing

!
interface Vlan1
no shutdown
ip address 10.4.120.106 255.0.0.0
!
interface GigabitEthernet4/0/1
!
interface GigabitEthernet4/0/2

interface GigabitEthernet4/0/3
!
...<output abbreviated>
!

!
end
```

**Step 11** After you complete the initial configuration of the switch, these choices are displayed:

```
[0] Go to the IOS command prompt without saving this config.

[1] Return back to the setup without saving this config.

[2] Save this configuration to nvram and exit.
```

If you want to save the configuration and use it the next time the switch reboots, select option 2 to save it in nonvolatile RAM (NVRAM).

```
Enter your selection [2]:2
```

**Step 12** Make your selection, and press **Return**.

---

After you complete the setup program, the switch can run the default configuration that you created. To change this configuration or to perform other management tasks, enter commands at the `Switch>` prompt, or use the Cisco Network Assistant, or another management tool for further configuration.