



Product Overview

This chapter provides the following topics that describe the Catalyst 2900 series XL switches, hereafter referred to as *the switches*.

- Switch features, including management options
- Descriptions of the front and rear panels
- Descriptions of the LEDs

Features

The switches are stackable 10/100 Ethernet switches to which you can connect workstations, Cisco IP Phones, and other network devices such as servers, routers, and other switches. The 2900 XL LRE switches employ Long-Reach Ethernet (LRE), a very-high-data-rate digital subscriber line (VDSL)-based technology that allows an Ethernet network to reach distances up to 4921 feet (1500 meters). The switches can be deployed as backbone switches, aggregating 10/100 and Gigabit Ethernet traffic from other network devices.

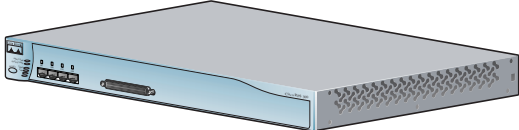
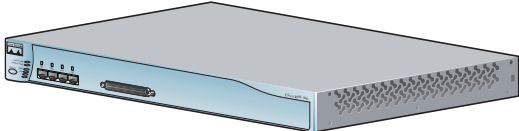
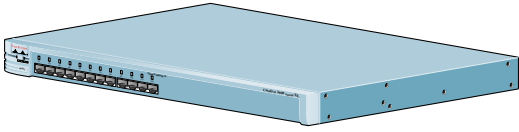
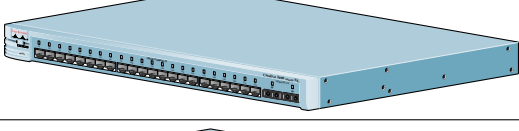
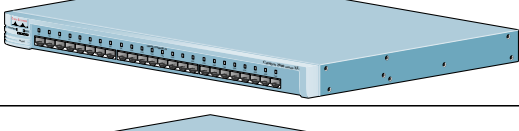
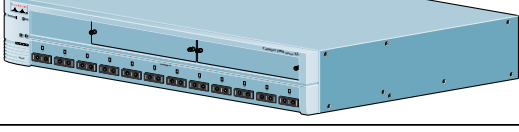
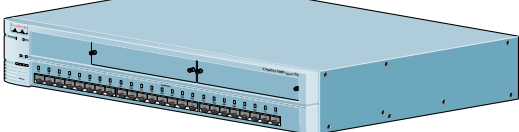
The Catalyst 2900 XL switches have these features:

- Autonegotiates speed and duplex operation on all 10/100 ports
- Operates in full-duplex mode on all 100BASE-FX ports
- Checks for errors on a received packet, determines the destination port, stores the packet in shared memory, and then forwards the packet to the destination port

- On the Catalyst 2924M XL and Catalyst 2912MF XL switches, two expansion slots for 10BASE-T/100BASE-TX, 100BASE-FX, Gigabit Ethernet, and asynchronous transfer mode (ATM) modules
- On the Catalyst 2912 LRE XL and 2924 LRE XL switches, up to 24 LRE ports through one RJ-21 connector
- Supports up to 2048 MAC addresses on the Catalyst 2924 XL, 2924C XL, and 2912 XL switches
- Supports up to 8192 MAC addresses on the Catalyst 2924M XL and 2912MF XL switches

Figure 1-1 shows the switch models.

Figure 1-1 Catalyst 2900 Series XL Switches

Version Number	Description	
WS-C2912-LRE-XL	4 fixed autosensing 10/100 ports 12 LRE ports	
WS-C2924-LRE-XL	4 fixed autosensing 10/100 ports 24 LRE ports	
WS-C2912-XL	12 fixed autosensing 10/100 ports	
WS-C2924C-XL	22 fixed autosensing 10/100 ports 2 100BASE-FX ports	
WS-C2924-XL	24 fixed autosensing 10/100 ports	
WS-C2912MF-XL	12 100BASE-FX ports 2 expansion slots	
WS-C2924M-XL	24 fixed autosensing 10/100 ports 2 expansion slots	

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Management Interface Options

The Catalyst 2900 XL and Catalyst 3500 XL switches are designed for plug-and-play operation: you only need to assign basic IP information to the switch and connect it to the other devices in your network. If you have specific network needs, you can configure and monitor the switch—on an individual basis or as part of a switch cluster—through its various management interfaces.

You can configure and monitor individual switches and switch clusters by using the following interfaces:

- **Cluster Management Suite (CMS)**—CMS is a graphical user interface that can be launched from anywhere in your network through a web browser such as Netscape Communicator or Microsoft Internet Explorer. CMS is already installed on the switch, and no additional installation is required. Using CMS, you can fully configure and monitor a standalone switch, a specific cluster member, or an entire switch cluster. You can also display network topologies to gather link information, and display switch images to modify switch- and port-level settings.
- **Command-line Interface (CLI)**—The switch CLI Cisco IOS software and is enhanced to support desktop-switching features. You can fully configure and monitor the switch and switch cluster members from the CLI. You can access the CLI either by connecting your management station directly to the switch console port or by using Telnet from a remote management station.
- **Simple network management protocol (SNMP)**—SNMP provides a means to monitor and control the switch and switch cluster members. You can manage switch configuration settings, performance, security, and collect statistics by using SNMP management applications such as CiscoWorks2000 LAN Management Suite (LMS) and HP OpenView.

You can manage the switch from an SNMP-compatible management station that is running platforms such as HP OpenView or SunNet Manager. The switch supports a comprehensive set of MIB extensions and four Remote Monitoring (RMON) groups.

For more information about CMS, the CLI, and SNMP refer to the *Catalyst 2900 Series XL and Catalyst 3500 Series XL Software Configuration Guide*.

Front-Panel Description

Depending on the model, the switch front panels can have up to 24 10/100 ports (See [Figure 1-2](#)), up to 12 100BASE-FX ports (See [Figure 1-2](#)), 2 expansion slots (see [Figure 1-2](#)), and up to 24 Long-Reach Ethernet ports (See [Figure 1-4](#)). All switches have a set of LEDs and a Mode button. This section describes these front-panel components.

Figure 1-2 Catalyst 2900 XL Front-Panel 10/100 Ports

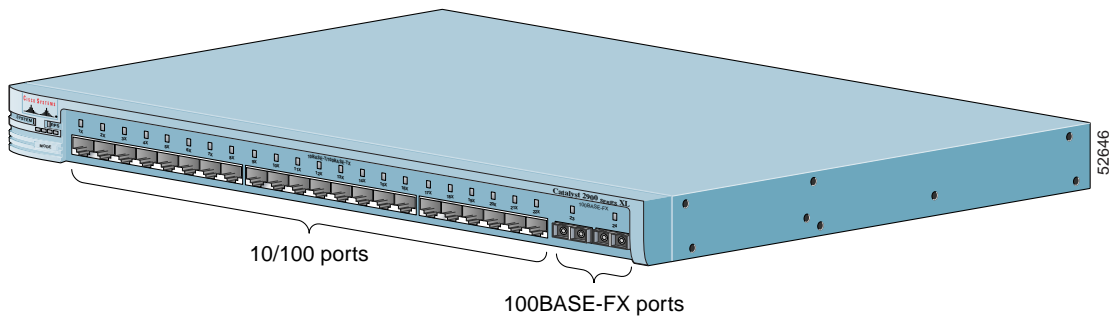


Figure 1-3 Catalyst 2900 XL 100BASE-FX ports and Expansion Slots

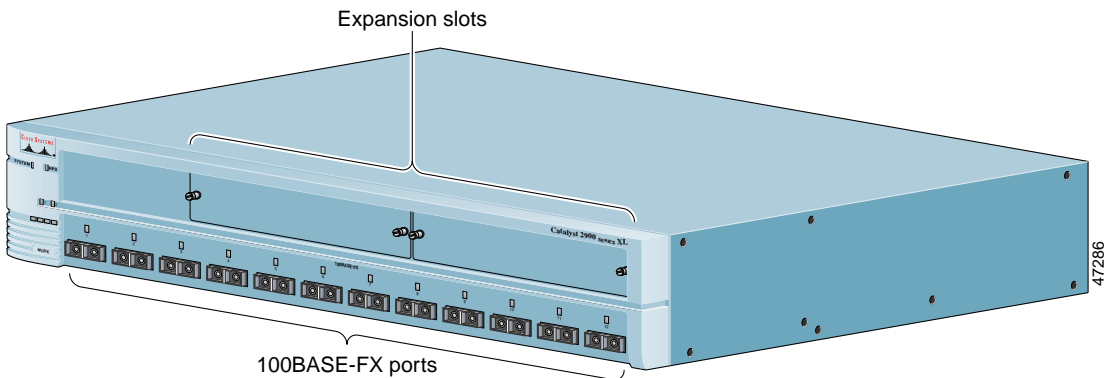
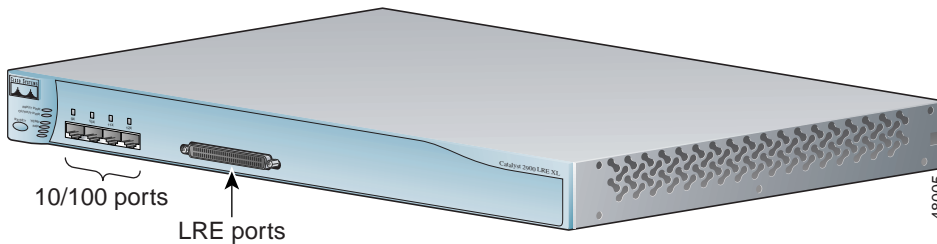


Figure 1-4 Catalyst 2900 LRE XL 10/100 and LRE Ports



10/100 Ports

The 10/100 switch ports (see [Figure 1-2](#) and [Figure 1-4](#)) can connect to any compatible network device up to 328 feet (100 meters) away:

- 10BASE-T-compatible devices, such as workstations, Cisco IP Phones, and hubs through standard RJ-45 connectors and Category 3, 4, or 5 cabling
- 100BASE-TX-compatible devices, such as high-speed workstations, Cisco IP Phones, servers, hubs, routers, and other switches through standard RJ-45 connectors and Category 5 cabling



Note

A Category 5 cable is required for 100BASE-TX traffic. A port operating at 10BASE-T can use Category 3 and 4 cables.

When connecting the switch to workstations, servers, routers, and Cisco IP Phones, be sure that the cable is a straight-through, twisted-pair cable. When connecting the switch to switches or hubs, use a crossover cable. Pinouts for the cables are described in [Appendix B, “Connectors and Cable Specifications.”](#)

The 10/100 switch ports can be explicitly set to operate in any combination of half duplex, full duplex, 10 Mbps, or 100 Mbps. These ports also can be set for speed and duplex autonegotiation, compliant with IEEE 802.3u. When set for autonegotiation, the port senses the speed and duplex settings of the attached device and advertises its own capabilities. If the connected device also supports autonegotiation, the switch port negotiates the best connection (that is, the fastest line speed that both devices support and full-duplex transmission if the attached device supports it) and configures itself accordingly.

The 10/100 ports on the Catalyst 2900 XL switches provide protocol support for Cisco IP Phones and per-port priority override. Refer to the *Catalyst 2900 Series XL and Catalyst 3500 Series XL Software Configuration Guide* for more information about these features.

Cisco IP Phones—connected to the 10/100 port—must be connected to an AC power source. Unlike the 3524-PWR XL switch, the Catalyst 2900 XL switches do not provide inline power.

For more info on the Catalyst 3524-PWR XL switch, refer to the *Catalyst 3500 Series XL Hardware Installation Guide*.

100BASE-FX Ports

The 100BASE-FX ports use 10/125- or 62.5/125-micron multimode fiber-optic cabling. The connection distances between the switch and the attached device can be as follows:

- If the switch port and the port on the attached device are configured for half-duplex operation, the connection can be up to 1352 feet (412 meters).
- If the switch port and the port on the attached device are configured for full-duplex operation, the connection can be over distances of up to 6562 feet (2 kilometers).

Long-Reach Ethernet Ports

The Long-Reach Ethernet (LRE) ports (Figure 1-4) use one RJ-21 connector to connect up to 24 Cisco 575 LRE customer premises equipment (CPE) devices through unstructured wiring, such as existing telephone lines. The link between the LRE switch port and each CPE device can reach speeds of up to 15 Mbps (full duplex) and distances of up to 4921 feet (1500 meters).

The default mode for each LRE port is speed autonegotiation, half duplex operation. For information about configuring the LRE ports, refer to the *Catalyst 2900 Series XL and Catalyst 3500 Series XL Software Configuration Guide*.

For more information about the Cisco 575 LRE CPE, refer to the *Cisco 575 LRE CPE Hardware Installation Guide*.

If telephone services, such as voice or integrated services digital network (ISDN), use the same cabling as LRE traffic, the LRE port must be connected to the patch panel through a basic telephone service, also known as *plain old telephone service* (POTS) splitter. The splitter routes LRE data (high-frequency) and voice (low-frequency) traffic from the telephone line to the switch and private branch exchange (PBX) switch or public-switched telephone network (PSTN)

If the other telephone services are connected through a private branch exchange (PBX) switch, a Cisco LRE 48 POTS Splitter can be used. The PBX routes voice traffic to private telephone networks and the public system telephone network (PSTN). For more information about the Cisco LRE 48 POTS Splitter (PS-1M-LRE-48), refer to the *Installation Notes for the Cisco LRE 48 POTS Splitter*.

If the installation does not have a PBX, a homologated POTS splitter is required to directly connect to the PSTN. For more information about homologated POTS splitters, contact your Cisco sales representative.

**Note**

If a connection to a phone network is not required at all, a splitter is not needed, and the switch can connect directly to the patch panel.

Expansion Slots

The expansion slots (see [Figure 1-2](#)) are for the Catalyst 2900 XL hot-swappable modules. Each module port is internally switched to other switch ports and is managed through the switch management interfaces.

[Table 1-1](#) lists the modules that the expansion slots support.

Table 1-1 Expansion Modules

Module Type	Model Number
10/100 Ethernet	WS-X2914-XL
	WS-X2914-XL-V
	WS-X2922-XL
100 BASE-FX	WS-X2922-XL-V
	WS-X2924-XL-V

Table 1-1 Expansion Modules (continued)

Module Type	Model Number
¹ Ethernet Gigabit	WS-X2931-XL
ATM	WS-X2971-XL
	WS-X2972-XL
	WS-X2951-XL
	WS-X2961-XL

1. Accommodates modules WS-G5484 =, WS-G5486 =, and WS-X3500-XL=

These modules automatically configure themselves when you insert them in expansion slots and tighten the thumb screws. A power-on self-test (POST) verifies that the module is working properly before it starts forwarding packets.

Modules WS-X2914-XL and WS-X2922-XL support 2048 MAC addresses. If you install one of these modules in a 2924M XL or Catalyst 2912MF XL switch (both supporting 8192 MAC addresses), the module fails POST. You can start the module by restarting the switch with the module installed. After the restart, the switch address capacity is reduced to 2048 MAC addresses.

See the *Catalyst 2900 Series XL Modules Installation Guide* and the *Catalyst 2900 Series XL ATM Modules Installation and Configuration Guide* for detailed information on expansion modules for Catalyst 2900 series XL switches.

LEDs

You can use the switch LEDs to monitor switch activity and its performance. [Figure 1-5](#), [Figure 1-6](#), and [Figure 1-7](#) show the location of the LEDs and the Mode button that you use to select a port mode. Changing a port mode changes the information provided by each port LED.

All of the LEDs described in this section except the utilization meter (UTL) are visible on the Cluster Management Suite (CMS) window and, if the switch is a cluster member, on the CMS Cluster Manager window. The *Catalyst 2900 Series XL and Catalyst 3500 Series XL Software Configuration Guide* describes how to use CMS to manage standalone or individual switches and how to use cluster management software to manage switch clusters].

Figure 1-5 Catalyst 2912 XL, 2924 XL, and 2924C XL LEDs

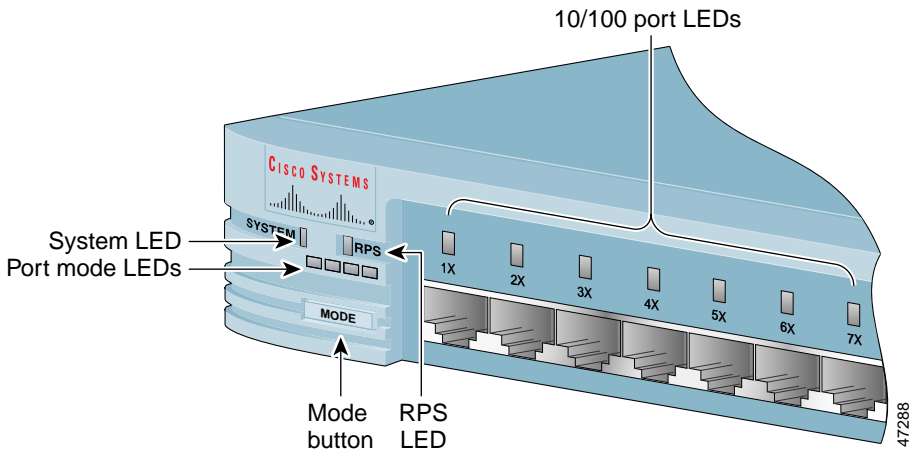


Figure 1-6 Catalyst 2912MF XL and 2924M XL LEDs

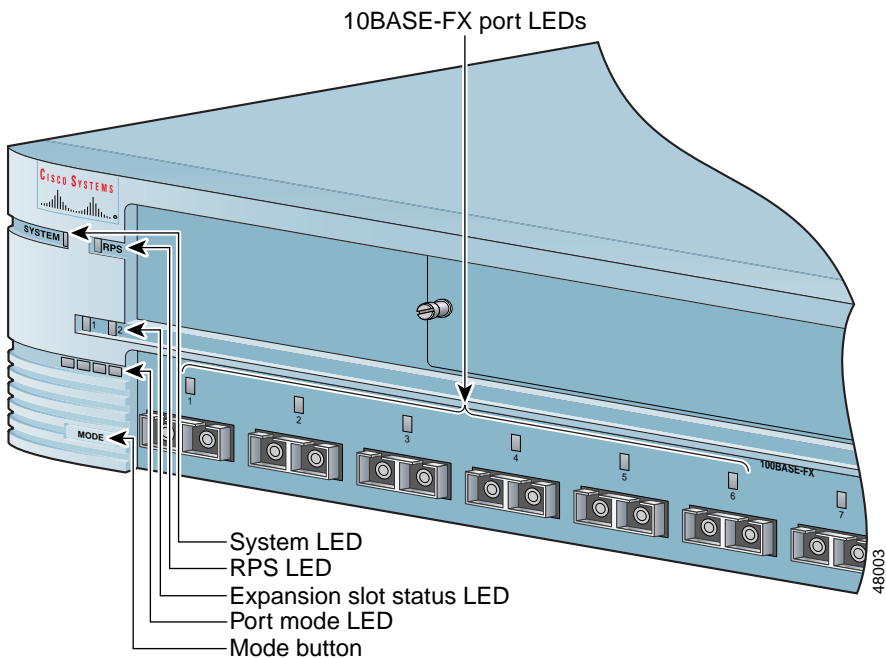
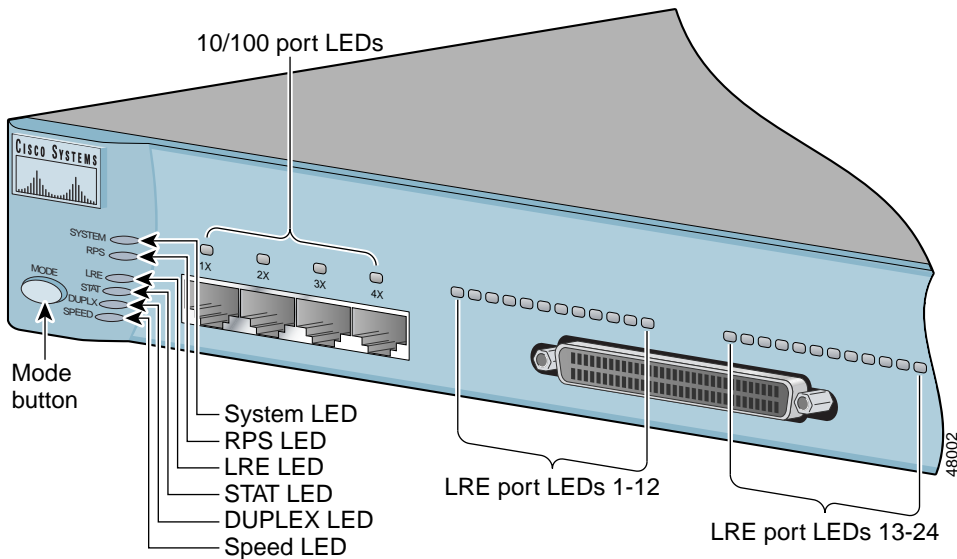


Figure 1-7 Catalyst 2912 LRE XL and 2924 LRE XL LEDs



System LED

The system LED shows whether the system is receiving power and functioning properly. [Table 1-2](#) lists the LED colors and their meanings.

Table 1-2 System LED

Color	System Status
Off	System is not powered up.
Green	System is operating normally.
Amber	System is receiving power but is not functioning properly.

For information on the System LED colors during POST, see the [“Powering On the Switch and Running POST”](#) section on page 2-25.

RPS LED

The Catalyst 2912 LRE XL, Catalyst 2924 LRE XL, and Catalyst 3524-PWR XL switches use the Cisco RPS 300 (model PWR300-AC-RPS-N1). All other Catalyst 2900 XL and Catalyst 3500 XL switches use the Cisco RPS 600 (model PWR600-AC-RPS). Refer to the appropriate switch documentation for redundant power system (RPS) descriptions specific for the switch. [Table 1-3](#) and [Table 1-4](#) list the RPS LED colors and their meanings.

Table 1-3 RPS LED on the Catalyst 2912 XL, 2924C XL, 2924 XL, 2924MF XL, and 2924M XL Switches

Color	RPS Status
Off	RPS is off or is not installed.
Green	RPS is operational.
Blinking green	<p>The RPS and the switch AC power supply are both powered up. If the switch power supply fails, the switch powers down and after 15 seconds restarts, using power from the RPS. The switch goes through its normal boot sequence when it restarts.</p> <p>Note This is not a recommended configuration. For more information see the “Cisco RPS Connector” section on page 1-19.</p>
Amber	<p>RPS is connected but not functioning.</p> <ul style="list-style-type: none"> • The RPS could be in standby mode. Pressing the Mode button on the RPS puts it in Ready mode, and the LED should turn green. • One of the power supplies in the RPS could have failed. • The fan in the RPS might have failed.

Table 1-4 RPS LED on the Catalyst 2912 LRE XL and 2924 LRE XL Switches

Color	RPS Status
Off	RPS is off or is not installed.
Solid green	RPS is connected and operational.
Blinking green	RPS is backing up another switch in the stack.

Table 1-4 RPS LED on the Catalyst 2912 LRE XL and 2924 LRE XL Switches (continued)

Color	RPS Status
Solid amber	<p>RPS is connected but not functioning properly.</p> <ul style="list-style-type: none"> The RPS could be in standby mode. Pressing the Standby/Active button the RPS puts it in Active mode, and the LED should turn green. One of the power supplies in the RPS could be powered down. A fan in the RPS might have failed.
Blinking amber	Internal power supply of the switch is down, and redundancy is lost. The switch is operating on the RPS.

Port LEDs and Modes

Each of the 10/100, 100BASE-FX, and LRE ports and module slots have a port LED. These port LEDs, as a group or individually, display information about the switch and about the individual ports. The port modes ([Table 1-5](#) and [Table 1-6](#)) determine the type of information displayed.

To select or change a mode, press the Mode button until the desired mode is highlighted. When you change port modes, the meaning of the port LED colors also changes. [Table 1-7](#) and [Table 1-8](#) list the port LED colors.

Table 1-5 Port Mode LEDs on the Catalyst 2912 XL, 2924C XL, 2924 XL, 2924MF XL, and 2924M XL Switches

Mode LED	Port Mode	Description
STAT	Port status	The port status. This is the default mode.
UTL	Switch utilization	The current bandwidth in use by the switch. (See Figure 1-7 .)
FDUP	Port duplex mode	The port duplex mode: full duplex or half duplex.
100	Port speed	The port operating speed: 10, 100, or 1000 Mbps.

Table 1-6 *Meanings of Port Status LED Colors for Different Modes on Catalyst 2912 LRE XL and 2924 LRE XL Switches*

Mode LED	Port Mode	Description
LRE	LRE link status	<p>Long-Reach Ethernet (LRE) link status of the LRE ports on the Catalyst 2912 LRE XL and Catalyst 2924 LRE XL switches.</p> <p>Default mode on these switches only.</p> <p>Note When the LRE mode is active, the 10/100 switch ports on the Catalyst 2912 LRE XL and Catalyst 2924 LRE XL continue to show Ethernet link status.</p>
STAT	Port status	<p>Ethernet link status of the 10/100, 100BASE-FX, or 1000BASE-FX switch ports or the Ethernet link status on the remote CPE.</p> <p>Default mode on all Catalyst 2900 XL and Catalyst 3500 XL switches except the Catalyst 2912 LRE XL and Catalyst 2924 LRE XL switches.</p>
DUPLX	Port duplex mode	The port duplex mode: full duplex or half duplex.
SPEED	Port speed	The port operating speed: 10 or 100 Mbps.

Table 1-7 Meanings of Port Status LED Colors for Different Modes on Catalyst 2912 XL, 2924C XL, 2924 XL, 2924MF XL, and 2924M XL Switches

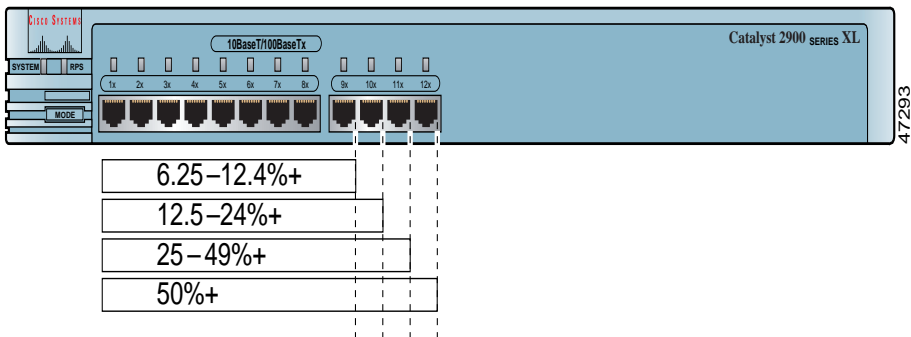
Port Mode	Port LED Color	Meaning
STAT (port status)	Off	No link.
	Solid green	Link present.
	Flashing green	Activity. Port is transmitting or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
	Solid amber	Port is not forwarding. Port was disabled by management or an address violation or was blocked by Spanning Tree Protocol (STP). Note After a port is reconfigured, the port LED can remain amber for up to 30 seconds as STP checks the switch for possible loops.
UTL (utilization)	Green	The LEDs display backplane utilization on a logarithmic scale. If all port LEDs are green, the switch is using 50 percent or more of its total bandwidth capacity. If the right-most LED is amber, the switch is using less than 50 percent of its total bandwidth. If the LED to the left of the right-most LED is amber, the switch is using less than 25 percent of its total capacity, and so on. See Figure 1-7 for details.
FDUP (port duplex)	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.
100 (port speed)	Off	Port is operating at 10 Mbps.
	Green	Port is operating at 100 Mbps.

Table 1-8 Meanings of Port Status LED Colors for Different Modes on Catalyst 2912 LRE XL and 2924 LRE XL Switches

Port Mode	Port LED Color	Meaning
LRE	Off	No LRE link present on the LRE port.
	Green	LRE link present on the LRE port. Port LED turns green within 10 seconds after the LRE port detects a connection to a Cisco 575 LRE CPE.
	Amber	LRE port and WAN CPE port unable to establish the rate defined by the assigned profile. The switch has detected a CPE, but has not established an LRE link at the configured profile. Note The LED can be amber for a short period of time while an LRE link is being established. However, if the LED remains amber, there is a problem with the link between the switch and the CPE.
STAT (port status)	Off	No link.
	Solid green	Link is present between LRE port and a CPE WAN port and also between the CPE Ethernet port and the remote Ethernet device.
	Flashing green	Activity. Port is transmitting or receiving data.
	Alternating green-amber	Link fault. Error frames can affect connectivity, and errors such as excessive collisions, CRC errors, and alignment and jabber errors are monitored for a link-fault indication.
	Solid amber	Port is not forwarding. Port was disabled by management or an address violation or was blocked by Spanning Tree Protocol (STP). Note After a port is reconfigured, the port LED can remain amber for up to 30 seconds as STP checks the switch for possible loops.
DUPLX	Off	Port is operating in half duplex.
	Green	Port is operating in full duplex.
SPEED	Off	Port is operating at 10 Mbps.
	Green	Port is operating at 100 Mbps.

Figure 1-7 shows bandwidth utilization percentages displayed by the right-most LEDs.

Figure 1-8 Bandwidth Utilization



Expansion Slot LEDs

Expansion slot LEDs (shown in [Figure 1-6](#)) show the status of installed modules. The LEDs are numbered 1 (left slot) and 2 (right slot). [Table 1-9](#) lists LED colors and their meanings.

Table 1-9 Expansion Slot LEDs

Color	Expansion Slot Status
Off	No module is installed.
Green	Module is operating normally.
Amber	Module failed POST and should be replaced.

Rear-Panel Description

The switch rear panels have an AC power connector, an RPS connector, and an RJ-45 console port (see [Figure 1-10](#), [Figure 1-10](#), and [Figure 1-11](#)), which are described in this section.

Figure 1-9 Catalyst 2912 XL, 2924 XL, and 2924C XL Rear Panel

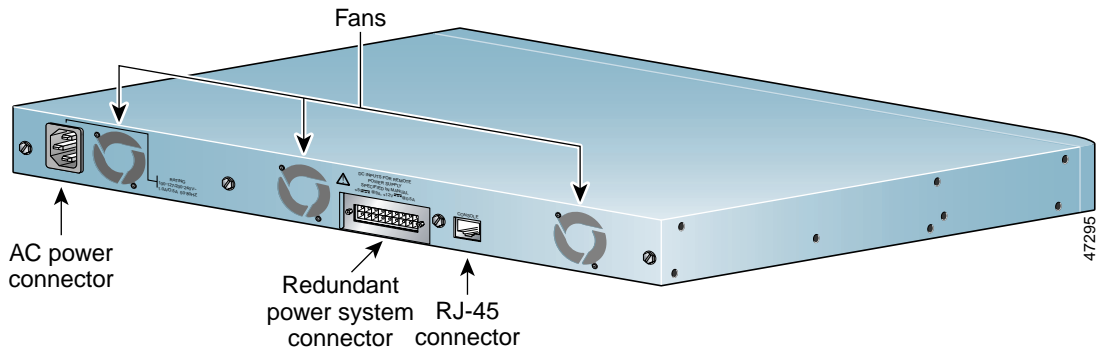


Figure 1-10 Catalyst 2924M XL and Catalyst 2912MF XL Rear Panel

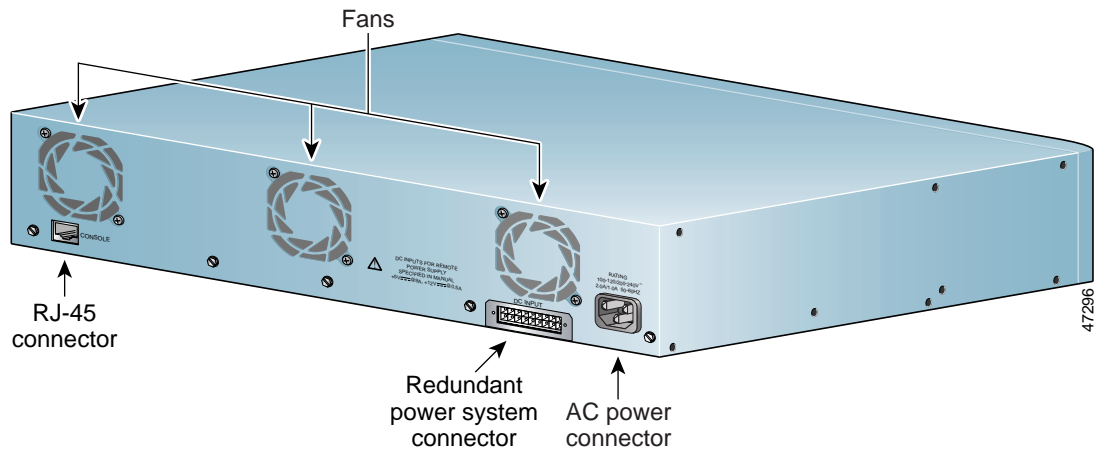
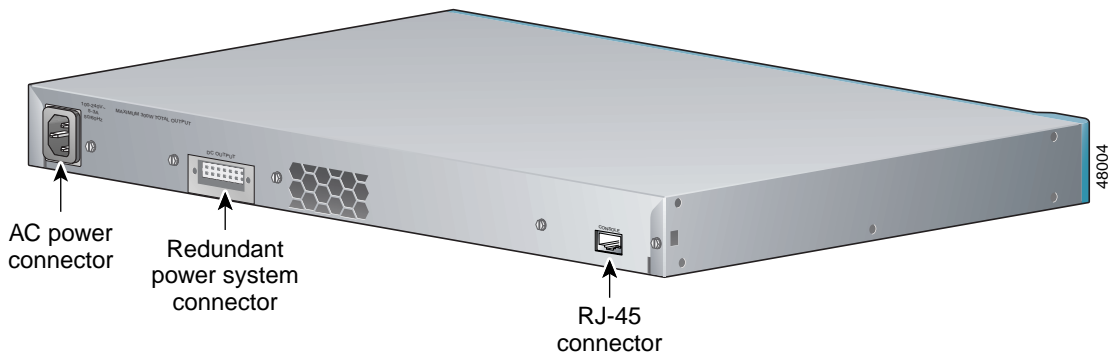


Figure 1-11 Catalyst 2912 LRE XL and 2924 LRE XL Rear Panel

Power Connectors

You can provide power to the switch either through the internal power supply or through the Cisco RPS.

Internal Power Supply Connector

The internal power supply is an autoranging unit that supports input voltages between 100 and 240 VAC. If you plan to use the internal power supply, use the supplied AC power cord to connect the AC power connector to an AC power outlet.

Cisco RPS Connector

Specific Cisco RPS models support specific Catalyst 2900 XL switches:

- Cisco RPS 600 (model PWR600-AC-RPS)—supports the Catalyst 2912 XL, 2924C XL, 2924 XL, 2924MF XL, and 2924M XL switches
- Cisco RPS 300 (model PWR300-AC-RPS-N1)—supports the Catalyst 2912 LRE XL and 2924 LRE XL switches

RPS Connector on the Catalyst 2912 XL, 2924C XL, 2924 XL, 2924MF XL, and 2924M XL Switches

The Cisco RPS 600 (model PWR600-AC-RPS) provides a quasi-redundant power source for four external devices that use up to 150W DC each. Use a one-to-one cable (one connector at each cable end) to connect four external devices to the four DC output power modules. The power source is quasi-redundant because there are two AC input power modules for the Cisco RPS and one DC output power module for each external device. The AC input to the Cisco RPS is fully redundant, but the DC output to the external devices is not.



Warning

Attach only the Cisco RPS (model PWR600-AC-RPS) to the RPS 600 receptacle.



Note

Do not connect the switch power cord to an AC outlet if the switch is also connected to a powered-on RPS. The switches do not support the fully-redundant configuration described in the RPS documentation. The redundant-with-reboot configuration is not recommended.

For more information on the Cisco RPS 600, refer to the *Cisco Redundant Power System Hardware Installation Guide*.

RPS Connector on the Catalyst 2912 LRE and 2924 LRE XL Switches

The RPS is a 300W redundant power system that can support six external network devices and provides power to one failed device at a time. It automatically senses when the power supply of a connected device fails and provides the necessary power to the failed device to prevent loss of network traffic. When the device internal power supply has been brought up or replaced, the RPS automatically stops powering the device.



Warning

Attach only the Cisco RPS (model PWR300-AC-RPS-N1) to the RPS 300 receptacle.

**Note**

The RPS can only power one switch at a time. If more than one switch fails at the same time, any subsequent switch is not supported by the RPS until the first switch failure is resolved.

For more information on the Cisco RPS 300, refer to the *Cisco Redundant Power System 300 Hardware Installation Guide*.

Console Port

You can connect a switch to a PC through the switch console port and by using the supplied rollover cable and DB-9 adapter. You need to provide a RJ-45-to-DB-25 female DTE adapter to connect the switch console port to a terminal. You can order a kit (part number ACS-DSBUASYN=) containing that adapter from Cisco. For console port and adapter pinout information, see the [“Connecting to the Console Port”](#) section on page 2-33.

