HP 2920 Switches

Installation and Getting Started Guide

PoE **PoE+**

Power over Ethernet

HP 2920 Switches

Installation and Getting Started Guide

Applicable Products

HP 2920-24G Switch	J9726A
HP 2920-24G-PoE+ Switch	J9727A
HP 2920-48G Switch	J9728A
HP 2920-48G-PoE+ Switch	J9729A
HP 2920-48G-PoE+ 740 W Switch	J9836A
HP 2920 2-Port 10GbE SFP+ Module	J9731A
HP 2920 2-Port 10GBASE-T Module	J9732A
HP 2920 2-Port Stacking Module	J9733A
HP 2920 0.5m Stacking Cable	J9734A
HP 2920 1m Stacking Cable	J9735A
HP 2920 3m Stacking Cable	J9736A
HP X331 165W 100-240VAC to 12VDC PS	J9739A
HP X332 575W 100-240VAC to 54VDC PS	J9738A
HP X332 1050W 100-240VAC to 54VAC PS	J9737A
HP X410 E-Series 1U Universal Rack Mounting Kit	J9583A

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Disclaimer

Warranty

For HP warranty information, visit

http://h17007.www1.hp.com/us/en/support/warranty/index.aspx

A copy of the specific warranty terms applicable to your Hewlett-Packard products and replacement parts can be obtained from your HP Sales and Service Office or authorized dealer.

Safety

Before installing or operating these products, read the "Installation Precautions" in chapter 2, the safety and regulatory information in the appendices, and any safety and regulatory information included with your product.

Contents

Introducing the HP 2920 Switches

The HP 2920 switches are multiport switches that you can configure to build a high-performance switched networks. These switches are store-and-forward devices offering low latency for high-speed networking. The HP 2920 switches also support a field-replaceable power supply, Power over Ethernet (PoE/PoE+) technologies, and full network management capabilities.

In addition, the HP 2920 switches support the **HP 2920 Stacking Technology** feature for stacking the switches. When you install the 2920 Stacking Modules (J9733A) in the switches, you can stack up to four HP 2920 switches together of any combination via the high-speed back-plane cables to form a single extended virtual switch. See "Stacking information and topologies" on page 2-27, and the *Advanced Traffic Management Guide* for more stacking information.

The following 2920 switches are described in this manual:

Non-PoE Switches	**PoE+ Switches**
HP 2920-24G Switch (J9726A)	HP 2920-24G-PoE+ Switch (J9727A)
HP 2920-48G Switch (J9728A)	HP 2920-48G-PoE+ Switch (J9729A)
	HP 2920-48G-PoE+ 740 W Switch (J9836A)

This chapter describes these switches with the following information:

- ■ Fronts of the switches:
    - • Network Ports
    - • Management Ports
    - • LEDs
    - • Buttons
- ■ Backs of the switches:
    - • Power Supplies and Power Connectors
    - • HP 2920 10G Modules
    - • HP 2920 Stacking Module
    - • RPS/EPS Shelf Connector
- ■ Switch Features

Fronts of the switches

PoE/PoE+ switches

Figure 1-1.   Front of the HP 2920-24G-PoE+ Switch
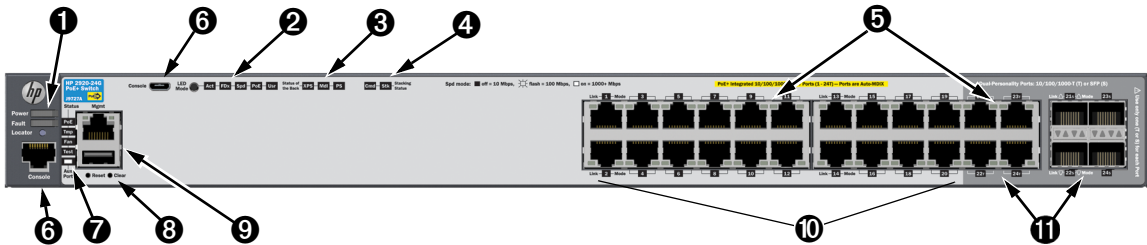
Figure 1-2.   Front of the HP 2920-48G-PoE+ Switch

❶	Power, Fault, and Locator LEDs	❼	PoE, Tmp (Temperature), Test, Fan, and Aux (Auxiliary) port status LED
❷	LED Mode button and Indicator LEDs	❽	Reset and Clear buttons
❸	Status LEDs for components on the back of the switch	❾	Aux port and Out-of-Band Management port
❹	Stacking status LEDs	❿	10/100/1000BASE-T PoE+ RJ-45 ports
❺	Switch port LEDs	⓫	Dual-Personality (10/100/1000BASE-T PoE+ RJ-45 or SFP) ports
❻	Console ports		

Non-PoE switches

Figure 1-3.   Front of the HP 2920-24G Switch
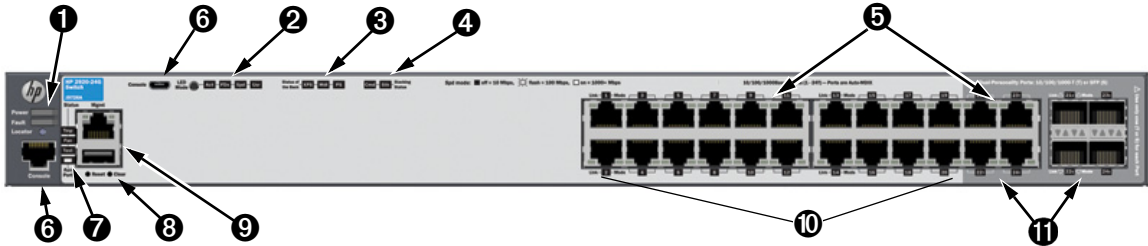
Figure 1-4.   Front of the HP 2920-48G Switch

❶	Power, Fault, and Locator LEDs	❼	Tmp (Temperature), Test, Fan, and Aux (Auxiliary) port status LED
❷	LED Mode button and Indicator LEDs	❽	Reset and Clear buttons
❸	Status LEDs for components on the back of the switch	❾	Aux port and Out-of-Band Management port
❹	Stacking status LEDs	❿	10/100/1000BASE-T RJ-45 ports
❺	Switch port LEDs	⓫	Dual-Personality (10/100/1000BASE-T RJ-45 or SFP) ports
❻	Console ports		

Network ports

Table 1-1.   Network Ports

Model name	10/100/1000 non-PoE RJ-45 ports[1]	10/100/1000 PoE/PoE+ RJ-45 ports[2]	1G SFP ports[3]	SFP+ ports[4]	10GBASE-T RJ-45 ports[1]
HP 2920-24G-PoE+ Switch		24	4		
HP 2920-48G-PoE+ Switch		48	4		
HP 2920-24G Switch	20		4		
HP 2920-48G Switch	44		4		
HP 2920-48G-PoE+ 740 W Switch		46	4		
HP 2920-2-port 10G SFP+ Module				2	
HP 2920-2-port 10G BASE-T Module					2

Notes:

[1] All RJ-45 ports support "Auto-MDIX," which means you can use either straight-through or crossover twisted-pair cables to connect network devices to the switch. On each switch, two of the 10/100/1000BASE-T ports are provided in the dual-personality ports.

[2] All RJ-45 ports on the front of the PoE+ switches can provide PoE/PoE+ to the connected devices.

[3] SFP ports are included in the dual-personality ports. The SFP ports support 1G SFP transceivers.

[4] SFP+ ports are provides on the HP 2920 2-Port 10-GbE SFP+ Module. They support 1G SFP and 10G SFP+ transceivers.

Dual-personality port operation. By default, the RJ-45 connectors are enabled. When you install an SFP transceiver in a slot, the SFP transceiver is enabled and the associated RJ-45 connector is disabled and cannot be used. When you remove the SFP transceiver, the associated RJ-45 port is automatically re-enabled.

On the PoE/PoE+ switches, the RJ-45 connector also supplies PoE/PoE+ power until you install an SFP transceiver. The PoE+ power is turned off when an SFP is installed.

These products also support the optional network connectivity shown in Table 1-2.

Table 1-2.   Optional network connectivity, speeds and technologies

Speed	Technology	Cabling	Transceiver Form-Factor and Connector[1]	
			SFP Connector	SFP+ Connector
100 Mbps	100-FX	Fiber (multimode)	LC	
	100-BX	Fiber (single-mode)	LC	
1 Gbps	1000-T	Copper (twisted-pair)	RJ-45	
	1000-SX	Fiber (multimode)	LC	
	1000-LX	Fiber (multimode or single-mode)	LC	
	1000-LH	Fiber (single-mode)	LC	
	1000-BX	Fiber (single-mode)	LC	
10 Gbps	10-Gig Direct Attach	Copper (twinaxial)		Not Applicable
	10-Gig SR	Fiber (multimode)		LC
	10-Gig LRM	Fiber (multimode)		LC
	10-Gig LR	Fiber (single-mode)		LC
	10-Gig ER	Fiber (single-mode)		LC

[1] For more information on supported transceivers, see **www.hp.com/networking/support**.
  – In the first textbox, type **J4858** (for 100-Mb and Gigabit information), or **J8436** (for 10-Gigabit information).
  – Select any of the products that display in the dropdown list.
  – Select **Product support information**. Then click on **Manuals** and find the **Transceiver Support Matrix**.
For technical details of cabling and technologies see "Cabling and Technology Information" in the appendices.

Management ports

Console port

Use the console port to connect a console to the switch by using the RJ-45 to DB9 cable supplied with the switch. For more information about the console connection, see "11. (Optional) Connect a management console" on page 2-22 and "Installing the Switch". The console can be a PC or workstation running a VT-100 terminal emulator, or a VT-100 terminal.

You can also connect a console to the switch using the Micro USB console port (cable not provided). Use a USB 2.0 high-speed cable with male type A (4-pin) to male micro-B (5-pin) connectors. The maximum allowable length is five meters.

Out-of-Band Management (OOBM) port

Use the RJ-45 port to connect a dedicated management network to the switch.

Auxiliary (Aux) port

An auxiliary port for processing a USB command file or downloading switch software code. This port uses a USB 1.1 connector.

Switch and port LEDs

■ Table 1-3 describes the switch and port LEDs and their operation for stand-alone HP 2920 switches.

■ Table 1-4 describes the operation of the LEDs when you stack the switches. The table includes descriptions of all stacking-related LEDs including those for Stacking Module Status and Stacking Status.

Table 1-3. Stand-alone switch and port LED behavior

Switch LEDs	State	Meaning
Power (green)	On Off	The switch is receiving power. The switch is NOT receiving power.
Fault (orange)	Off	The normal state, indicates there are no fault conditions on the switch.
	Blink orange[1]	A fault has occurred on the switch or in one of the switch ports or a module in the rear of the switch or in the fan. The Status LED for the component with the fault blinks simultaneously.
	On	On briefly when you power on or reset the switch or at the beginning of switch self-test. If this LED is on for a prolonged time, the switch has encountered a fatal hardware failure, or has failed its self-test. For more information about LED behavior, see "Troubleshooting".
Locator (blue)	On Blinking Off	Use the Locator LED to identify a specific component in your network equipment installation. You can set the LED to be on solid or to blink, and for a specified number of minutes (1-1440). The default time is 30 minutes. Use the command "chassislocate" to control this LED.
Test (green/ orange)	Off	The normal operational state; the switch is not undergoing self-test.
	On	The self-test and initialization of the switch is in progress after the switch has been power cycled or reset. The switch is not operational until this LED goes off. The Self Test LED also comes on briefly when you "hot swap" a mini-GBIC into the switch; the mini-GBIC runs self-test when it is hot swapped.
	Blink orange[1]	A component of the switch has failed its self-test. The status LED of the failed component blinks. For example, the Fan LED and the switch Fault LED blinks simultaneously.
Port LEDs (green/ orange - Link and Mode)	Link	**For non-PoE or PoE-disabled ports:** Port LEDs display sport link information: • On – The port is enabled and receiving a link indication from the connected device. • Off – The port has no active network cable connected, or is not receiving link beat or sufficient light (fiber-optic port). Otherwise, the port might have been disabled through the switch console, the web browser interface, or network management. • Blinking orange[1] – The corresponding port has failed its self-test. Blinks simultaneously with the switch Fault LED. **For PoE-enabled ports**, see the LED mode information for PoE mode below.
	Mode	The LED Mode select button controls the operation of the port Mode LED. The LED Mode indicator LEDs near the LED Mode select button indicate the current settings. Press the button to step from one view mode to the next. The default view is Activity (Act). When you enable the Save Power LED feature on the switch (savepower led command), then the switch operates in this mode and all port LEDs are Off.

Switch LEDs	State	Meaning
LED Mode Indicators (green)	Act	Indicates the port LEDs are displaying network activity information.
	FDx	Indicates port Mode LEDs are lit for ports in Full Duplex Mode. Off indicates half duplex.
	Spd	Indicates the port Mode LEDs are displaying the connection speed at which each port is operating. Each port Mode LED then indicates one of the following: • Off – the port is operating at 10 Mbps. • Blinking[2] – the port is operating at 100 Mbps. • On – the port is operating at 1000 Mbps.
	PoE[4]	Indicates that the port Link and Mode LEDs are displaying PoE information as follows: • Link On – PoE is enabled on the port. • Link Off – PoE is disabled on the port. • Link Blink orange[2] – the port has an error or the port is denied power due to insufficient power. • Mode On – the port is providing PoE power. • Mode Off – the port is not providing PoE power.
	Usr	When stacking is enabled, this mode is used to display the member ID of the individual switch via the port Mode LEDs (for member 1, one LED is lit; for member 2, two LEDs are lit, and so on), and to indicate which switch is the Standby the Cmd LED blinks.
	Save Power	All the mode indicator LEDs that are Off indicate this mode. This display occurs only if the switch has been configured with the **savepower led** command. See the *Management and Configuration Guide* for more information on that command.
PS (Power Supply Status green/ orange)	On	Normal operation. Power supply is connected and operating correctly.
	Blink orange[1]	A redundant power supply is installed but not connected (the switch Fault LED does not blink simultaneously). Or, a power supply is connected but has experienced a fault (the switch Fault LED blinks simultaneously).
	Off[3]	Power supply is not connected or is not installed.
Fan Status (green/ orange)	On	Normal operation, all fans are OK.
	Blink orange[1]	One of the unit's fans has failed. The switch Fault LED blinks simultaneously.
PoE Status (green/ Orange)[4]	On	When the switch is ready to start supplying PoE power.
	Off[3]	Should be off only during the boot process.
	Blink orange[1]	A port has a internal hardware failure. The switch Fault LED blinks simultaneously.
	Fast blink orange[2]	A port is denied PoE power or is detecting an external PD fault.

Switch LEDs	State	Meaning
Tmp (green/ Orange)	On	Switch temperature is normal.
	Fast blink orange[2]	An over temperature condition is detected.
Aux Port (green)		Used for processing a USB command file or downloading switch software code.

[1] The blinking behavior is an on/off cycle once every 1.6 seconds, approximately.
[2] The fast blinking behavior is an on/off cycle once every 0.5 seconds, approximately.
[3] If the Save Power LED feature is configured for the switch (**savepower led** command), then all LEDs except the Power LED may be off.
[4] Applies only to HP 2920 switches that support PoE/PoE+.

Table 1-4. Stacking-related switch and port LED behavior

Switch LEDs	State	Meaning
LED Mode indicator (green)		For switches in a stack, the LED mode indications are the same as for stand-alone switches (see Table 1-3), but all the switches in the stack are coordinated and all show the same LED mode. See the Stacking Note under "LED Mode Select Button and Indicator LEDs" on page 1-11.
Mdl (Module Status, green/ orange)	On	A Stacking Module or one or more 10G Expansion Modules is installed into the expansion slots in the back of the switch and is operating correctly.
	Blink orange[1]	A Stacking Module or 10G Expansion Module is plugged into a module slot but has experienced a fault (including port or transceiver faults), or the stacking cable is not connected correctly or has experienced a fault (if using the Stacking Module).
	Fast blink orange[2]	The Stacking Module or a 10G Expansion Module has been installed while the switch was powered on (hot swapped) and the switch needs to be rebooted to support the module.
	Off[3]	No modules are installed into the module slots in the back of the switch.
Stacking Status (green/ orange)	Cmd on	This switch is a Commander of a stack.
	Cmd blink green	This switch is becoming a Commander of a stack, or if Usr LED mode is selected, indicates which switch is the Standby in the stack.
	Cmd off[3]	The switch is not the Commander of the stack.
	Stk on	The switch is a member of a stack.
	Stk blink green	The switch is joining a stack.
	Stk blink orange[1]	A stacking cable is disconnected or faulty, or is connected to a failed or powered off switch. The Mdl LED might also be blinking orange simultaneously.
	Stk off[3]	Stacking has been disabled.

[1] The blinking behavior is an on and off cycle once every 1.6 seconds, approximately.
[2] The fast blinking behavior is an on and off cycle once every 0.5 seconds, approximately.
[3] If the Save Power LED feature is configured for the switch (**savepower led** command), then all LEDs except the Power LED may be off.

LED mode select button and indicator LEDs

The operation of the Mode LED is controlled by the LED Mode select button, and the current setting is indicated by the LED Mode indicator LEDs near the button. Press the button to step from one view mode to the next. See the LED information in Table 1-3 on page 1-7 for standalone switches, and in Table 1-4 on page 1-10 for stacked switches.

Stacking Notes:

■ For HP 2920 switches that are in a stack, the Mode select button on every switch in the stack controls the LED mode for *all* the switches in the stack.

■ If there is a combination of PoE/PoE+ switches and non-PoE switches in the stack, when any of the Mode select buttons is pressed to put the stack into PoE mode, the non-PoE switches indicate *no* PoE support by not illuminating any of the Mode indicator LEDs or any of the port LEDs.

■ If any of the switches in the stack are configured with the **Save Power LED** feature, then the default LED Mode for the whole stack becomes the Save Power display (all LED Mode indicator LEDs are off), but *only* the stack members on which that feature is configured display the other characteristics of that feature (all LEDs Off except for the Power LED).

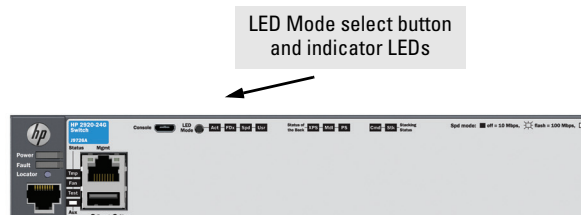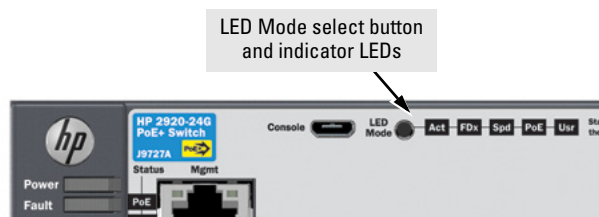**Figure 1-5.   Example of indicator LEDs on a non-PoE HP 2920 Switch**

Figure 1-6.   Example of indicator LEDs on a PoE/PoE+ HP 2920 Switch

Reset and clear buttons

The Reset and Clear buttons are located behind the front panel (to protect them from being pushed accidentally) and are accessible through small holes in the lower left corner of the front panel. Use pointed objects, such as unbent paper clips, to push them.

The Reset and Clear buttons are used singly or in combination, as follows:

To accomplish this:	Do this:	This will happen:
Soft Reset (Standalone switch)	Press and release the Reset button	The switch operating system is cleared gracefully (such as data transfer completion, temporary error conditions are cleared), then reboots and runs self tests.
Hard Reset (Standalone switch)	Press and hold the Reset button for more than 5 seconds (until all LEDs turn on), then release.	The switch reboots, similar to a power cycle. A hard reset is used, for example, when the switch CPU is in an unknown state or not responding.
Soft Reset (Stacked switch)	Press and release the Reset button	Same as a standalone switch, except: • If the Commander, the Standby switch will become Commander. • If the Standby, a new Standby will be elected.
Hard Reset (Stacked switch)	Press and hold the Reset button for more than 5 seconds (until all LEDs turn on), then release.	Same as a standalone switch, except: • If the Commander, the Standby switch will become Commander. • If the Standby, a new Standby will be elected.
Delete console and management access passwords	Press Clear for at least one second, but not longer than five seconds.	The switch deletes all access passwords.
Restore the factory default configuration	1. Press Clear and Reset simultaneously. 2. While continuing to press Clear, release Reset. 3. When the Test LED begins blinking (after approximately 25 seconds), release Clear.	The switch removes all configuration changes, restores the factory default configuration, and runs self test.
Note: These buttons are provided for your convenience. If you are concerned with switch security though, you should make sure that the switch is installed in a secure location, such as a locked wiring closet. You can also disable these buttons by using the **front-panel-security** command. See the *HP 2920 Management and Configuration Guide* for a description of that command.		

Backs of the switches

The backs of all the HP 2920 switches are the same.

Figure 1-7.   Back of the HP 2920 Switch
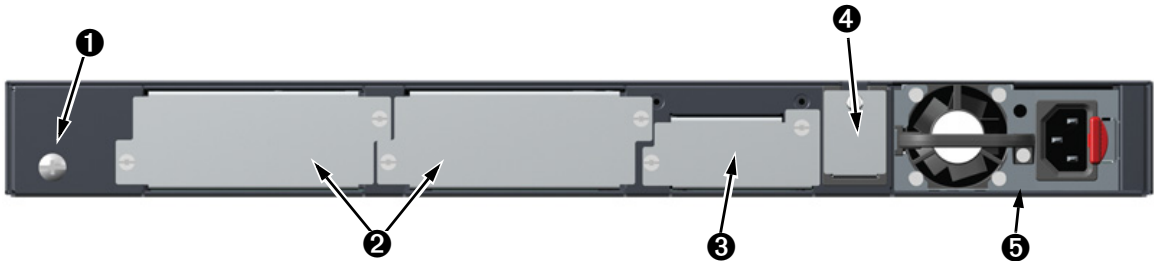
❶	Grounding lug mounting hole	❹	XPS Connector
❷	10G Expansion Module slots	❺	Power Supply and AC power connector
❸	Stacking Module slot		

Power supplies

There is a single slot for power supplies that can be installed into the HP 2920 switches. These power supplies are installed:

■ **HP X331 165W 100-240VAC to 12VDC PS** (J9739A) -- a 165 watt power supply for the HP 2920 non-PoE switches. The 165 watt power supply does not provide any PoE/PoE+ power. The 165 watt power supply is keyed such that it does not fit into the HP 2920 PoE+ switches.

■ **HP X332 575W 100-240VAC to 54VDC PS** (J9738A) -- a 575 watt power supply for the HP 2920 PoE+ switches. The 575 watt power supply provides up to 370 watts of PoE/PoE+ power. The 575 watt power supply is keyed such that it does not fit into the non-PoE switches.

■ **HP X332 1050W 100-240VAC to 54VDC PS** (J9740A) -- a 1050 watt power supply for the HP 2920 PoE+ switches. The 1050 watt power supply provides up to 740 watts of PoE/PoE+ power. It is keyed such that it does not fit into the non-PoE switches.

Power connector

The HP 2920 switches do not have a power switch; they are powered on when connected to an active AC power source. These switches automatically adjust to any voltage between 100-127 or 200-240 volts and either 50 or 60 Hz. There are no voltage range settings required.

External Power Supply (XPS) connector

Use the external power supply connector to connect external power sources to the switch. Specifically, you can connect an HP 640 RPS/EPS Power Shelf. The Power Shelf has three slots for the same power supplies that you install into the switch. For more information, see *HP 640 Redundant/External Power Supply Shelf Installation and Power Setup Guide.*

10G Expansion Module slots

Each of the HP 2920 switches has two slots that can accept the two HP 2920 10G Expansion Modules. These modules provide additional high-speed network connectivity:
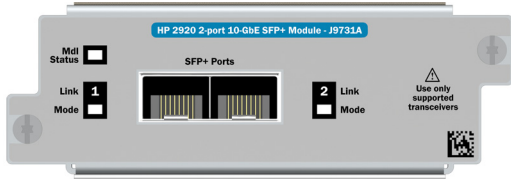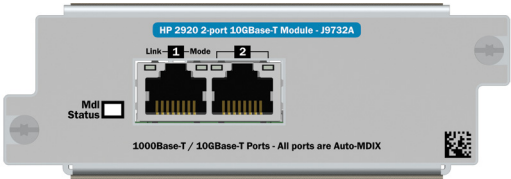
■ A 2-port 10-GbE SFP+ module. This module provides two bays for SFP+ transceivers.

■ A 2-port 10GBASE-T module. This module provides two 10GBASE-T RJ-45 connectors.

Stacking Module slot

Each of the HP 2920 switches has one slot that can accept the HP 2920 Stacking Module that provides high-speed connectivity to other HP 2920 switches. Only the HP 2920 switches support this module. See "HP 2920 Stacking Module" on page 1-18 for more information.

HP 2920 10G Expansion Modules

The HP 2920 10G Expansion Modules are components you can add to a HP 2920 Switch to provide a variety of network connectivity options. The following modules are available:

Module		Description
HP 2920 2-Port 10-GbE SFP+ Module (J9731A)		2-port 10 Gigabit switch expansion module. This module has two slots for HP SFP+ transceivers.
HP 2920 2-Port 10GBASE-T Module (J9732A)		2-port 10 Gigabit switch expansion module. This module has two 10GBASE-T RJ-45 ports.

Contact your HP Networking authorized networking products reseller or your HP Networking representative for information on availability of other modules and transceivers. You can also visit the HP Networking products website www.hp.com/networking/support to get more information.

10G Expansion Module features

Figure 1-8.   Example HP 2920 10G Expansion Module
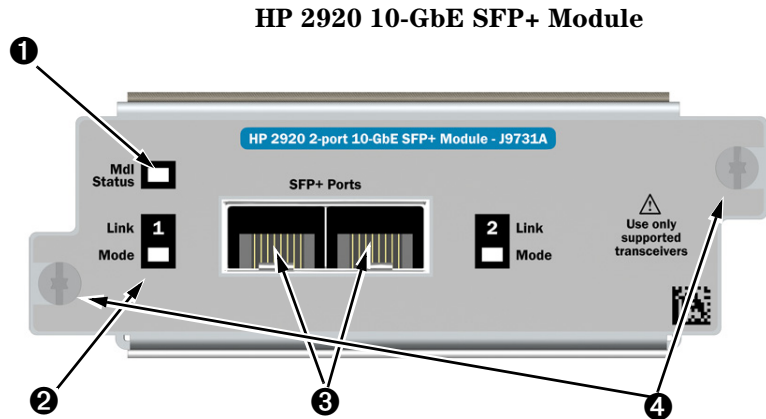
❶	Module Status LEDs	❸	SFP/SFP+ transceiver bays
❷	Link and Mode LEDs (one pair per port)	❹	Retaining screws

The HP 2920 10G Expansion Modules have the following features:

■ Connectivity ports: two 10GBASE-T RJ-45 ports, or two SFP+ bays, depending on the module installed.

■ LEDs that provide information on the module status, and the link status and LED mode for each port.

■ "hot swap transceiver" support—you can add, replace, or change the type of any of the transceivers that you use in the SFP+ module ports, without having to first remove the module, and without having to shut down the switch.

Standards adherence:

■ 10G BASE-T Module: IEEE 802.3an-2006 Type 10GBASE-T

■ 10-GbE SFP+ Module: See "Connectivity standards" on page A-3

N o t e   The HP 2920 10G Expansion Modules are not "Hot-swappable".

10G Expansion Module LEDs

The following LEDs are located on the bulkheads of the HP 2920 10G Modules.
These LEDs are only viewable in the rear of the switch on the module itself.

Table 1-5.   10G Expansion Modules LEDs

Name	Mode	Description
LEDs per module		
Module Status (green/ orange) (Replicated on the switch front as the Mdl LED.)	On	Stacking module is installed into the module slot and is operating correctly.
	Off	Stacking module is not installed into the module slot.
	Blink orange	• If the LED is blinking simultaneously with the switch Fault LED, then the Stacking Module is installed into the module slot but has experienced a fault. • If the LED is blinking without the switch Fault LED, a stacking cable is not connected correctly at its other end, or it is connected to a switch that is powered off. The module was installed while the switch was powered on.
	Fast blink orange	The module was installed while the switch was powered on. The switch must be rebooted to support the module.
LEDs per port		
Link (green/ orange)	On	The port is enabled and receiving a link indication from the connected switch.
	Off	The port has no active stacking cable connected, is not receiving the link indication, or the port may have been disabled through the switch console, the web browser interface, or network management interface.
	Blinking orange	• If the LED is blinking simultaneously with the switch Fault LED, the corresponding port has failed its self test. The module status LEDs (on the module and front of the switch will also be blinking). • If the LED is blinking without the switch Fault LED, then the switch detects the stacking cable but the cable is not getting is not connected correctly at the other switch, or the cable may be faulty, or there is

Name	Mode	Description
Mode (green)	Same as the per-port Mode LEDs on the front of the switch. See Table 1-3 on page 1-7 for a description.	

HP 2920 Stacking Module

The HP 2920 2-port Stacking Module (J9733A) is a component you can add to an HP 2920 Switch to provide high-speed stacking connections to other HP 2920 switches. See "Stacking information and topologies" on page 2-27, and the *HP 2920 Advanced Traffic Management Guide* for more information about stacking configuration and operation.

Figure 1-9.   Front of HP 2920 2-Port Stacking Module
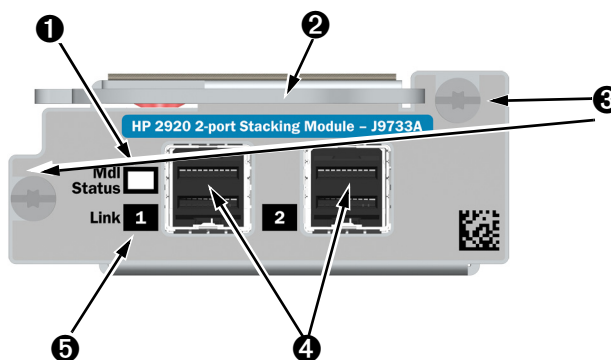
❶	Module Status LED	❹	Stacking connectors
❷	Extractor handle	❺	Link LEDs (one per port)
❸	Retaining screws		

Stacking Module features

The HP 2920 2-Port Stacking Module J9733A has the following features:

■ Two stacking connectors for connecting the HP 2920 switch to other HP 2920s in a stacked topology (chain or ring). Any of these available HP 2920 stacking cables can be used for these connections:

- • 0.5m Stacking Cable (J9734A)
- • 1.0m Stacking Cable (J9735A)
- • 3.0m Stacking Cable (J9736A)
■ LEDs, described in Table 1-6.

Stacking Module LEDs

The following LEDs are located on the HP 2920 Stacking Module bulkhead.
These LEDs are only viewable in the rear of the switch on the module itself.

Table 1-6.   Stacking Module LEDs

Name	Mode	Description
Stacking LEDs per module		
Module Status (green/ orange) (Replicated on the switch front as the Mdl LED.)	On	Stacking module is installed into the module slot and is operating correctly.
	Off	Stacking module is not installed into the module slot.
	Blink orange	• If the LED is blinking simultaneously with the switch Fault LED, then the Stacking Module is installed into the module slot but has experienced a fault. • If the LED is blinking without the switch Fault LED, a stacking cable is not connected correctly at its other end, or it is connected to a switch that is powered off. The module was installed while the switch was powered on.
	Fast blink orange	The module was installed while the switch was powered on. The switch must be rebooted to support the module.
Stacking Module LEDs per port		

Name	Mode	Description
Link (green/ orange)	On	The port is enabled and receiving a link indication from the connected switch.
	Off	The port has no active stacking cable connected, is not receiving the link indication, or the port may have been disabled through the switch console, the web browser interface, or network management interface.
	Blinking orange	• If the LED is blinking simultaneously with the switch Fault LED, the corresponding port has failed its self test. The module status LEDs (on the module and front of the switch will also be blinking). • If the LED is blinking without the switch Fault LED, then the switch detects the stacking cable but the cable is not getting is not connected correctly at the other switch, or the cable may be faulty, or there is

HP 2920 Switch features

The features of the HP 2920 Switches include:

- Network ports as described under "Network ports" on page 1-4:
  - 20 or 44 auto-sensing 10/100/1000BASE-T with Auto-MDIX.
  - Four dual-personality ports – either the auto-sensing 10/100/1000BASE-T RJ-45 or the SFP slot can be used for each port.
- One module slot is provided in the back of the switches to support a stacking module to provide connectivity to other HP 2920 switches with stacking modules. See "Stacking information and topologies" on page 2-27, the *HP 2920 Advanced Traffic Management Guide* for more information about stacking.
- Two 10G Expansion Module slots to provide additional high-speed network connectivity and a variety of network connectivity options.
- Power over Ethernet (PoE/PoE+) operation for all RJ-45 ports on the fronts of the HP 2920-24G-PoE+ and HP 2920-48G-PoE+ Switches. These switches are IEEE 802.3at standard compliant and provide up to 30 W per RJ-45 port to power IP phones, wireless access points, web cameras, and other PoE/PoE+ PDs. For more information, see the *HP Power over Ethernet (PoE/PoE+) Planning and Implementation Guide* which is on the HP Web site, **www.hp.com/networking/support**.

  The switches support 802.3af and 802.3at standard devices and some pre-standard PoE devices. For a list of these devices, see the FAQs (Frequently Asked Questions) for your switch model. PoE is disabled by default and must be enable for use. (For instructions, see the *Management and Configuration Guide* for your switch at www.hp.com/networking/support.

- A replaceable internal power supply.
- Connection to an HP 640 RPS/EPS Shelf which can hold up to three HP X331 and X332 power supplies (the same ones that you install in your 2920 switch). These external power supplies provide additional power to the switch for power redundancy, and for additional PoE/PoE+ power for the 2920-PoE+ switches. For more information, see the *HP 640 RPS/EPS Shelf Installation and Power Setup Guide*.
- Plug-and-play networking—all ports are enabled—just connect the network cables to active network devices and your switched network is operational.
- An auxiliary port (USB Type A connector) for processing a USB command file and updating switch software.

- Auto MDI/MDI-X on all twisted-pair ports (10/100/1000BASE-T on the switch front, and 10GBASE-T – available on the optional 10G module), meaning that **all connections can be made using straight-through twisted-pair cables**. Cross-over cables are not required, although they will also work. (See the appendices for recommended or required cabling.)

- Automatic learning of the network addresses in each switch's 16,000-address forwarding table, (with configurable address aging value).

- Automatically negotiated full-duplex operation for the 10/100/1000 RJ-45 ports when connected to other auto-negotiating devices—the SFP/SFP+ ports (available on an optional 10G module) always operate at full duplex.

- Easy management of the switch through several available interfaces:
  - **Console interface**—a full featured, easy to use, VT-100 terminal interface for out-of-band switch management (through the console port or Management network ports) or in-band Telnet access to the switch.
  - **Web browser interface**—an easy to use built-in graphical interface that can be accessed from common web browsers.
  - **HP Intelligent Management Center (IMC)**—an SNMP-based, graphical network management tool that you can use to manage your entire network.

- Support for the Spanning Tree Protocol (RSTP) and Rapid Per VLAN Spanning Tree Plus (RPVST+) to eliminate network loops.

- Support for OpenFlow communication protocol enables sophisticated traffic management compared to access control lists (ACLs) and routing protocols.

- Support for CDPv2 provides more intelligent device tracking features.

- Support for up to 256 IEEE 802.1Q-compliant VLANs so you can divide the attached end nodes into logical groupings that fit your business needs.

- Support for many advanced features to enhance network performance—for a description, see the *HP 2920 Management and Configuration Guide* at **www.hp.com/networking/support**.

- Ability to update the switch software. Software updates are routinely available from HP.

- Low power operation:
  - Ports on a switch or stack member may be set to operate at reduced power.
  - Port status LEDs may be turned off.

  RJ-45 ports will operate at reduced power if the port is not connected (link partner is not detected).

Installing the Switch

The HP 2920 switches come with an accessory kit that includes the brackets for mounting the switch in a standard 19-inch Telco rack or an equipment cabinet, and includes rubber feet that can be attached so the switch can be securely located on a horizontal surface. The brackets are designed to allow mounting the switch in a variety of locations and orientations. For other mounting options contact your local HP authorized network reseller or HP representative. This chapter shows how to install the switch.

Caution   If the switch is to be shipped in a rack, it can be mounted and shipped in any four post rack using HP X410 E-Series 1U Universal Rack Mounting Kit (J9583A). Optionally, it can also be mounted in an HP 10K rack using the HP 1U RK MT SWITCH 10K ALL rail kit, part number 356578-B21 and shelf kit AB469A, HP rx 16/26 Factory Rackmount Shelf Kit (both kits must be used, otherwise you will void the warranty).

Included parts

The HP 2920 switches have the following components shipped with them:

- *HP 2920 Switch Quick Setup Guide and Safety/Regulatory Information*

- Console cable

- Accessory kit

(5069-5705)
two mounting brackets
eight 8-mm M4 screws to attach the mounting brackets to the switch
four 5/8-inch number 12-24 screws to attach the switch to a rack
four rubber feet

■ Power cord, any one of the following:

Country/Region	HP X331 165W and HP X332 575W Power Supplies	HP X332 1050W Power Supply [1]
Argentina	8120-6869	8121-1481
Australia/New Zealand	8121-0834	8121-1476
Brazil	8121-1069	8121-1474
Chile	8120-6980	8121-1477
China	8120-8707	8121-1484
Continental Europe/South Korea	8120-6811	8121-1479
Denmark	8120-6814	8121-1486
India	8121-0780	8121-1483
Israel	8121-1035	8121-1478
Japan	8120-4753	8120-5338
Switzerland	8120-6815	8121-1480
South Africa	8120-6813	8121-1483
Taiwan	8121-0974	8121-1511
Philippines/Thailand	8121-0668	8121-1485
United Kingdom/Hong Kong/Singapore/Malaysia	8120-6809	8121-1475
United States/Canada/Mexico	8121-0914	8121-0914

[1] The cords for the HP X332 1050W Power Supply supports a higher amperage and uses a C15 connector.

Japan Power Cord Warning

製品には、同梱された電源コード をお使い下さい。
同梱された電源コード は、他の製品では使用出来ません。

Installation procedures

Summary

1. **Prepare the installation site (**page 2-5). Ensure the physical environment is properly prepared, including having the correct network cabling ready to connect to the switch and having an appropriate location for the switch. See page 2-4 for some installation precautions.

N o t e   If an HP 2920 switch is powered on for the first time without a stacking module installed, the stacking feature will be disabled and that status will be saved in the switch's running configuration. For more information, see "Stacking information and topologies" on page 2-27.

2. **Verify the switch boots correctly (**page 2-6**).** Plug the switch into a power source and observe that the LEDs on the switch's front panel indicate correct switch operation. When self test is complete, unplug the switch.

3. **(Optional) Install one or more of the HP 2920 10G Expansion Modules** (page 2-8).

4. **(Optional) Install the HP 2920 Stacking Module (**page 2-10**).**

   Depending on where the switch is mounted, it may be easier to install the optional modules before mounting the switch.

5. **Mount the switch (**page 2-12**).** The Switch can be mounted in a 19-inch telco rack, in an equipment cabinet, or on a horizontal surface.

6. **(Optional) Install the stacking cables** (page 2-17). If you have installed the HP 2920 Stacking Module, you can now install up to two stacking cables and connect them to other switches in the desired stacking topology.

7. **(Optional) Install SFP transceivers**
   (page 2-18). Each HP 2920 Switch has either four slots for installing SFP transceivers. If you have installed an HP 2920 10GbE 2-Port SFP+ Module, you have an additional 2 slots for installing SFP+ transceivers. Depending on where the switch is mounted, it may be easier to install the SFP transceivers first. SFP transceivers can be installed or removed while the switch is powered on.

8. **(Optional) Connect HP 640 RPS/EPS power cable with the Switch 2920** (page 2-18). When using an HP 640 RPS/EPS with the Switch 2920, connect the RPS/EPS cable to the XPS connector on the back of the switch and then to the desired connector on the HP 640 RPS/EPS Shelf. See page ... for more information.

9. **Connect the switch to a power source (**page 2-19**).** Once the switch is mounted, plug it into the nearby main power source. If you are using an HP 640 RPS/EPS Shelf with your Switch, make sure that the Shelf is also powered on and that there is a good connection between the Switch and the Shelf.

10. **Connect the network devices (**page 2-21**).** Using the appropriate network cables, connect the network devices to the switch ports.

11. **(Optional) Connect a Management console** (page 2-22). You may wish to modify the switch's configuration, for example, to configure an IP address so it can be managed using a web browser, from an SNMP network management station, or through a Telnet session. Configuration changes can be made easily by using the included console cable to connect a PC to the switch's console port.

At this point, the switch is fully installed. See the rest of this chapter if you need more detailed information on any of these installation steps.

Installation precautions:

Follow these precautions when installing the HP 2920 switches.

WARNING

- **Do not mount the 2920 Switches on a wall.**
- **Do not carry the 2920 Switches by using the handles on any installed power supply.**
- **The rack or cabinet should be adequately secured to prevent it from becoming unstable, tilting, or falling.**
- **Devices installed in a rack or cabinet should be mounted as low as possible, with the heaviest devices at the bottom and progressively lighter devices installed above.**

Caution

- If the switch is to be shipped in a rack, it can be mounted and shipped in many four post racks using HP X410 E-Series 1U Universal Rack Mounting Kit (J9583A).
- Ensure the power source circuits are properly grounded, then use the power cord supplied with the switch to connect it to the power source.
- If your installation requires a different power cord than the one supplied with the switch and power supply, be sure the cord is adequately sized for the switch's current requirements. In addition, be sure to use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country.
- When installing the switch, the AC outlet should be near the switch and should be easily accessible in case the switch must be powered off.
- Ensure the switch does not overload the power circuits, wiring, and over-current protection. To determine the possibility of overloading the supply circuits, add together the ampere ratings of all devices installed on the same circuit as the switch and compare the total with the rating limit for the circuit. The maximum ampere ratings are usually printed on the devices near the AC power connectors.

■ For safe operation, proper switch cooling, and reduction of electromag-netic emissions, ensure that a slot cover is installed on any unused module or power supply slot.

■ Do not install the switch in an environment where the operating ambient temperature might exceed 55°C (131°F). If you are installing any trans-ceivers, the operating ambient temperature should not exceed 45°C (113°F).

■ Ensure the air flow around the sides and back of the switch is not restricted.

1. Prepare the installation site

Cabling Infrastructure - Ensure the cabling infrastructure meets the necessary network specifications. See "Cabling and Technology Information" in the appendices for more information.

Installation Location - Before installing the switch, plan its location and orientation relative to other devices and equipment:

■ In the front of the switch, leave at least 7.6 cm (3 inches) of space for the twisted-pair and fiber-optic cabling.

■ In the back of the switch, leave at least 3.8 cm (1 1/2 inches) of space for the power cord. If you are stacking the switches, you will need 20 to 23 cm (approximately 8 to 9 inches), depending on the lengths of the stacking cables being used.

■ On the sides of the switch, leave at least 7.6 cm (3 inches) for cooling, except if the switch is installed in an open EIA/TIA rack.

Figure 2-1. Air flow direction of the HP 2920 switches
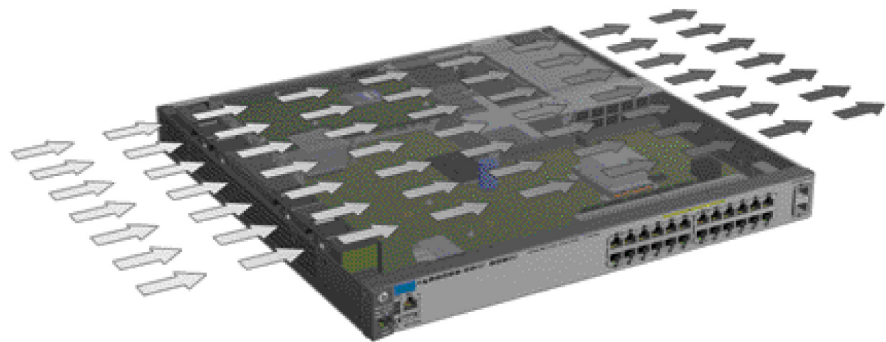
2. Verify the switch boots correctly

N o t e   If an HP 2920 switch is powered on for the first time without a stacking module installed, the stacking feature will be disabled and that status will be saved in the switch's running configuration. For more information, see "Stacking information and topologies" on page 2-27.

Before installing the switch in its network location, you should first verify it is working properly by plugging it into a power source and verifying that it boots correctly.

1. Connect the power cord supplied with the switch to the power connector on the back of the switch, and then into a properly grounded electrical outlet.

Figure 2-2.   Connecting the power cord
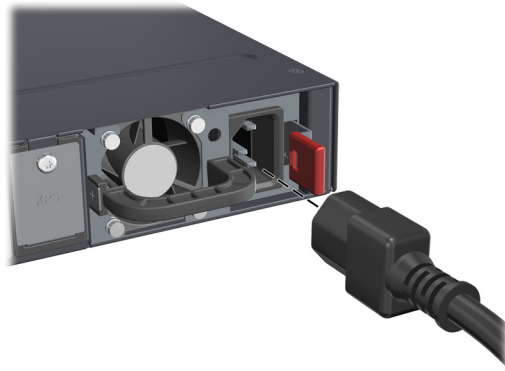
N o t e   The HP 2920 switches do not have a power switch. They are powered on when the power cord is connected to the switch and to a power source. For safety, the power outlet should be located near the switch installation.

The switch automatically adjusts to any voltage between 100-127 and 200-240 volts and either 50 or 60 Hz. No voltage range settings are required.

If your installation requires a different power cord than the one supplied with the switch, be sure to use a power cord displaying the mark of the safety agency that defines the regulations for power cords in your country. The mark is your assurance that the power cord can be used safely with the switch.

2. Check the LEDs on the switch as described below.

Figure 2-3. Example of an HP 2920 24-port non-PoE switch
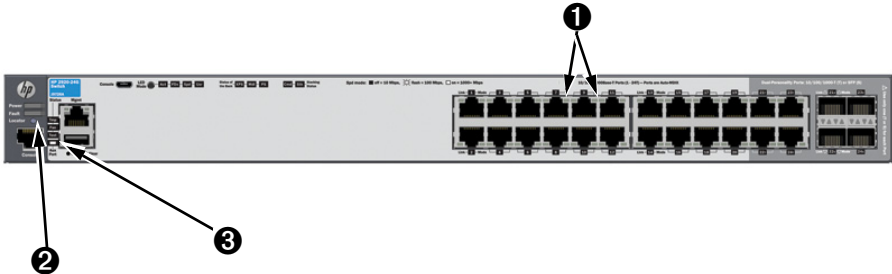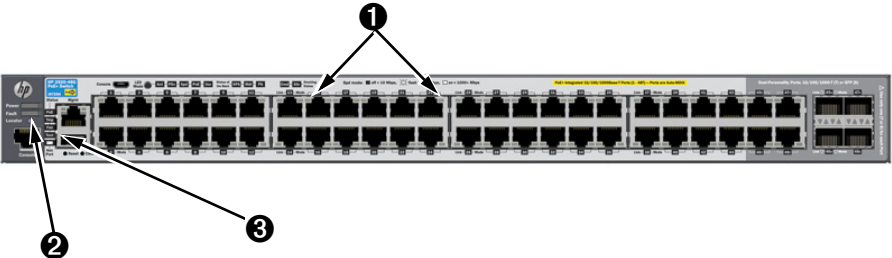

Figure 2-4. Example of an HP 2920-48-port PoE+ switch

When the switch is powered on, it performs its diagnostic self test and initialization. This boot process takes approximately 50 seconds to complete.

❶	Switch port LEDs	❸	Test LED
❷	Power and Fault LEDs		

LED behavior:

During the switch boot:

- The **Power**, **Fault**, **Test**, and **Locator** LEDs, other Status LEDs, Mode indicator LEDs, and port LEDs are on for most of the duration of the test.

- Most of the LEDs go off and may turn on again during phases of the boot.

When the switch boots successfully, Status LEDs display:

- **Power** and **Tmp** LEDs (and the **PoE** LED for PoE+ switches) remain on.

- **Fault**, **Test**, and **Locator** LEDs are off.

- Other status LEDs may be on or off depending on the switch configuration and the hardware installed.

- The port LEDs on the front of the switch go into their normal operational mode:
  - If the ports are connected to active network devices, the port Link LEDs are on, and the port Mode LEDs behave according to the LED Mode selected. In the default LED mode (Act), the LEDs should be flickering to show network traffic.
  - If the ports are not connected to active network devices, the LEDs will stay off.

If the LED display is different than what is described above, especially if the **Fault** and **Test** LEDs stay on for more than 60 seconds or they start blinking, then the switch boot has not completed correctly. Refer to chapter 5, "Troubleshooting" for diagnostic help.

3. (Optional) Install 10G Expansion Modules

N o t e   Hot swapping the 10G Expansion Modules is *not* supported. If a module is installed with the switch powered on, self-test of the module will not occur, the **Mdl** LED on the front of the switch and the **Module Status** LED on the module will blink orange. The switch must be reset or power cycled for the module to function. Only insert or remove a module during scheduled downtime with the switch powered off.

1. Remove the cover plate.

2. Insert the module aligning with the guides in the slot.

3. Press the module fully into place – the module's bulkhead should be contacting the switch face.

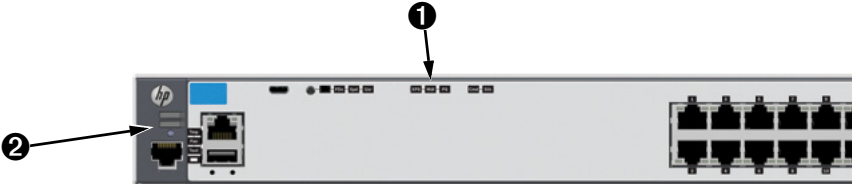4. Tighten the captive screws until they are snug – do not overtighten them.

Figure 2-5.   Installing a 10G Expansion Module
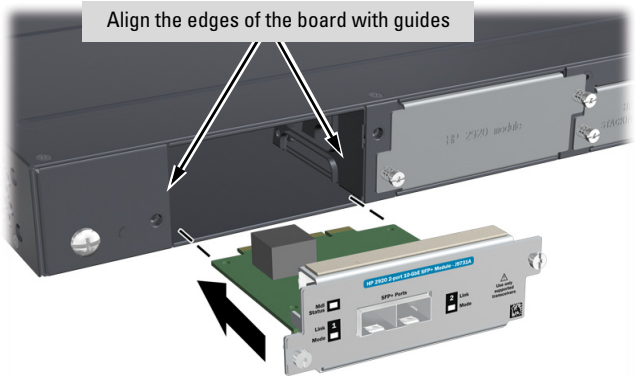
Align the edges of the board with guides

Verifying the module is installed correctly

Observe the Module Status (**Mdl**) and Fault LEDs on the front of the switch to verify the module is installed properly.

Figure 2-6.   Location of module status LEDs

❶	Module (Mdl) Status LED	❷	Fault LED

If the module is installed properly and the switch is powered on, the module undergoes a self test that takes a few seconds. You can use the LEDs to determine that the module is installed properly and has passed the self test, as described in the "LED Behavior" table below.

Table 2-1.   10G Expansion Module LED behavior

| LED	Display for a Properly Installed Module
Mdl LED on the front of the switch and Module Status LED on the module	The LED goes ON as soon as the module is installed and the switch is powered on, and stays ON steadily.
Fault	OFF normal state, no fault condition exist.
Link (for each network port on the module)	If networking cables are connected to the module and to another powered on networking device, the LED goes ON to indicate the port is enabled, connected, and detects a signal from the attached device. The Mode LEDs for each connected port will behave according to the LED mode that is selected for the switch.

4. (Optional) Install the Stacking Module

N o t e

Hot swapping the Stacking Module is *not* supported. If a module is installed with the switch powered on, self-test of the module will not occur, the **Mdl** LED on the front of the switch and the **Module Status** LED on the module will blink orange. The switch must be reset or power cycled for the module to function. Only insert or remove a module during scheduled downtime with the switch powered off.

1. Remove the cover plate.

2. Insert the module aligning with the guides in the slot.

3. Once the contacts have engaged, use the extractor handle to seat the module completely.

4. Tighten the captive screws until they are snug – do not overtighten them.
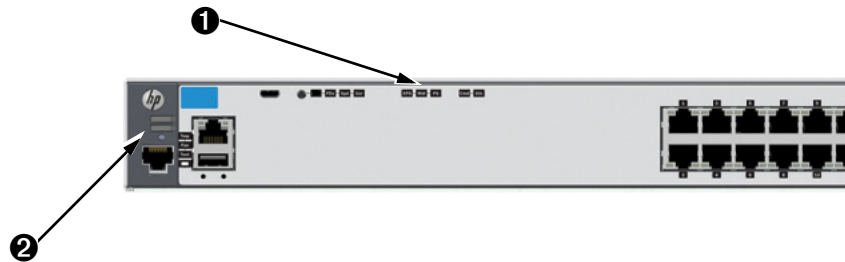
Figure 2-7.   Installing the Stacking Module
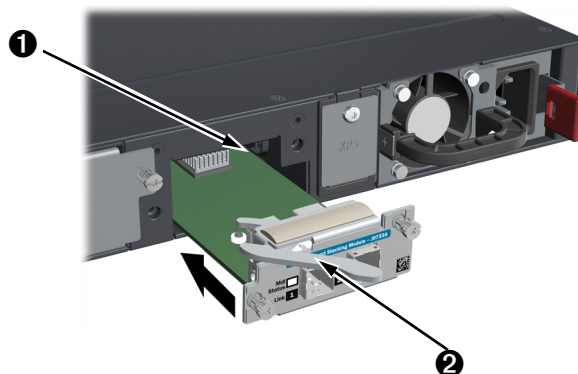
| ❶ | Align the edges of the board with guides | ❷ | Extractor handle |

Verifying the module is installed correctly

Observe the Module Status (**Mdl**) and Fault LEDs on the front of the switch to verify the module is installed properly.

Figure 2-8.   Location of module status LEDs

| ❶ | Module (Mdl) Status LED | ❷ | Fault LED |

If the module is installed properly and the switch is powered on, the module undergoes a self test that takes a few seconds. You can use the LEDs to determine that the module is installed properly and has passed the self test, as described in the "LED Behavior" table below.

Table 2-2.   Stacking Module LED behavior

LED	Display for a Properly Installed Module
Mdl LED on the front of the switch and Module Status LED on the module	The LED goes ON as soon as the module is installed and the switch is powered on, and stays ON steadily.
Fault	OFF normal state, no fault condition exist.
Link (for each stacking port on the module)	If stacking cables are connected to the module and to a Stacking Module on another powered on HP 2920 switch, the LED goes ON to indicate the stacking port is enabled, connected, and detects a signal from the attached switch.

5. Mount the switch

After the switch passes self test, the switch is ready to be mounted in a stable location. The HP 2920 switches can be mounted in these ways:

■ in a rack or cabinet
■ on a horizontal surface

Warning

Do not mount the 2920 Switches on a wall.

For other mounting options contact your local HP authorized network reseller or HP representative.

Rack or Cabinet Mounting

The HP 2920 Switches are designed to be mounted in any EIA-standard 2-post 19-inch telco rack or 4-post communication equipment cabinet.

WARNING

For safe operation, please read the mounting precautions on , before mounting a switch.

Equipment Cabinet Note

The 12-24 screws supplied with the switch are the correct threading for standard EIA/TIA open 19-inch racks. If you are installing the switch in an equipment cabinet such as a server cabinet, use the clips and screws that came with the cabinet in place of the 12-24 screws that are supplied with the switch.

Complete step 1, and plan which four holes you will be using in the cabinet and install all four clips. Then proceed to step 2.

Rack Mounting the HP 2920 switch in a 2-post rack

1. Use a #1 Phillips (cross-head) screwdriver and attach the mounting
    brackets to the switch with the included 8-mm M4 screws.

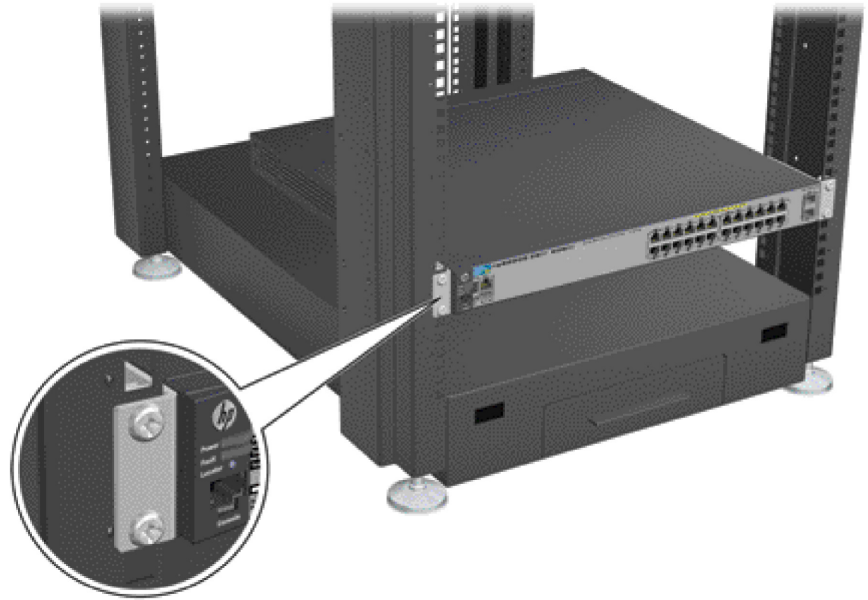**Figure 2-9.   Attaching the mounting brackets to the switch**

8 mm
M4 screws

N o t e   The mounting brackets have multiple mounting holes and can be rotated
allowing for a wide variety of mounting options. These include mounting the
switch so its front face is flush with the face of the rack as shown in the
illustration, or mounting it in a more balanced position.

2. Hold the switch with attached brackets up to the rack and move it
    vertically until rack holes line up with the bracket holes, then insert and
   tighten the four number 12-24 screws holding the brackets to the rack.

Figure 2-10. Mounting the switch in a rack

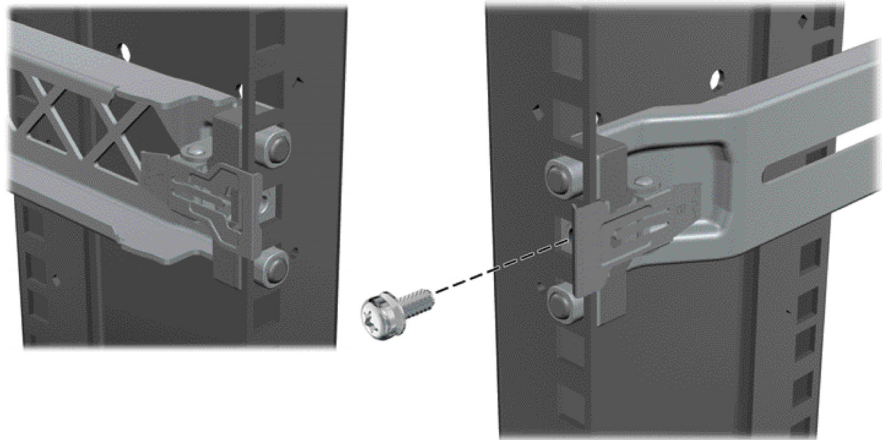## Rack mounting the HP 2920 switch in a 4-post rack

1. Using the (J9583A) HP X410 E-Series 1U Universal Rack Mounting Kit, use a #1 Phillips (cross-head) screwdriver and attach the slider brackets to the switch with the included 8-mm M4 screws.

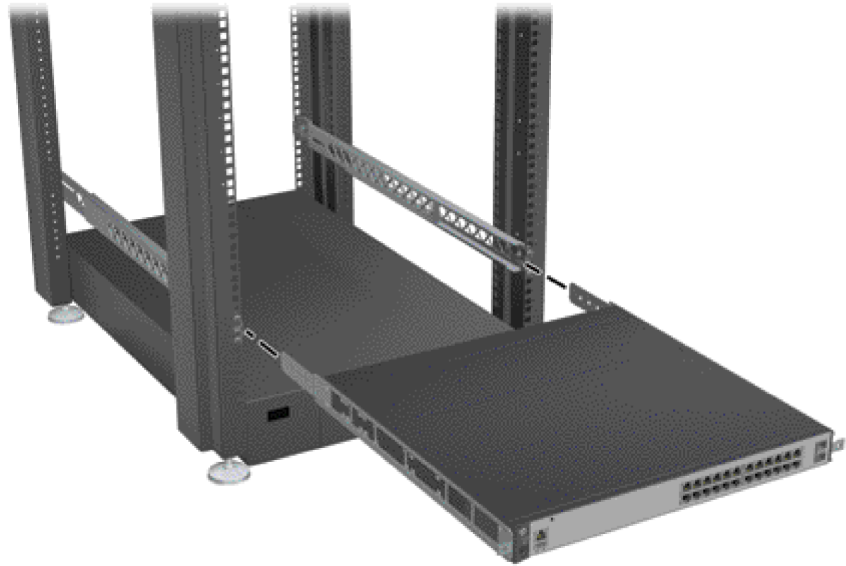**Figure 2-11. Attaching the rail kit slider brackets to the switch**
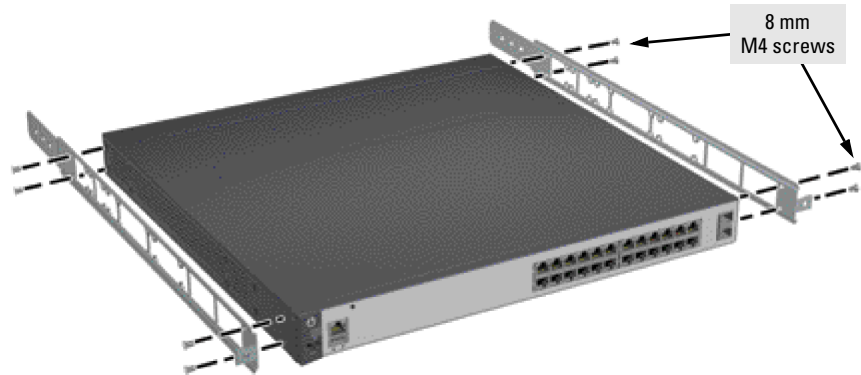
2. Install the rails in the rack.

Figure 2-12. Installing the rails

3. Install the switch into the rails.

Figure 2-13. Installing the switch

Horizontal surface mounting

Place the switch on a table or other horizontal surface. The switch comes with rubber feet in the accessory kit that can be used to help keep the switch from sliding on the surface.

Attach the rubber feet to the four corners on the bottom of the switch within the embossed angled lines. Use a sturdy surface in an uncluttered area. You may want to secure the networking cables and switch power cord to the table leg or other part of the surface structure to help prevent tripping over the cords.

**C a u t i o n**   Make sure the air flow is not restricted around the sides and back of the switch.

6. (Optional) Install stacking cables

Hot swapping stacking cables is supported. You can install or remove a stacking cable with the switch powered on.

a. Make sure that the stacking cable connector is oriented with the tab on top, as shown in figure 2-14. Then slide in the stacking cable into the module connector until the cable clicks into place. Pull on the cable connector (not the tab) to make sure that it is fully latched.

Figure 2-14. Installing a stacking cable
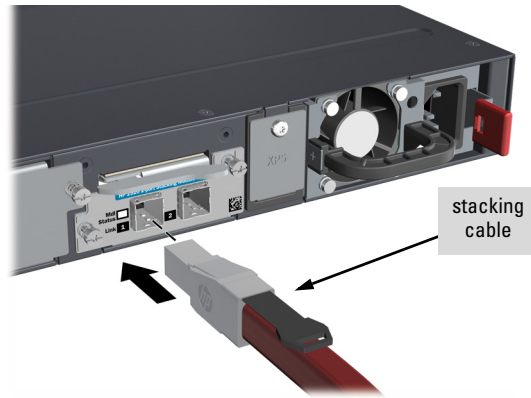
b. Connect the other end of the cable to a Stacking Module in another HP 2920 switch. See page 2-27 for connectivity.

N o t e   When switch power is on, and one end of the stacking cable is inserted the Link and Mdl LEDs blink orange until the other end is connected to another switch stacking module. The LEDs turn solid green when the cable is fully seated at both ends and a link is established. For more stacking LED information, see Table 1-4 on page 1-10.

To remove the stacking cable pull the tab on the stacking cable connector straight out.

7. (Optional) Install transceivers

You can install or remove transceivers from the slots on the front of the switch, or in the HP 2920 2-Port 10GbE SFP+ Module in the back of the switch, without having to power off the switch.

N o t e s
- The transceivers operate only at full duplex. Half duplex operation is not supported.
- Ensure the network cable is NOT connected when you install or remove a transceiver.

C a u t i o n
Use only supported genuine HP transceivers with your switch. Non-HP transceivers are not supported, and their use may result in product malfunction. Should you require additional HP transceivers, contact your HP Sales and Service Office or authorized dealer.
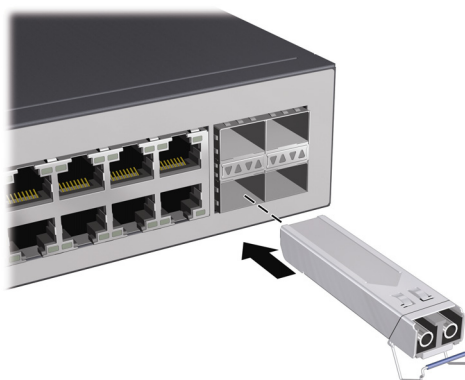
Installing a transceiver:

Hold the transceiver by its sides and gently insert it into either of the slots on the switch until it clicks into place. When a transceiver is inserted the switch authenticates it. This can take 1-3 seconds, with the worst case being 5 seconds. If the transceiver is removed before the authentication completes a self test failure will be reported.

W A R N I N G
The fiber-optic HP transceivers are Class 1 laser devices. Avoid direct eye exposure to the beam coming from the transmit port.

Figure 2-15. Installing a transceiver.

Removing a transceiver:

Always disconnect the network cable from the transceiver before removing it from the switch.

Depending on when the transceiver was purchased, it may have either of three different release mechanisms: a plastic tab on the bottom of the transceiver, a plastic collar around the transceiver, or a wire bail.

To remove the transceivers that have the plastic tab or plastic collar, push the tab or collar toward the switch until the transceiver releases from the switch (it will move outward slightly), then pull it from the slot.

To remove the transceivers that have the wire bail, lower the bail until it is approximately horizontal, and then using the bail, pull the transceiver from the slot.

8. (Optional, when using an HP 640 RPS/EPS with the switch) Connect RPS/EPS power cables.

Connect the RPS/EPS power cable between the XPS connector on the back of the switch and one of the connectors on the HP 640 RPS/EPS Shelf.

On the 640 RPS/EPS, connect the RPS/EPS power cable into any of the connectors for the power supply slot that you are using. Then hand tighten the retaining screw. Ensure that you do not overtighten the screw.

Figure 2-16. Connecting the RPS/EPS power cable
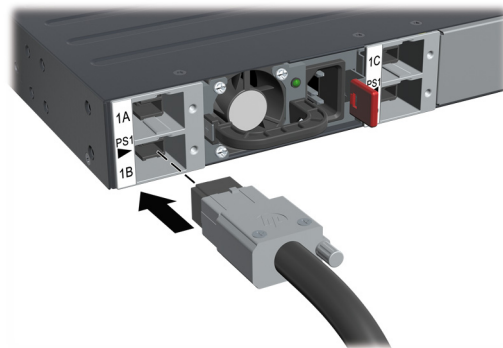
Then, also connect and secure the RPS/EPS power cable to the switch.
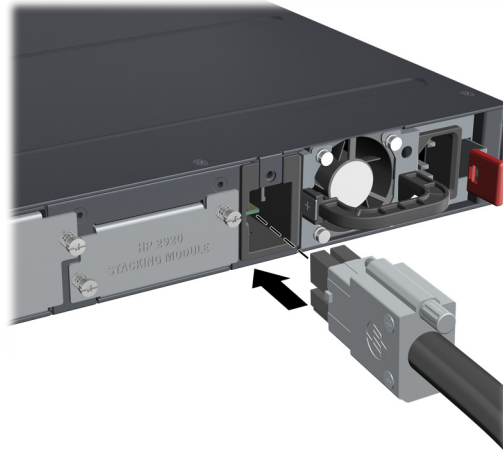
Verifying the RPS/EPS cables are installed correctly.

Check the LEDs on the front of the 640 RPS/EPS and the switch. On the 640 RPS/EPS, the Device Connected LED for the connector that you have used (for example 1A) will be on solid green. On the switch, the XPS LED will be on solid green. If either of the LEDs does not appear this way, then refer to the "Troubleshooting" chapter in the switch Installation and Getting Started Guide.

9. Connect the switch to a power source

1. Plug the included power cord into the switch's power connector and into a nearby AC power source. See Figure 2-2 on page 2-6.

2. Re-check the LEDs during self test. See "LED Behavior" on page 2-7.

Stacking Note   If you are stacking your HP 2920 switches, then the first switch you should power on is the switch that you want to be the stack Commander. The second switch that you power on should be the one that you want to be the stack Standby. For the other switches in the stack, their member ID will be determined by the order in which they are booted. For more information, see "Stacking information and topologies" on page 2-27.

PoE/PoE+ Operation

It is important to understand the PoE/PoE+ power requirements of the switches because if the PoE/PoE+ power is not planned and implemented correctly the end devices connected to the switch ports may not receive power if an internal switch PoE/PoE+ power supply should fail.

For further information regarding the PoE/PoE+ capabilities, see the *HP Power over Ethernet (PoE/PoE+) Planning and Implementation Guide*, on the HP Networking web site at **www.hp.com/networking/support**.

10. Connect the network devices

Connect the network cables, described under "Cabling Infrastructure" (page 2-5), from the network devices or your patch panels to the fixed RJ-45 ports on the switch or to any transceivers installed in the switch.

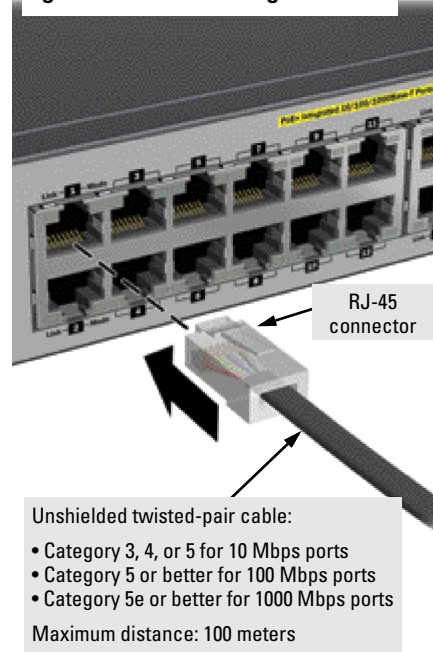### Using the RJ-45 Connectors

To connect:
Push the RJ-45 plug into the RJ-45 jack until the tab on the plug clicks into place. When power is on for the switch and for the connected device, the Link LED for the port should light to confirm a powered-on device (for example, an end node) is at the other end of the cable.

If the Link LED does *not* go on when the network cable is connected to the port, see "Diagnosing with the LEDs" on page 5-4, in chapter 5, "Troubleshooting".

To disconnect:
Press the small tab on the plug and pull the plug out of the jack.

Figure 2-17. Connecting an RJ-45

RJ-45 connector

Unshielded twisted-pair cable:

• Category 3, 4, or 5 for 10 Mbps ports
• Category 5 or better for 100 Mbps ports
• Category 5e or better for 1000 Mbps ports

Maximum distance: 100 meters

Connecting cables to transceivers

If you have any transceivers installed in the switch, the type of network connections you will need to use depends on the type of transceivers installed.

For transceiver ports, and in general for all the switch ports, when a network cable from an active network device is connected to the port, the Link LED for that port should go on. If the Link LED does *not* go on when the network cable is connected to the port, see "Diagnosing with the LEDs" on page 5-4 in chapter 5, "Troubleshooting".

Connecting a fiber cable

To connect:
1. Remove the dust covers from the cable connectors and the port.

2. Aligning the notches on the cable connectors with the slots of the port, press the cable connector into the port until it snaps into place.

If the Link LED does *not* go on when the network cable is connected to the port, see "Diagnosing with the LEDs" on page 5-4, in chapter 5, "Troubleshooting".

To disconnect:
Pull the cable connector straight out.

Figure 2-18. Connecting fiber optic cable
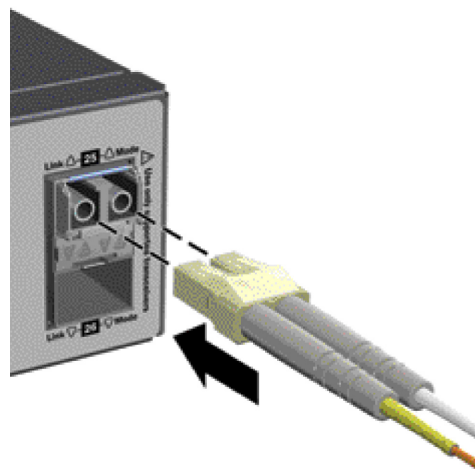
11. (Optional) Connect a management console

The switch has a full-featured, easy to use console interface for performing switch management tasks including:

■   monitor switch and port status and observe network activity statistics

■   modify the switch's configuration to optimize switch performance, enhance network traffic control, and improve network security

■   read the event log and access diagnostic tools to help in troubleshooting

■ download new software to the switch

■ add passwords to control access to the switch from the console, web browser interface, and network management stations

I m p o r t a n t   After you install and power up the switch, to use a networked (in-band or out-of-band) connection to manage the switch, you can use the out-of-band console connection to minimally configure the switch with an IP address and subnet mask. By default, the switch is configured to acquire an IP address via DHCP. See "Minimal configuration through the console port connection" on page 3-2 for more information.

To connect a console to the switch, use the RJ-45 console cable shipped with the switch. Alternatively, you can use a USB cable (not supplied) for a console connection. (See "USB Console Port Notes" below.) Connect a PC or VT-100 terminal to either of the Console ports. The connected PC or terminal then functions as a management console connected directly to the switch.

The switch can simultaneously support one out-of-band console session, through one of the console ports, and in-band Telnet console sessions. The console ports are used only for out-of-band management, not for Telnet sessions.

U S B C o n s o l e P o r t N o t e s   ■ **USB Console Port Driver Download.** When using the USB Console Port, the connected PC first requires "virtual COM port" USB drivers to be installed.

USB drivers are available for Windows XP (SP3 or later), Windows Vista (SP2 or later), and Windows 7 (SP1 or later). The drivers can be found on the HP Web site at www.hp.com/networking/support. On that web site, follow these steps:

1. Type your product model (for example, **2920**), or product number in the **Auto Search** text box.

2. Select one of the switches from the drop down list.

3. Click the **Display selected** button.

4. From the options that appear, select **Software downloads** (on the right-hand side). Then, download the "USB Console Port Drivers and Information".

Your PC's operating system may also automatically find the correct driver when it detects the switch USB connection.

■ **USB Console Port and RJ-45 Console Port Interaction.** Note that you cannot use both the RJ-45 and USB console ports at the same time. By default, the RJ-45 console port is active (to allow remote access to the switch via a terminal server). But, when the USB console port is connected to the switch and then to a live PC, it takes priority over the RJ-45 console port and becomes the active port. If the USB console session is closed by the inactivity timer, though, the RJ-45 console port becomes active again. To reactivate the USB console port, make sure that the USB console cable is connected to a live PC and then simply unplug it from the switch and then reconnect it to the switch. If desired, you can configure the inactivity timer to a longer time via the terminal emulation program that you are using.

Configuring the management console connection

To configure a console to manage the switch through the console port connection:

1. Configure the PC terminal emulator as a DEC VT-100 (ANSI) terminal, or use a VT-100 terminal.

2. Configure the terminal with the following settings:
    - A baud rate from 1200 to 115200 (the switch senses the speed)
    - 8 data bits, 1 stop bit, no parity, and flow control set to Xon/Xoff
    - For the Windows Terminal program, disable (uncheck) the "Use Function, Arrow, and Ctrl Keys for Windows" option.
    - For the Hilgraeve HyperTerminal program, select the "Terminal keys" option for the "Function, Arrow, and Ctrl Keys act as" parameter.

If you use a management console with different configuration settings, be sure to reconfigure the settings on both the terminal and the switch in the following order so that both configurations are compatible:

1. Reconfigure the switch and save the new settings.
2. Reconfigure the terminal and save the new settings.
3. Reboot the switch and re-establish the console session.

Setting up a console connection

To access the Switch through an Console port (out-of-band) connection, follow these steps:

1. Configure the management console as described above under "Config-uring the management console connection".

2. For a direct console connection, connect the PC or terminal to the Console serial port using one of these console cables:
   - A DB9-to-RJ45 cable (shipped with the switch).
   - A micro-USB cable (not provided).

Figure 2-19. Connecting a console cable
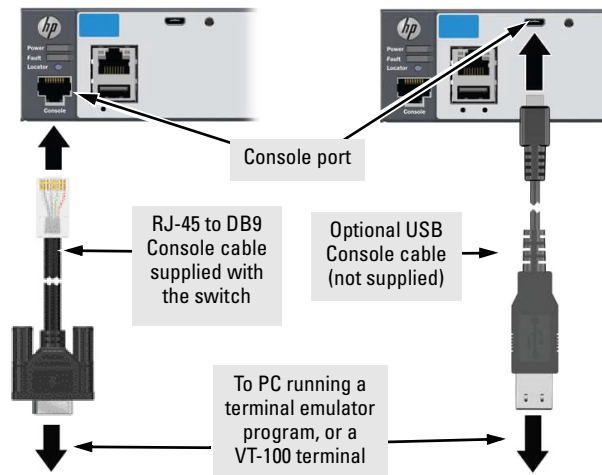
3. Power on the management console (terminal or PC). If you are using a PC, start the PC terminal program.

4. For a direct console connection through the Console port:
   a. Press **Enter** two or three times to display the copyright page and the message "Press any key to continue".
   b. Press any key to display the switch console command (CLI) prompt; for example: **HP 2920#**
   c. Continue the console session to configure the switch by following the procedure in "Minimal Configuration Through the Out-of-Band Console Connection" on page 3-2.

Console cable pinouts

The console cable has an RJ-45 plug on one end and a DB-9 female connector on the other end. Table 2-3 describes the mapping of the RJ-45 to DB-9 pins.
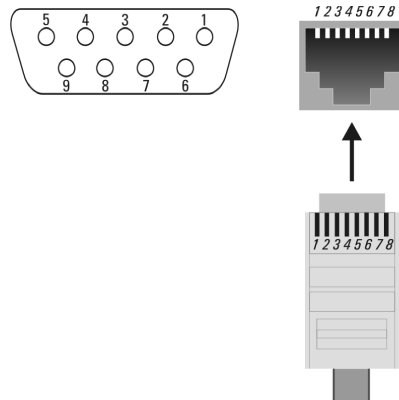
Figure 2-20. RJ-45 to DB-9 pinouts

Table 2-3.   Mapping of RJ-45 to DB-9

RJ-45 (Signal reference from Chassis)		DB-9 (Signal reference from PC)	
Reserved	1	8	CTS
Reserved	2	6	DSR
TXD	3	2	RXD
Reserved	4	1	DCD
GND	5	5	GND
RXD	6	3	TXD
Reserved	7	4	DTR
Reserved	8	7	RTS
		9	RI

Stacking information and topologies

The HP 2920 switches support the **HP 2920 Stacking Technology** feature for stacking the switches. When HP 2920 Stacking Modules (J9733A) are installed in the switches, any combination of up to four HP 2920 switches can be stacked together via high-speed backplane cables to form a single extended virtual switch. The stacking topologies supported depend on the number of switches being stacked.

The stacking cables and connections operate independently of any layer 2 or layer 3 network protocols and features, including Spanning Tree. When multiple switches are stacked, they behave as a single, virtual switch with additional network ports being supplied by the stack members.

N o t e

If an HP 2920 switch is powered on for the first time without a stacking module installed, stacking will be disabled and that will be saved in the switch's running configuration. Subsequently, after a stacking module has been installed, stacking must be enabled through the console (CLI) command **stacking enable**.

To set up a stack of HP 2920 switches, you should:

1. Power off all switches that are going to be stacked.

2. Install Stacking Modules in the switches, and connect the stacking cables to create your stacking topology.

3. Power-on each switch, one at a time. The first switch that you should power on is the one that you want to be the Commander of the stack. The second one will become the stack Standby. For the other stack members, their Member ID is determined by the sequence in which they are booted.

There are additional methods for creating your HP 2920 stack. For configuration options and other information on stacking, see "Stack Management" chapter in the *Advanced Traffic Management Guide* for your switch.

The supported stacking topologies include the following:

■ Chain
■ Ring

Chain topologies

Up to 4 switches may be stacked in an open-ended chain with single cables between each pair of switches.

Chain topologies are not recommended because a single failure (switch, stacking module, or cable) will cause switch-to-switch communication failures between switches that are located on opposite sides of the failure. Unless the failure is on the switch or stacking module that is at the very end of the chain, two stack fragments are formed as a result. One of the fragments becomes inactive to make sure that network topology and protocol rules are not violated by the creation of two virtual switches. For the inactive fragment, the switches remain powered on and create a separate stack, but all of network ports on the switches in the inactive fragment become disabled and do not pass network traffic.

For more information and recovery procedures, see the "Stack Management" chapter in the *Advanced Traffic Management Guide* for your switch.

A typical chain topology is illustrated in Figure 2-21

Figure 2-21. Typical chain topology

Cable connection examples for stacked chains are illustrated in Figure 2-22.

Figure 2-22. Cable connection examples for chain topologies
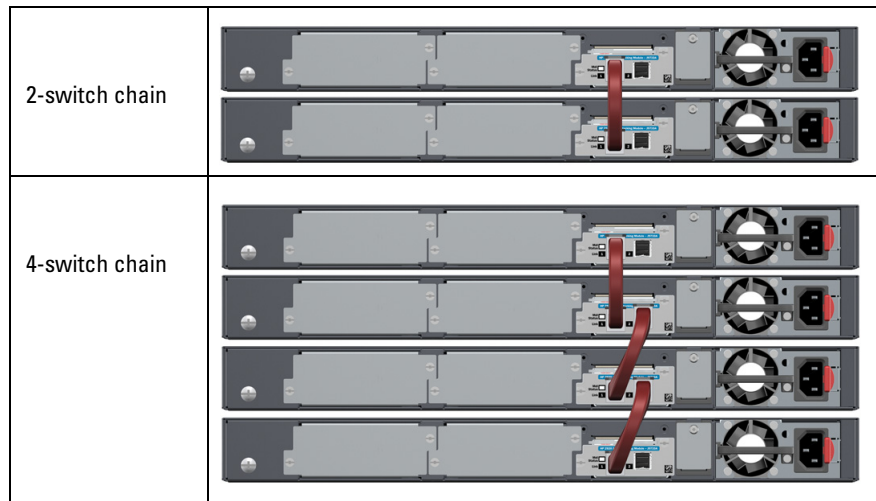
Ring topologies

Up to 4 switches may also be connected in closed ring topologies. Ring topologies afford some protection from a single failure because communications between the switches continues, in a direction away from the failure. Therefore ring topologies are recommended.
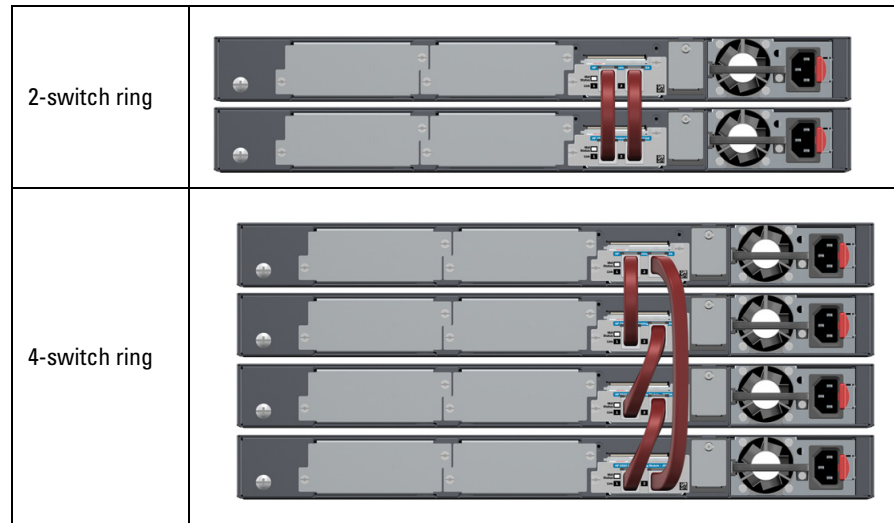
A typical ring topology is illustrated in Figure 2-23.

Figure 2-23. Typical ring topology

Cable connection examples for stacked rings are illustrated in Figure 2-24.

Figure 2-24. Cable connection examples for ring topologies

Sample network topologies

This section shows a few sample network topologies in which the switch is implemented. For more topology information, visit the product's Web site at **www.hp.com/networking/support**.

The switch is designed to be used primarily as a desktop switch to which end nodes, printers and other peripherals, and servers are directly connected, as shown in the following illustration. Notice that the end node devices are connected to the switch by straight-through or crossover twisted-pair cables. Either cable type can be used because of the "Auto MDI-X" features on the switch.

Figure 2-25. Example as a desktop switch implementing PoE/PoE+
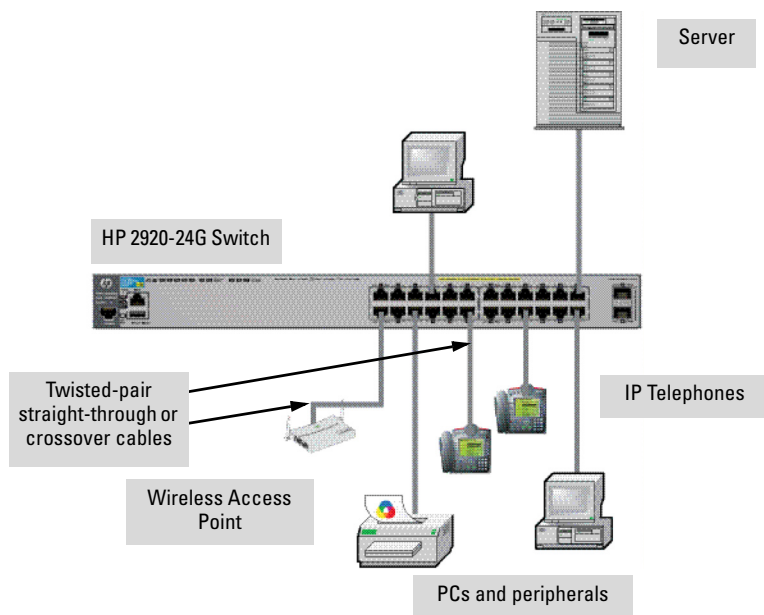
This illustration is an example of the switch being configured to supply PoE/ PoE+ power to end devices such as IP telephones and wireless access points (WAPs).

The end node devices are connected to the switch by straight-through or crossover twisted-pair cables. Either cable type can be used because of the "Auto MDI-X" features on the switch.

Figure 2-26.   Example as a segment switch
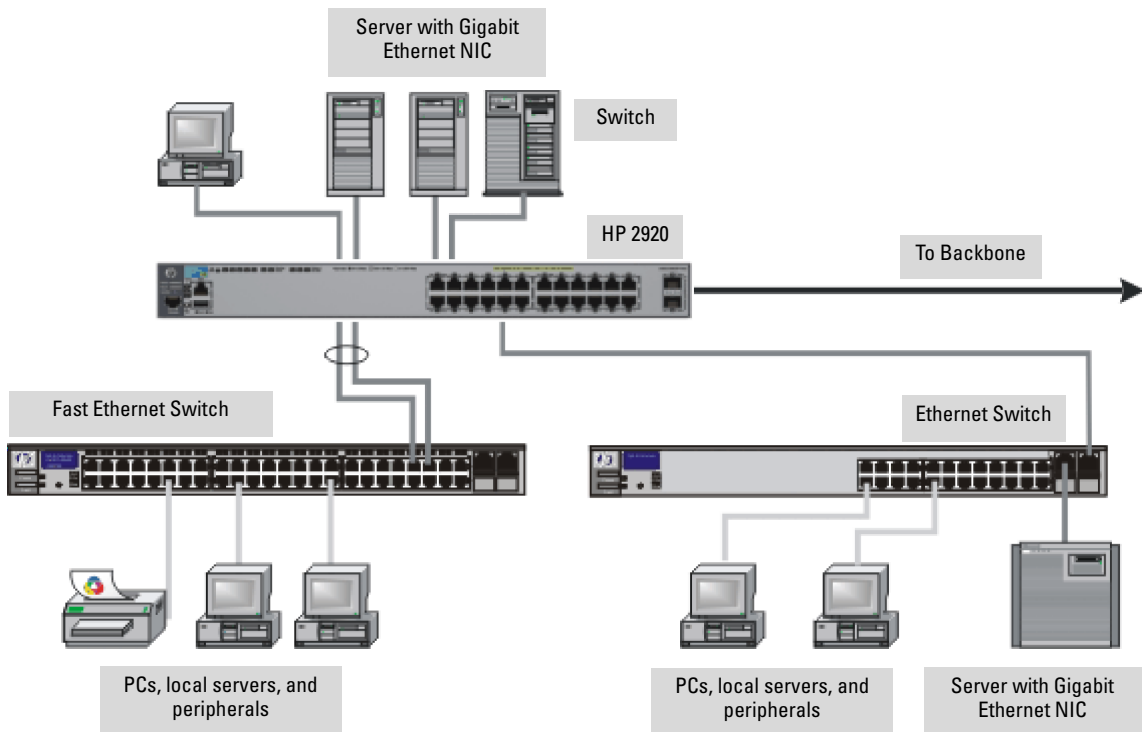
The HP 2920 Switch also works well as a segment switch. That is, with its high performance, it can be used for interconnecting network segments – simply connect the other network switches that form those segments to the HP 2920 Switch.

In the illustration above, two other switches with PCs, printers, and local servers attached, are both connected to an HP 2920 Switch. The devices attached to the two other switches can now communicate with each other through the HP 2920. They can also all communicate with the server that is connected to a 1000Base-T port on the switch.

Because the Switch has the "Auto MDI-X" features, the connections between the HP 2920 and the other switches, and between the switch and end nodes or servers can be through category 5 straight-through or crossover twisted-pair cable.

Category 3 or 4 cable can also be used if the connection is 10 Mbps only. In all cases, the device ports must be configured to auto negotiate the link characteristics for this feature to work.

The switch, in turn, can be connected to a network backbone through fiber-optic cabling connected to a Gigabit-SX, -LX, or -LH transceiver installed in the switch. Now, all the devices on these network segments can access other network resources that are connected elsewhere on the network backbone.

Figure 2-27. Example as a segment switch implementing PoE/PoE+
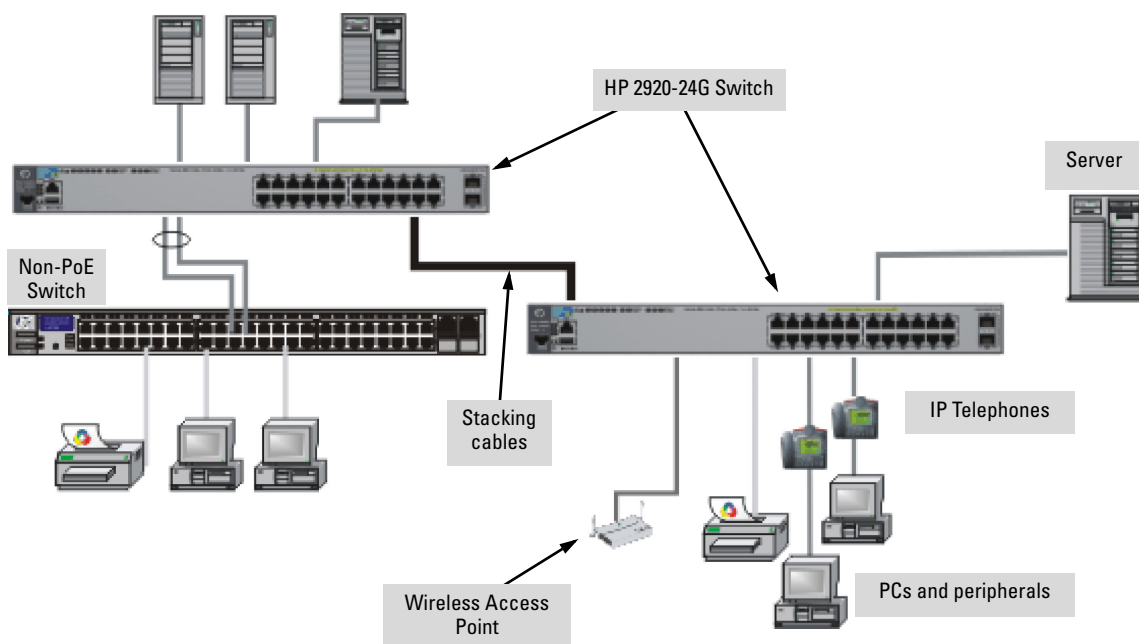
As shown in Figure 2-28, the IP telephones have been inserted in between the HP 2920-PoE+ switch and the PCs, and a WAP has been connected to the HP 2920-PoE+ switch. Only devices directly connected to the PoE+ switches can receive PoE/PoE+ power. Devices connected to a non-PoE+ switch cannot receive PoE/PoE+ power.

3

Getting Started with Switch Configuration

This chapter is intended as a guide for using the console Switch Setup screen to quickly assign an IP (Internet Protocol) address and subnet mask to the switch, set a Manager password, and, optionally, configure other basic features.

For more information on using the switch console and the other switch management interfaces: the web browser interface and the SNMP management tool, HP Intelligent Management Center (IMC), please see the *Management and Configuration Guide*, which is on the HP Networking web site at **www.hp.com/networking/support**.

Recommended minimal configuration

In the factory default configuration, the switch has no IP (Internet Protocol) address and subnet mask, and no passwords. In this state, it can be managed only through a direct console connection.

To manage the switch through a networked (in-band data port or out-of-band management port) connection, you must first configure the switch with an IP address and subnet mask compatible with your network.

Note   By default, the switch is configured to acquire an IP address configuration from a DHCP or Bootp server. To use DHCP/Bootp instead of the manual configuration method described in "Minimal Configuration Through the Out-of-Band Console Connection", see "DHCP/Bootp Operation" in the *Management and Configuration Guide* on the HP Networking web site.

Also, you should configure a Manager password to control access privileges from the console and web browser interface. Other parameters in the Switch Setup screen can be left at their default settings or you can configure them with new values.

You can configure many other switch features through the switch's console interface to:

■   Optimize switch performance

■   Enhance control of network traffic

■   Improve network security

■   Enable stacking.

After you configure an IP address on the switch, you can manage these features more conveniently in any of the following ways:

■   A remote Telnet session

■   A web browser interface

■   An SNMP network management station running a network management program, such as HP IMC.

For a list of switch features available with and without an IP address, refer to "How IP Addressing Affects Switch Operation" in the *Management and Configuration Guide* on the HP Networking web site.

For more information on IP addressing, refer to "IP Configuration" in the *Management and Configuration Guide.*

Minimal configuration through the console port connection

The quickest and easiest way to minimally configure the switch for networked management and password protection is to use the direct (out-of-band) connection through the console port to start a console session and access the Switch Setup screen.

1. Configure a management console as described in "Configuring the management console connection" on page 2- 24.

2. Set up a console connection through the Console port by following the procedure described in "Setting up a console connection" on page 2- 25. The HP 2920 command-line prompt should be displayed on the console screen, typically with the switch model number; for example: **HP 2920#**

3.   Enter the **setup** command at the prompt to display the Switch Setup screen. The following illustration shows the Setup screen with the default settings.

Figure 3-1.   Example CLI switch setup screen

```
HP-2920-24G-PoEP                                     8-Jan-1990  10:06:58
=========================- CONSOLE - MANAGER MODE -=======================
                              Switch Setup

    System Name : HP-2920-24G-PoEP
    System Contact :
    Manager Password : ****************

    Logon Default : CLI               Time Zone [0] : 0
    Community Name : public           Spanning Tree Enabled [No] : No
    Default Gateway :
    Time Sync Method [None] : TIMEP
    TimeP Mode [Disabled] : Disabled


    IP Config [Manual] : DHCP/Bootp

    IP Address  : 15.255.135.24
    Subnet Mask : 255.255.248.0
 Actions->   Cancel     Edit      Save      Help

Enter System Name - up to 32 characters.
Use arrow keys to change field selection, <Space> to toggle field choices,
and <Enter> to go to Actions.
```

4.   Use the **Tab** key to select the **Manager Password** field and enter a manager password of up to 16 characters.

5.   Tab to the **IP Config (DHCP/Bootp)** field and use the Space bar to select the **Manual** option.

6.   Tab to the **IP Address** field and enter the IP address that is compatible with your network.

7.   Tab to the **Subnet Mask** field and enter the subnet mask for your network.

8.   Press **Enter**, then **S** (for **S**ave).

The following fields are displayed in the Setup screen. For more information on these fields, see the *Management and Configuration Guide,* which is on the HP Networking web site at **www.hp.com/networking/support**.

Parameter	Default	
System Name	blank	Optional; up to 25 characters, including spaces
System Contact	blank	Optional; up to 48 characters, including spaces
Manager Password	blank	Recommended; up to 16 characters (no blank spaces)
Logon Default	CLI	The default setting selects the command line interface for console access. The alternative is the menu interface.
Time Zone	0 (none)	Optional; 1440 to -1440. The number of minutes your location is to the West (-) or East (+) of GMT.

Parameter	Default	
Community Name	public	Default setting recommended.
Spanning Tree Enabled	No	Default setting recommended unless STP is already running on your network or the switch will be used in complex network topologies.
Default Gateway	blank	Optional; Enter the IP address of the next-hop gateway node if network traffic needs to be able to reach off-subnet destinations.
Time Sync Method	None	Optional; The protocol the switch uses to acquire a time signal. The options are SNTP and TimeP.
TimeP Mode	Disabled	Optional; The method the switch uses to acquire the TimeP server address.
IP Config (DHCP/Bootp)	DHCP/Bootp	Set to Manual unless a DHCP/Bootp server is used on your network to configure IP addressing.
IP Address	xxx.xxx.xxx.xxx	Recommended; If you set IP Config to Manual, then enter an IP address compatible with your network.

Note: The IP address and subnet mask assigned for the switch must be compatible with the IP addressing used in your network.

Subnet Mask	xxx.xxx.xxx.xxx	Recommended; If you entered an IP address, then enter a subnet mask compatible with your network.
Stacking		Stacking is enabled by default, but if the switch was powered on for the first time and a stacking module is not installed, it becomes disabled and that configuration change is saved in the switch's running configuration. In that case, for the stacking feature to operate, stacking must first be enabled. From the config context in the CLI, enter the command **stacking enable**.

Where to Go from here: Managing the switch over the network

After the switch is configured with a Manager password, IP address, and subnet mask, you can manage the switch from a networked connection, such as:

- PC equipped with Telnet (see "Starting a Telnet Session" on).
- Web browser interface (see "Starting a Web Browser Session on).
- SNMP-based network management station using a tool such as HP IMC.

For more information on these management interfaces and all the features that you can configure on the switch, refer to the *Management and Configuration Guide* for your switch on the HP Networking web site.

The following types of networked management connections are supported on an HP 2920 Switch:

■ Out-of-band networked connection through the dedicated Management port:

To use: Connect an RJ-45 network cable to the **Mgmt** port to manage an HP 2920 Switch through Telnet from a remote PC or UNIX workstation.

To use this port, the switch must have an IP address. IP settings can be configured through a Console port connection (see "Minimal configuration through the console port connection" on page 3- 2) or automatically from a DHCP/Bootp server.

A networked out-of-band connection through the **Mgmt** port allows you to manage data network switches from a physically and logically separate management network.

For more information, refer to the "Network Out-of-Band Management (OOBM)" appendix in the *Management and Configuration Guide* at **www.hp.com/networking/support**.

■ In-band networked connection through a data port on the switch:

To use: Connect a PC or UNIX workstation with a VT-100 terminal emulator directly to a switch data port. Then access the switch via Telnet from the workstation

To use Telnet, the switch must have an IP address. IP settings can be configured through a Console port connection (see "Minimal configuration through the console port connection" on page 3- 2) or automatically from a DHCP/Bootp server.

For more information on in-band and out-of-band networked connections for switch management, refer to "Using the IP Address for remote switch management" on page 3- 6 and the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**.

Management Sessions

An HP 2920 Switch can simultaneously support one out-of-band serial console session through the Console port and up to six in-band Telnet/TCP (networked) sessions through data ports on the switch.

Using the IP Address for remote switch management

The switch's IP address can be used to manage the switch from any PC on the same or on a different subnet as the switch. In a networked (in-band or out-of-band) connection, you can use a Telnet session or a standard web browser to manage the switch.

Starting a Telnet session

To access the switch through a Telnet session, follow these steps:

1. Ensure that the switch is configured with an IP address and that the switch is reachable from the PC that is running the Telnet session (for example, by using a Ping command to the switch's IP address).

2. Start the Telnet program on a PC that is on the same subnet as the switch and connect to the switch's IP address.

3. You will see the copyright page and the message "Press any key to continue". Press a key, and you will then see the switch console command (CLI) prompt, for example:

   HP 2920#

   Enter **help** or **?** to see a list of commands that can be executed at the prompt. Entering any command followed by **help** provides more detailed context help information about the command. Entering any command followed by **?** displays a list of options that are available at that point in the command entry.

Starting a web browser session

The HP 2920 Switch can be managed through a graphical interface that you can access from any PC or workstation on the network by running a web browser and typing in the switch's IP address as the URL. No additional software installation is required to make this interface available; it is included in the switch's onboard software.

The minimum operating systems, web browsers, and Java support required to manage the switch through the browser interface are listed in the following table:

Operating System	Internet Explorer	Java Version
Windows 2000 SP4	5.5 SP2, 6.0 SP1	1.3.1_12 and 1.4.2_05
Windows XP SP1a	6.0 SP1	1.3.1_12 and 1.4.2_05
Windows Server 2003	6.0 SP1	1.3.1_12 and 1.4.2_05

The following illustration shows a typical web browser interface screen.

Figure 3-2.   Example web browser interface screen
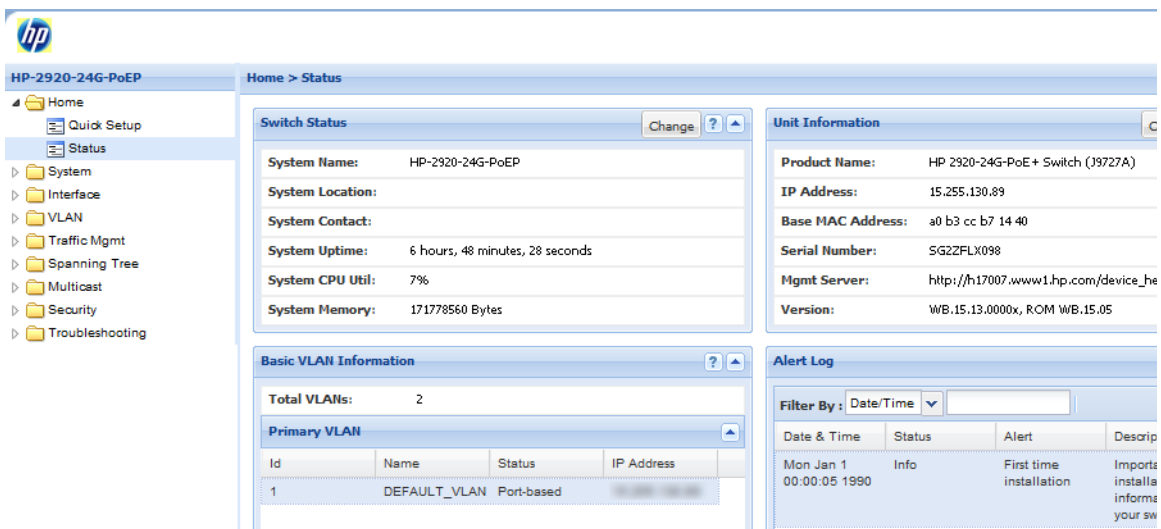
For more information on using the web browser interface, see the *Management and Configuration Guide,* which is on the HP Networking web site at **www.hp.com/networking/support**.

An extensive help system is also available for the web browser interface. To access the help system though, the subnet on which the switch is installed must have access to the internet, or HP IMC needs to be installed on a network management station that is on the subnet.

4

Replacing Components

This chapter shows you how to remove and install the following components:

- Power Supply (see)
- 10G Expansion Module (see)
- Stacking Module (see)

Hot Swapping The HP 2920 10G Expansion Modules and the HP 2920 Stacking Module are *not* hop swappable. The switch must be powered off before installing or replacing any of these modules.

Caution The HP 2920 switches and their components are sensitive to static discharge. Use an antistatic wrist strap and observe all static precautions when replacing components.

Caution If a power supply must be removed and then reinstalled, wait at least 5 seconds before reinstallation. Otherwise, damage to the switch may occur. The power supply needs this time to bleed off any retained power.

Replacing the power supply

If the HP 2920 Switches have replaceable power supplies. Replace the failed component as soon as possible. The PS (Power Supply) LED will blink simultaneously with the switch Fault LED indicating the power supply is having a problem, such as a failed fan. If the power supply fails completely, the switch will not be powered on when it is connected to an active AC power source.

To remove an AC power supply:

1. Remove the AC power cable from the failed power supply's connector.

2. Grasping the handle of the failed power supply, release the locking mechanism by squeezing the latch release handle, then, at the same time, pull the power supply straight out.

Figure 4-1.   Replacing a failed power supply

Latch release handle

Power supply handle
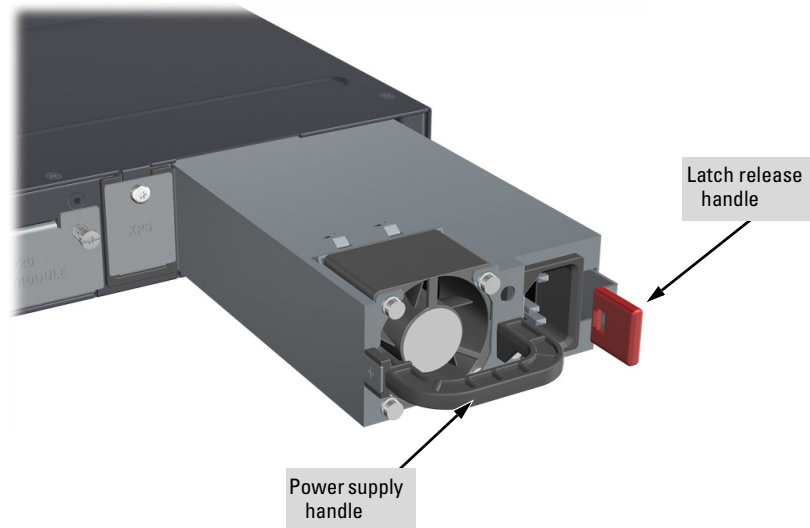
3. Insert the new power supply. Slide it in all the way in until the locking mechanism locks.

Replacing a 10G Expansion Module

The HP 2920 10G Expansion Modules are *not* hot swappable. The switch must be powered off before replacing the module. When a 10G Expansion Module fails, the Module Status (Mdl) LED on the front of the switch and the Module Status LED on the module will blink orange simultaneously with the switch Fault LED. In this case, the module needs to be replaced.

To replace a 10G Expansion Module:

1. Power off the switch.

2. Remove the new 10G Expansion Module from it's packaging, being careful to not touch any of the circuitry on the board.

3. Disconnect the networking cables from the failed module. You do not need to disconnect the cables from the networking devices at the other ends of the cables.

4. Unscrew the two retaining screws on the module.

5. Insert the new stacking module fully into the slot as shown in Figure 2-7 on page 2-10. The face plate of the module will be flush with the back face of the switch.

6. Engage the retaining screws and tighten them. Be sure to not over tighten the screws.

7. Power on the switch and make sure the module passes its self test. See Table 2-1 on page 2-10 for the module LED behavior that indicates correct installation.

Replacing the Stacking Module

The HP 2920 Stacking Module is *not* hot swappable. The switch must be powered off before replacing the module. When a stacking module fails, the Module Status (Mdl) LED on the front of the switch and the Module Status LED on the module will blink orange simultaneously with the switch Fault LED. In this case, the stacking module needs to be replaced.

To replace a stacking module:

1. Power off the switch.

2. Remove the new stacking module from it's packaging, being careful to not touch any of the circuitry on the board.

3. Disconnect the stacking cables from the failed module. You do not need to disconnect the cables from the switches at the other ends of the cables.

4. Unscrew the two retaining screws on the module.

5. Pull the extractor handle toward you and outward until it stops and then pull the module straight out.

6. Insert the new stacking module fully into the slot as shown in Figure 2-7 on page 2-10. The face plate of the module will be flush with the back face of the switch.

7. Close the extractor handle all the way until it stops.

8. Engage the retaining screws and tighten them. Be sure to not over tighten the screws.

9. Power on the switch and make sure the module passes its self test. See Table 2-2 on page 2-11 for the module LED behavior that indicates correct installation.

5

Troubleshooting

This chapter describes how to troubleshoot your switch. This document describes troubleshooting mostly from a hardware perspective. You can perform more in-depth troubleshooting on the switch using the software tools available with the switch, including the full-featured console interface, the built-in web browser interface, and HP Intelligent Management Center (HP IMC), the SNMP-based network management tool. For more information, see the chapter "Troubleshooting" in the *Management and Configuration Guide* for your switch, which is on the HP Networking web site at **www.hp.com/networking/support**. You may want to bookmark this web page for easy access in the future.

This chapter describes the following:

- Basic Troubleshooting Tips (page 5-2)
- Diagnosing with the LEDs (page 5-4)
- Proactive Networking Tools (page 5-12)
- Hardware Diagnostic Tests (page 5-13)
- Restoring the Factory Default Configuration (page 5-15)
- Downloading New Switch Software (page 5-16)
- HP Customer Support Services (page 5-16)

Basic troubleshooting tips

Most problems are caused by the following situations. Check for these items first when starting your troubleshooting:

■ **Connecting to devices that have a fixed full-duplex configuration.** The RJ-45 ports are configured as "Auto". That is, when connecting to attached devices, the switch will operate in one of two ways to determine the link speed and the communication mode (half duplex or full duplex):

- If the connected device is also configured to Auto, the switch will automatically negotiate both link speed and communication mode.

- If the connected device has a fixed configuration, for example 100 Mbps, at half or full duplex, the switch will automatically sense the link speed, but will default to a communication mode of *half* duplex.

Because the switch behaves in this way *(in compliance with the IEEE 802.3 standard)*, if a device connected to the switch has a fixed configuration at *full* duplex, the device will not connect correctly to the switch. The result will be high error rates and very inefficient communications between the switch and the device.

Make sure that all devices connected to the switch are configured to auto negotiate, or are configured to connect at half duplex (all hubs are configured this way, for example).

■ **Faulty or loose cables.** Look for loose or obviously faulty connections. If they appear to be OK, make sure the connections are snug. If that does not correct the problem, try a different cable.

■ **Non-standard cables.** Non-standard and miswired cables may cause network collisions and other network problems, and can seriously impair network performance. Use a new correctly-wired cable or compare your cable to the cable in appendix B, "Cables and Connectors" for pinouts and correct cable wiring. A category 5 cable tester is a recommended tool for every 100Base-TX and 1000Base-T network installation.

■ **Improper Network Topologies.** It is important to make sure you have a valid network topology. Common topology faults include excessive cable length and excessive repeater delays between end nodes. If you have network problems after recent changes to the network, change back to the previous topology. If you no longer experience the problems, the new topology is probably at fault. Sample topologies are shown at the end of chapter 2 in this book, and some topology configuration guidelines can be found online at the HP Networking web site, **www.hp.com/networking/support**.

In addition, you should make sure that your network topology contains *no data path loops*. Between any two end nodes, there should be only one active cabling path at any time. Data path loops will cause broadcast storms that will severely impact your network performance.

For your switch, if you wish to build redundant paths between important nodes in your network to provide some fault tolerance, you should enable **Spanning Tree Protocol** support on the switch. This ensures only one of the redundant paths is active at any time, thus avoiding data path loops. Spanning Tree can be enabled through the switch console, the web browser interface, or HP IMC.

The HP 2920 switches also support **Trunking**, which allows multiple network cables to be used for a single network connection without causing a data path loop. For more information on Spanning Tree and Trunking, see the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**.

■ **Check the port configuration.** A port on your switch may not be operating as you expect because it has been put into a "blocking" state by Spanning Tree, GVRP (automatic VLANs), or LACP (automatic trunking). (Note that the normal operation of the Spanning Tree, GVRP, and LACP features may put the port in a blocking state.) Or, the port just may have been configured as disabled through software.

Use the switch console to determine the port's configuration and verify that there is not an improper or undesired configuration of any of the switch features that may be affecting the port. For more information, see the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**.

■ **Improper external power setup**. If you are using an HP 640 RPS/EPS Shelf to provide redundant or extra power to your switch, you must make sure that you have the HP 640 and the switch connected together in a supported topology. See the HP 640 RPS/EPS Shelf Installation and Power Setup Guide for more information.

Diagnosing with the LEDs

■ Table 5-1 shows LED patterns on the switch that indicate switch problem conditions.

■ Table 5-2 shows LED patterns on the switches and on stacking modules in a stack that indicate stack-related problem conditions.

1. Check in the tables for the LED pattern you see on your switch and stacking module.

2. Refer to the corresponding diagnostic tip on the next few pages.

Table 5-1.   Switch LED Error Indicators

LED Pattern Indicating Problems									See Diag Tips
Power	**Fault**	**Tmp**	**Test**	**PoE**	**Fan**	**PS**	**Mdl** [2]	**Port Link LED**	
off with power cord plugged in	*	*	*	*	*	*	*	*	**1**
on	prolonged on	*	prolonged on	*	*	*	*	*	**2**
on	blink orange[1]	*	blink orange[1]	*	*	*	*	*	**3**
on	blink orange[1]	*	off	*	blink orange[1]	*	*	*	**4**
on	blink orange[1]	*	blink orange[†]	*	*	*	*	blink orange[1]	**5**
on	off	*	off	*	*	*	*	off with cable connected	**6**
on	off	*	off	*	*	*	*	on, but no activity on the port	**7**
on	blink orange[1]	*	*	*	*	blink orange[1]	*	*	**8**
on	blink orange[1]	blink orange[1]	*	*	*	*	*	*	**9**
on	blink orange[1]	*	*	blink orange[1]	*	*		*	**10**
on	blink orange[1]	*	*	*	*	*	blink orange[1]	*	**11**
*	off	*	*	*	*	*	*	*	**12**
*	off	*	*	*	*	*	*	*	**13**

LED Pattern Indicating Problems									See Diag Tips
Power	**Fault**	**Tmp**	**Test**	**PoE**	**Fan**	**PS**	**Mdl** [2]	**Port Link LED**	
*	off	*	*	*	*	*	*	*	**14**
*	blink orange[1]	*	*	*	*	*	*	*	**15**

* **This LED is not important for the diagnosis.**
[1] **The blinking behavior is an on/off cycle once every 1.6 seconds, approximately.**
[2] **The Mdl LED is on the switch front. It is replicated by the Mdl Status LED on the 10G Expansion Modules.**
   Note that this LED is also used to report the status of a Stacking Module installed in the switch. See Table 5-2.

Diagnostic Tips:

Tip	Problem	Solution
1	The switch is not plugged into an active AC power source, or the switch's power supply may have failed. The switch will not power up if the top of the chassis is removed.	1. Verify the power cord is plugged into an active power source and to the switch. Make sure these connections are snug. 2. Try power cycling the switch by unplugging and plugging the power cord back in. 3. If the Power LED is still not on, verify that the AC power source works by plugging another device into the outlet. Or try plugging the switch into a different outlet or try a different power cord. If the power source and power cord are OK and this condition persists, the switch power supply may have failed. Call your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software.
2	A switch hardware failure has occurred. All the LEDs will stay on indefinitely.	Try power cycling the switch. If the fault indication reoccurs, the switch may have failed. Call your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software.
3	The switch has experienced a software failure during self test.	1. Try resetting the switch by pressing the Reset button on the front of the switch, or by power cycling the switch. 2. If the fault indication reoccurs, attach a console to the switch (as indicated in chapter 2) and configure it to operate at 9600 baud. Then, reset the switch. Messages should appear on the console screen and in the console log identifying the error condition. You can view the console log at that point by selecting it from the console Main Menu. If necessary to resolve the problem, contact your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. SeeDownloding new switch software.
4	One or more of the switch cooling fans may have failed.	Try disconnecting power from the switch and wait a few moments. Then reconnect the power to the switch and check the LEDs again. If the error indication reoccurs, one or more of the fans has failed. The switch has four fans and may continue to operate under this condition if the ambient temperature does not exceed normal room temperature. If necessary to resolve the problem, contact your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. SeeDownloding new switch software.
5	The network port for which the LED is blinking has experienced a self test or initialization failure.	Try power cycling the switch. If the fault indication reoccurs, the switch port may have failed. Call your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software. If the port is a pluggable SFP/SFP+ unit, verify it is one of the pluggables supported by the switch. Unsupported pluggables will be identified with this fault condition. **Caution:** Use only supported genuine HP transceivers with your switch. To verify the port has failed, try removing and reinstalling the SFP/SFP+. You can do that without having to power off the switch. If the port fault indication reoccurs, you will have to replace the SFP/SFP+ unit.

Tip	Problem	Solution

6	The network connection is not working properly.	Try the following procedures:
		• For the indicated port, verify both ends of the cabling, at the switch and the connected device, are connected properly.
		• Verify the connected device and switch are both powered *on* and operating correctly.
		• Verify you have used the correct cable type for the connection:
		  – For twisted-pair connections to the fixed 10/100 or 10/100/1000 ports, if the port is configured to "Auto" (auto negotiate), either straight-through or crossover cables can be used because of the switch's "Auto-MDIX" feature.
		  Note: If the switch port configuration is changed to one of the **fixed configuration** options (for example, 100 Mbps/Full Duplex), then the port operates as **MDI-X only** and you must use the correct type of cable for the connection. In general, for connecting an end node (MDI port) to the switch, use straight-through cable; for connecting to MDI-X ports on hubs, other switches, and routers, use crossover cable.
		  – For fiber-optic connections, verify the transmit port on the switch is connected to the receive port on the connected device, and the switch receive port is connected to the transmit port on the connected device.
		• For 1000Base-T connections, verify that the network cabling complies with the IEEE 802.3ab standard. the cable should be installed according to the ANSI/TIA/EIA-568-A-5 specifications. Cable testing should comply with the stated limitations for Attenuation, Near-End Crosstalk, Far-End Crosstalk, Equal-Level Far-End Crosstalk (ELFEXT), Multiple Disturber ELFEXT, and Return Loss.
		The cable verification process must include all patch cables from any end devices, including the switch, to any patch panels in the cabling path.
		• Verify the port has not been disabled through a switch configuration change.
		You can use the console interface, or, if you have configured an IP address on the switch, use the web browser interface, or IMC network management software to determine the state of the port and re-enable the port if necessary.
		• Verify the switch port configuration matches the configuration of the attached device. For example, if the switch port is configured as "Auto", the port on the attached device also MUST be configured as "Auto". Depending on the port type, twisted-pair or fiber-optic, if the configurations don't match, the results could be a very unreliable connection, or no link at all.
		• If the other procedures don't resolve the problem, try using a different port or a different cable.

Tip	Problem	Solution
7	The port may be improperly configured, or the port may be in a "blocking" state by the normal operation of the Spanning Tree, LACP, or IGMP features.	Use the switch console to see if the port is part of a dynamic trunk (through the LACP feature) or to see if Spanning Tree is enabled on the switch, and to see if the port may have been put into a "blocking" state by those features. The **show lacp** command displays the port status for the LACP feature; the **show spanning-tree** command displays the port status for Spanning Tree. Also check the Port Status screen using the **show interfaces** command to see if the port has been configured as "disabled". Other switch features that may affect the port operation include VLANs and IGMP. Use the switch console to see how the port is configured for these features. For software troubleshooting tips, see the chapter "Troubleshooting" in the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**. Make sure also, the device at the other end of the connection is indicating a good link to the switch. If it is not, the problem may be with the cabling between the devices or the connectors on the cable.
8	The power supply has experienced a fault.	Check the power supply to make sure it is plugged in to an active power source. If this is ok but the LEDs are still blinking, the power supply may have failed. Try unplugging and then replugging the power supply. If the fault light is still blinking, replace the power supply.
9	The switch has overheated.	Check to ensure the fans are functioning correctly.
10	The port may have an internal hardware failure, or the port may be denied PoE power or detecting an external PD fault.	Check the port for a hardware failure, this may require a reboot of the switch. Check the port for correct PoE configuration and check for PoE allocation. Also check the external PD for a fault.
11	A 10G Expansion Module has experienced a fault.	1. Try resetting the switch by pressing the Reset button on the front of the switch, or by power cycling the switch. 2. If the fault indication reoccurs, the 10G Expansion Module may have to be replaced. If necessary to resolve the problem, contact your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software.

Table 5-2.   Stacked Switch and Stacking Module LED error indicators

LED Pattern Indicating Problems						See Diag Tips
Fault	**Cmd**	**Stk**	**Mdl** [2]	**Module Port Link LEDs**	**Switch Port LEDs**	
off	off	off	on	off	*	**1**
off	off	off	blink orange[1]	off	*	**2**
off	see tip 2	on off	blink orange[1]	blink orange[1]	*	**3**
blink orange[1]	see tip 3	off	blink orange[1]	off	*	**4**
off	on	blink orange[1]	*	*	*	**5**
off	on	blink orange[1]	*	*	all off	**6**
off	*	blink orange[1]	blink orange[1]	blink orange[1]	*	**7**
off	off	blink orange[1]	on	on	*	**8**

*   This LED is not important for the diagnosis.
[1]   The blinking behavior is an on/off cycle once every 1.6 seconds, approximately.
[2] The Mdl LED is on the switch front. It is replicated by the Mdl Status LED on the stacking module itself.
    Note that this LED is also used to report the status of any 10G Expansion Modules installed in the switch.
    See Table 5-1.

Diagnostic tips for stack errors:

Tip	Problem	Solution
1	Stacking is disabled on the switch.	1. Connect a console cable to the switch and establish a console session, as described in Downloding new switch software 2. From the CLI config context, enter the command **stacking enable**. 3. Recheck the switch LEDs to confirm that the switch has now correctly joined the stack: – Stk LED is blinking green (indicates joining the stack) or on solid green (indicates has joined the stack). – Cmd LED may be on green if the switch has been elected as the stack Commander. – Mdl (module status) LEDs on the switch front and on the stacking module are on green. – Link LEDs for the stacking module ports are on green.
2	The Stacking Module was installed in the switch while the switch was powered on. Hot install is not supported.	Reset or power cycle the switch to reboot it. After rebooting, the module will be correctly recognized and supported by the switch, and will be operational. When installing or removing the Stacking Module, the switch should be powered off.
3	One of these problems exists: • The stacking cable connected to the stacking port on which the Link LED is blinking orange is not connected at the far end. • A stacking link failure has occurred on a link that was functioning: – the switch at the other end of the stacking cable has been powered off – The stacking feature is disabled on the switch at the other end of the stacking cable – the stacking module or switch at the other end of the stacking link has failed – the stacking cable is faulty	Make sure that the stacking cable is fully connected at both ends of the link. If an equipment failure has occurred, see the LEDs on the device at the other end of the connection. If this error occurred on an operational stack, it could result in changes to the stack configuration including election of a new stack Commander, and possibly a new Standby. See the Stack Management chapter in the *Advance Traffic Management Guide* for your switch for more information. If necessary to resolve the problem, contact your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software.

Tip	Problem	Solution
4	The stacking module on this switch has experienced a failure. The Test LED on the front of the switch may also be blinking orange simultaneously.	1. Try resetting the switch by pressing the Reset button on the front of the switch, or by power cycling the switch. 2. If the fault indication reoccurs, the stacking module may have to be replaced. This error could result in changes to the stack configuration including election of a new stack Commander, and possibly a new Standby. See the Stack Management chapter in the *Advance Traffic Management Guide* for your switch for more information. If necessary to resolve the problem, contact your HP authorized LAN dealer, or use the electronic support services from HP to get assistance. See Downloding new switch software.
5	A stack link failure has occurred in a chain topology and multiple stack fragments have been created. Each fragment will elect a Commander, so there will be multiple switches with the Cmd LED on.	Repair the cause of the stack link failure and reconnect the switches in their original topology so that the switches can reform the original stack.
6	A stack link failure has occurred in a chain topology and multiple stack fragments have been created. One of the fragments has been made inactive according to the rules of the stack operation. All the network ports on the switches in the inactive fragment are disabled. As a result, all the port LEDs are off for those switches.	Repair the cause of the stack link failure so that the switches can reform the original stack.
7	You have tried to merge two stacks that have different Stack IDs – they were not previously part of the same stack. This is not allowed by the stack operation rules.	1. Select one of the stacks as the one to retain. 2. For the switches in the other stack, erase their stacking configuration by issuing the following config-level CLI command to each switch: HP Switch(config)# **stacking factory-reset** This erases the complete startup configuration for each switch, including the stacking configuration. 3. Add the switches to the stack as described in the Stack Management chapter in the *Advanced Traffic Management Guide* for your switch.
8	You have tried to add a fifth switch to a stack. A maximum of four switches can be stacked together.	Disconnect the fifth switch from the stack.

Proactive networking

The HP 2920 Switches have built-in management capabilities that proactively help you manage your network, they include:

- finding and helping you fix the most common network error conditions (for example, faulty network cabling, and non-standard network topologies)
- informing you of the problem with clear, easy-to-understand messages
- recommending network configuration changes to enhance the performance of your network

The following interfaces provide tests, indicators, and an event log that can be used to monitor the switch and its network connections and to help you take advantage of these proactive networking features:

- HP Intelligent Management Center (HP IMC) - an SNMP-based network management tool.
- PCM+ is supported.
- A graphical web browser interface that you can use to manage your switch from a PC running a supported web browser, for example Microsoft Internet Explorer.
- A full-featured easy-to-use console interface that you can access by connecting a standard terminal or PC running a terminal emulator to the switch's console port. The cable to make that connection is provided with your switch. The console interface is also accessible through a Telnet connection.

For more information on using these software tools to diagnose and manage your switch, see the "Troubleshooting" chapter in the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**.

Hardware diagnostic tests

Testing the switch by resetting it

If you believe the switch is not operating correctly, you can reset the switch to test its circuitry and operating code. To reset a switch, either:

- unplug and plug in the power cord (power cycling)
- press the Reset button on the front of the switch

Power cycling the switch and pressing the Reset button both cause the switch to perform its power-on self test, which almost always will resolve any temporary operational problems. These reset processes also cause any network traffic counters to be reset to zero, and cause the System Up Time timer to reset to zero.

Checking the switch LEDs

The self test passes if the Fault and Self Test LEDs on the front of the switch go off after approximately 50 seconds. If these LEDs stay on longer than 60 seconds or begin blinking, there may be a problem with the switch.

See "Diagnosing With the LEDs" on page 5-4 for information on interpreting the LED patterns and LED behaviors in chapter one.

Checking console messages

Useful diagnostic messages may be displayed on the console screen when the switch is reset. As described in chapter 2 under step 7, "Connect a Console to the Switch", connect a PC running a VT-100 terminal emulator program or a standard VT-100 terminal to the switch's Console Port and configure it to run at 9600 baud, and with the other terminal communication settings shown on page 2-24. Then, when you reset the switch, note the messages that are displayed. Additionally, you can check the switch event log, which can be accessed from the console using the **show log** command, or from the console Main Menu.

Testing twisted-pair cabling

Network cables that fail to provide a link or provide an unreliable link between the switch and the connected network device may not be compatible with the IEEE 802.3 Type 10Base-T, 100Base-TX, or 1000Base-T standards. The twisted-pair cables attached to the Switch must be compatible with the appropriate standards. To verify your cable is compatible with these standards, use a qualified cable test device.

Testing switch-to-device network communications

You can perform the following communication tests to verify the network is operating correctly between the switch and any connected device that can respond correctly to the communication test.

- Link Test -- a physical layer test that sends IEEE 802.2 test packets to any device identified by its MAC address.
- Ping Test -- a network layer test used on IP networks that sends test packets to any device identified by its IP address.

These tests can be performed through the switch console interface from a terminal connected to the switch or through a Telnet connection, or from the switch's web browser interface. For more information, see the *Management and Configuration Guide* for your switch at **www.hp.com/networking/support**.

These tests can also be performed from an SNMP network management station running a program that can manage the switch, for example, HP IMC.

Testing end-to-end network communications

Both the switch and the cabling can be tested by running an end-to-end communications test -- a test that sends known data from one network device to another through the switch. For example, if you have two PCs on the network that have LAN adapters between which you can run a link-level test or Ping test through the switch, you can use this test to verify that the entire communication path between the two PCs is functioning correctly. See your LAN adapter documentation for more information on running a link test or Ping test.

Restoring the factory default configuration

As part of your troubleshooting process on the switch, it may become necessary to return the switch configuration to the factory default settings. This process momentarily interrupts the switch operation, clears any passwords, clears the console event log, resets the network counters to zero, performs a complete self test, and reboots the switch into its factory default configuration including deleting the IP address, if one is configured.

Note

This process removes all switch configuration changes you have made from the factory default settings. This includes, for example, configuration of VLANs, Spanning Tree, trunks, and stacking. Returning the configuration of these features to their factory default settings (usually disabling them) may result in network connectivity issues.

If the switch has a valid configuration, and you are restoring the factory default settings for a reason other than configuration problems, you should save the switch configuration prior to performing the factory default reset. Then, after the reset and resolution of the original problem, you can restore the saved configuration to the switch. For both the save and restore processes, you can use the console **copy** command. For more information on this command, see the *Management and Configuration Guide* for your switch at **www.hp.com/ networking/support**.

You can restore the factory default configuration either on the switch itself, or through the switch console.

To execute the factory default reset on the switch, perform these steps:

1. Using pointed objects, simultaneously press both the Reset and Clear buttons on the front of the switch.

2. Continue to press the Clear button while releasing the Reset button.

3. When the Test LED begins to blink, release the Clear button. It takes approximately 25 seconds before the Test LED will begin to blink.

   The switch will then complete its boot process and begin operating with its configuration restored to the factory default settings.

To restore the factory default configuration using the console, execute the **erase startup-config** command from the console command prompt.

For stacked switches, reset stacking configurations to factory defaults. by executing the **stacking factory-reset** command.

Downloading new switch software

Software Updates can be downloaded to the switch through several methods. Switch software updates are available at **www.hp.com/networking/support**.

For more information, see the *Management and Configuration Guide* for your switch on the HP Networking web site.

HP customer support services

If you are still having trouble with your product, Hewlett-Packard offers support 24 hours a day, seven days a week through the use of a number of automated electronic services. HP provides up-to-date customer care, support and warranty information at **www.hp.com/networking/support**.

Additionally, your HP authorized network reseller can provide you with assistance, both with services that they offer and with services offered by HP.

Before Calling Support

Before calling your networking dealer or HP Support, to make the support process most efficient, you first should have retrieved the following information:

Information Item	Information Location
• product identification, including SFP/SFP+s	the front of the switch and on labels on the SFP/SFP+s
• details about the switch's status including the software (OS) version, a copy of the switch configuration, a copy of the switch Event Log, and a copy of the switch status and counters information	switch console: **show tech** command
• copy of your network topology map, including network addresses assigned to the relevant devices	your network records

A

Specifications

Switch specifications

Physical

Product	Weight	Width	Depth	Height
HP 2920-24G Switch (J9726A)	7.2 kg (15.90 lb)			
HP 2920-24G-PoE+ Switch (J9727A)	7.6 kg (16.85 lb)	442.5 mm (17.42 in)	336 mm (13.23 in)[1]	IU = 44 mm (1.73 in)
HP 2920-48G Switch (J9728A)	7.5 kg (16.45 lb)			
HP 2920-48G-PoE+ Switch (J9729A)	7.8 kg (17.25 lb)			
HP 2920-48G-PoE+ 740 W Switch (J9836A)	5.84 kg (12.9 lb)			

[1] Does not includes the power supply handle, which extends from the back of the switch chassis.

Electrical

HP 2920 Switches:	2920-24G Switch (J9726A) or 2920-48G Switch (J9728A) with HP X331 165W Power Supply (J9739A)	2920-24G PoE+ Switch (J9727A) or 2920-48G PoE+ Switch (J9729A) with HP X332 575W Power Supply (J9738A)	2920-24G PoE+ Switch (J9727A) or 2920-48G PoE+ Switch (J9729A) with HP X332 1050W Power Supply (J9737A)
Electrical: AC voltage: Maximum current: Frequency range:	100 – 240 VAC 2.50 – 1.25 A [1] 50 – 60 Hz	100 – 240 V 9.0 – 4.0 A [1] 50 – 60 Hz	110 - 240 V 12.0 – 7.0 A [1] 50 – 60 Hz
	The switches automatically adjusts to any voltage between 100 – 240 VAC and 50 to 60 Hz.		

[1] These values represent the maximum current that these power supplies could draw. For typical values, see the HP 2920 Switch data sheets on the web site: **www.hp.com/networking/support**.

Environmental

	HP 2920 Switches
Environmental Operating Temperature[1]:	0°C to 55°C (32°F to 131°F)
Relative Humidity:	15% to 95% at 40°C (104°F) non-condensing
Non-Operating Temperature:	-40°C to 70°C (-40°F to 158°F)
Non-Operating Relative Humidity:	15% to 90% at 65°C (149°F)
Maximum Operating Altitude:	3.0 km (10,000 ft)
Non-Operating Altitude:	4.6 km (15,000 ft)

[1] If you are installing any SFP or SFP+ transceivers, the operating ambient temperature should not exceed 45°C (113°F).

Acoustics

	Acoustics
HP 2920-24G Switch (J9726A)	Geraeuschemission LpA=57 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19 Noise Emission LpA=57 dB at virtual workspace according to DIN 45635 T.19
HP 2920-24G-PoE+ Switch (J9727A)	Geraeuschemission LpA=61 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19 Noise Emission LpA=61 dB at virtual workspace according to DIN 45635 T.19
HP 2920-48G Switch (J9728A)	Geraeuschemission LpA=57 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19 Noise Emission LpA=57 dB at virtual workspace according to DIN 45635 T.19
HP 2920-48G-PoE+ Switch (J9729A)	Geraeuschemission LpA=62 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19 Noise Emission LpA=62 dB at virtual workspace according to DIN 45635 T.19
HP 2920-48G-PoE+ 740 W Switch (J9836A)	Geraeuschemission LpA=53 dB am fiktiven Arbeitsplatz nach DIN 45635 T.19 Noise Emission LpA=53 dB at virtual workspace according to DIN 45635 T.19

Safety

- EN60950-1: 2006+A11:2009+A1:2010+A12:2011
- IEC60950-1:2005
- Am1:2009
- CSA22.2 No. 60950-1-07 2nd
- UL60950-1 2nd
- EN 60825-1:2007 / IEC 60825-1:2007 Class 1
- Class 1 Laser Products / Laser Klasse 1

Connectivity standards

Use only supported HP SFP and SFP+ transceivers.

Table A-1.   Technology Standards and Safety Compliance

Technology	Compatible with these IEEE standards	Laser safety information		
		EN/IEC standard compliance	SFP Lasers	SFP+ Lasers
10-T	IEEE 802.3 10BASE-T			
100-TX	IEEE 802.3u 100BASE-TX			
1000-T	IEEE 802.3ab 1000BASE-T			
10GBASE-T	IEEE 802.3an 10GBASE-T			
100-FX	IEEE 802.3u 100BASE-FX	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
100-BX	IEEE 802.3ah 100BASE-BX10	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
1000-SX	IEEE 802.3z 1000BASE-SX	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
1000-LX	IEEE 802.3z 1000BASE-LX	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
1000-LH	(not an IEEE standard)	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
1000-BX	IEEE 802.3ah 1000BASE-BX10	EN/IEC 60825	Class 1 Laser Product Laser Klasse 1	
10-Gig Direct Attach	(not an IEEE standard)			
10-Gig SR	IEEE 802.3ae 10GBASE-SR	EN/IEC 60825		Class 1 Laser Product Laser Klasse 1
10-Gig LRM	IEEE 802.3aq 10GBASE-LRM	EN/IEC 60825		Class 1 Laser Product Laser Klasse 1
10-Gig LR	IEEE 802.3ae 10GBASE-LR	EN/IEC 60825		Class 1 Laser Product Laser Klasse 1
10-Gig ER	IEEE 802.3ae 10GBASE-ER	EN/IEC 60825		Class 1 Laser Product Laser Klasse 1

10G Expansion Modules specifications

Physical

Product	Weight	Width	Depth	Height
HP 2920 2-Port 10GbE SFP+ Module (J9731A)	0.159 kg (0.35 lb)	10.16 mm (4 in)	10.62 mm (4.18 in)	3.56 mm (1.4 in)
HP 2920 2-Port 10GBASE-T Module (J9732A)	0.159 kg (0.35 lb)	106.17 mm (4.18 in)	104.39 mm (4.11 in)	35.56 mm (1.40 in)

Environmental

Operating Temperature:	0°C to 55°C (32°F to 131°F)
Relative Humidity:	32ºF to 113ºF (0ºC to 45ºC)
Non-Operating Temperature:	-40°C to 70°C (-40°F to 158°F)
Non-Operating Relative Humidity:	15% to 90% at 65°C (149°F)
Maximum Operating Altitude:	3.0 km (10,000 ft)
Non-Operating Altitude:	4.6 km (15,000 ft)

Stacking Module specifications

Physical

Product	Weight	Width	Depth	Height
HP 2920 2-Port Stacking Module (J9733A)	0.159 kg (0.35 lb)	6.83 mm (2.69 in)	20.5 mm (8.07 in)	2.87 mm (1.13 in)

Environmental

Operating Temperature:	0°C to 55°C (32°F to 131°F)
Operating Relative Humidity:	15% to 95% at 40°C (104°F) non-condensing
Non-Operating Temperature:	-40°C to 70°C (-40°F to 158°F)
Non-Operating Relative Humidity:	15% to 90% at 65°C (149°F)
Maximum Operating Altitude:	3.0 km (10,000 ft)
Non-Operating Altitude:	4.6 km (15,000 ft)

Cabling and Technology Information

This appendix includes switch connector information and network cable information for cables that should be used with the HP switches.

N o t e   Incorrectly wired cabling is a common cause of problems for LAN communications. HP recommends that you work with a qualified LAN cable installer for assistance with your cabling requirements.

Cabling Specifications

Table B-1.   Cabling Specifications

Twisted-pair copper	10 Mbps Operation	Category 3, 4 or 5, 100-ohm unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable, complying with IEEE 802.3 10BASE-T specifications.
	100 Mbps Operation	Category 5, 100-ohm UTP or STP cable, complying with IEEE 802.3u 100BASE-TX specifications.
	1000 Mbps Operation	Category 5, 100-ohm 4-pair UTP or STP cable, complying with IEEE 802.3ab 1000BASE-T specifications—Category 5e or better is recommended. See Note on 1000BASE-T Cable Requirements below.
	10 Gbps Operation	Category 6 or 6A, 100-ohm 4-pair UTP cable, or Category 6A or 7, 100-ohm 4-pair STP cable, complying with IEEE 802.3an 10GBASE-T specifications. See Note on 10GBASE-T Cable Requirements below, and see Table B-2 for distances supported with each cable type.
Twinaxial copper	Direct attach cables	One-piece devices consisting of a cable with SFP+ connectors permanently attached to each end, complying with SFF 8431 SFP+ specifications.
Multimode fiber		62.5/125 μm or 50/125 μm (core/cladding) diameter, low metal content, graded index fiber-optic cables, complying with the ITU-T G.651 and ISO/IEC 793-2 Type A1b or A1a standards respectively.[1]
Single mode fiber		9/125 μm (core/cladding) diameter, low metal content fiber-optic cables, complying with the ITU-T G.652 and ISO/IEC 793-2 Type B1 standards.

[1] A mode conditioning patch cord may be needed for some Gigabit-LX and 10-Gigabit LRM installations. See **"Mode Conditioning Patch Cord" on page B-4** for more information

Note on 1000BASE-T Cable Requirements The Category 5 networking cables that work for 100BASE-TX connections should also work for 1000BASE-T, as long as all four-pairs are connected. But, for the most robust connections, you should use cabling that complies with the Category 5e specifications, as described in Addendum 5 to the TIA-568-A standard (ANSI/TIA/EIA-568-A-5).

Because of the increased speed provided by 1000BASE-T (Gigabit-T), network cable quality is more important than for either 10BASE-T or 100BASE-TX. Cabling plants being used to carry 1000BASE-T networking must comply with the IEEE 802.3ab standards. In particular, the cabling must pass tests for Attenuation, Near-End Crosstalk (NEXT), and Far-End Crosstalk (FEXT). Additionally, unlike the cables for 100BASE-TX, the 1000BASE-T cables must pass tests for Equal-Level Far-End Crosstalk (ELFEXT) and Return Loss.

When testing your cabling, be sure to include the patch cables that connect the switch and other end devices to the patch panels on your site. The patch cables are frequently overlooked when testing cable and they must also comply with the cabling standards.

Note on 10GBASE-T Cable Requirements The Category 6 networking cables that work for 1000BASE-T connections may work for 10GBASE-T, as long as the distance is less than 55m and the cable installation has been tested for compliance to IEEE requirements. But, for the most robust connections, you should use cabling that complies with the Category 6A or Category 7 specifications, as described in the TIA-568-C (ANSI/TIA-568-C.2) and ISO/IEC 11801 standards. 10GBASE-T is a sophisticated technology that relies upon high quality cable installations. It is sensitive to Alien Near End Crosstalk (ANEXT) which can arrive upon the cable due to cables placed in close proximity to the data cables. It is recommended that cable dressing be done carefully and in compliance with recommendations in the TIA TSB-155A.

Like 1000BASE-T, 10GBASE-T requires testing of all the crosstalk and return loss parameters described above, and also ANEXT.

In addition to ANEXT, 10GBASE-T is more sensitive to external electrical noise in the environment. It is recommended that radio transmitters and other sources of high frequency continuous wave radio frequency be kept away from LAN cables.

When testing your cabling, be sure to include the patch cables that connect the switch and other end devices to the patch panels on your site. The patch cables are frequently overlooked when testing cable and they must also comply with the cabling standards. For 10GBASE-T, Category 6 patch cables are sensitive to movement once link has been established, and could cause

link to drop if moved. Therefore, HP recommends using Category 6A patch cables, or using cable management options to tie down (dress) the Category 6 patch cables so they cannot move.

Technology Distance Specifications

Table B-2.   Technology Distance Specifications

Technology	Supported cable type	Multimode fiber modal bandwidth	Supported distances
100-FX	multimode fiber	any	up to 2,000 meters
100-BX	single mode fiber	N/A	0.5 - 10,000 meters
1000-T	twisted-pair copper	N/A	up to 100 meters
10GBASE-T	twisted-pair copper	N/A	Cat 6 unshielded - up to 55 meters[1] Cat 6 shielded - up to 100 meters[1] Cat 6A unshielded - up to 100 meters Cat 6A shielded - up to 100 meters Cat 7 shielded - up to 100 meters
1000-SX	multimode fiber	160 MHz*km 200 MHz*km 400 MHz*km 500 MHz*km	2 - 220 meters 2 - 275 meters 2 - 500 meters 2 - 550 meters
1000-LX	multimode fiber single mode fiber	400 MHz*km 500 MHz*km N/A	2 - 550 meters 2 - 550 meters 2 - 10,000 meters
1000-LH	single mode fiber	N/A	10 - 70,000 meters[2]
1000-BX	single mode fiber	N/A	0.5 - 10,000 meters
10-Gig Direct Attach	twinaxial copper	N/A	(various lengths offered)
10-Gig SR	multimode fiber	160 MHz*km 200 MHz*km 400 MHz*km 500 MHz*km 2000 MHz*km	2 - 26 meters 2 - 33 meters 2 - 66 meters 2 - 82 meters 2 - 300 meters
10-Gig LRM	multimode fiber	400 MHz*km 500 MHz*km	0.5 - 100 meters 0.5 - 220 meters

Table B-2. Technology Distance Specifications(Continued)

Technology	Supported cable type	Multimode fiber modal bandwidth	Supported distances
10-Gig LR	single mode fiber	N/A	2 - 10,000 meters
10-Gig ER	single mode fiber	N/A	2 - 40,000 meters
[1] Cat 6 cabling requires TIA TSB-155A testing for 500 MHz operation and ANEXT. [2] For distances less than 20km, a 10dB attenuator must be used. For distances between 20km and 40km, a 5dB attenuator must be used. Attenuators can be purchased from most cable vendors.			

Mode Conditioning Patch Cord

The following information applies to installations in which multimode fiber-optic cables are connected to a Gigabit-LX port or a 10-Gigabit LRM port. Multimode cable has a design characteristic called "Differential Mode Delay", which requires the transmission signals be "conditioned" to compensate for the cable design and thus prevent resulting transmission errors.

Under certain circumstances, depending on the cable used and the lengths of the cable runs, an external Mode Conditioning Patch Cord may need to be installed between the Gigabit-LX or 10-Gigabit LRM transmitting device and the multimode network cable to provide the transmission conditioning. If you experience a high number of transmission errors on those ports, usually CRC or FCS errors, you may need to install one of these patch cords between the fiber-optic port in your switch and your multimode fiber-optic network cabling, at both ends of the network link.

The patch cord consists of a short length of single mode fiber cable coupled to graded-index multimode fiber cable on the transmit side, and only multimode cable on the receive side. The section of single mode fiber is connected in such a way that it minimizes the effects of the differential mode delay in the multimode cable.

N o t e   Most of the time, if you are using good quality graded-index multimode fiber cable that adheres to the standards listed in Table B-1, there should not be a need to use mode conditioning patch cords in your network. This is especially true if the fiber runs in your network are relatively short.

For 10-Gigabit LRM using OM3 cable (50 μm multimode @ 1500/500 MHz*km), a mode conditioning patch cord is not required. Other multimode cables may require mode conditioning patch cords to achieve the LRM maximum distances.

Installing the Patch Cord

As shown in the illustration below, connect the patch cord to the HP transceiver with the section of single mode fiber plugged in to the Tx (transmit) port. Then, connect the other end of the patch cord to your network cabling patch panel, or directly to the network multimode fiber.

If you connect the patch cord directly to the network cabling, you may need to install a female-to-female adapter to allow the cables to be connected together.

Figure B-1. Example: Connecting a Mode Conditioning Patch Cord for Gigabit-LX

Gigabit-LX port

To network multimode cabling

Mode Conditioning Patch Cord

The multimode cable in the patch cord must match the characteristics of your network cable

Single mode section plugs into Tx port on Gigabit-LX Transceiver or Gigabit-LX mini-GBIC
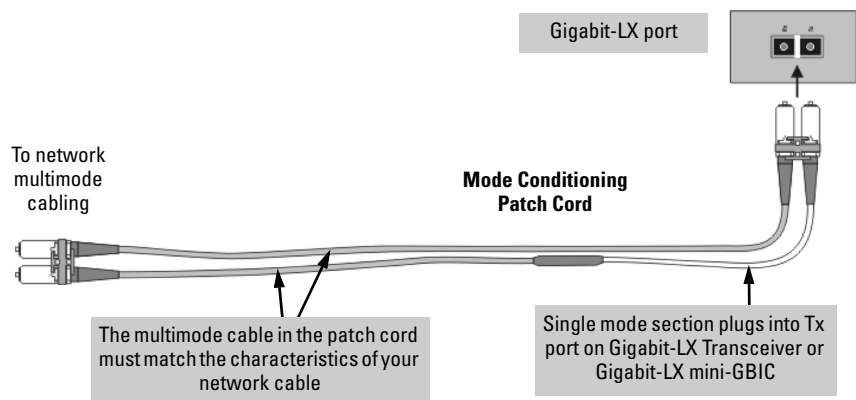
Make sure you purchase a patch cord that has appropriate connectors on each end, and has multimode fibers that match the characteristics of the multimode fiber in your network. Most important, the core diameter of the multimode patch cord must match the core diameter of the multimode cable infrastructure (either 50 or 62.5 microns).

Twisted-Pair Cable/Connector Pin-Outs

Auto-MDIX Feature: The 10/100/1000-T ports support the IEEE 802.3ab standard, which includes the "Auto MDI/MDI-X" feature. In the default configuration, "Auto", the ports on the HP 2920 Switches all automatically detect the type of port on the connected device and operate as either an MDI or MDI-X port, whichever is appropriate. So for any connection, a straight-through twisted-pair cable can be used -- *you no longer have to use crossover cables*, although crossover cables can also be used for any of the connections.

If you connect an HP 2920 Switch twisted-pair port to another switch or hub, which typically have MDI-X ports, the 2920 port automatically operates as an MDI port. If you connect it to an end node, such as a server or PC, which typically have MDI ports, the HP 2920 switch port operates as an MDI-X port. In all cases, you can use standard straight-through cables or crossover cables.

If you happen to use a correctly wired crossover cable, though, the switch will still be able to automatically detect the MDI/MDI-X operation and link correctly to the connected device.

Other Wiring Rules:

- All twisted-pair wires used for 10 Mbps, and 100 Mbps operation must be twisted through the entire length of the cable. The wiring sequence must conform to EIA/TIA 568-B (not USOC). See "Pin Assignments" later in this appendix for a listing of the signals used on each pin.

- For 1000Base-T connections, all four pairs of wires in the cable must be available for data transmission. See "Note on 1000BASE-T Cable Requirements" on page B-2 for more information on 1000Base-T cabling.

- For 10 Mbps connections to the ports, you can use Category 3, 4, or 5 unshielded twisted-pair cable, as supported by the IEEE 802.3 Type 10Base-T standard.

- For 100 Mbps connections to the ports, use 100-ohm Category 5 UTP or STP cable only, as supported by the IEEE 802.3u Type 100Base-TX standard.

- For 1000 Mbps connections, 100-ohm Category 5e or better cabling is recommended.

Straight-Through Twisted-Pair Cable for 10 Mbps or 100 Mbps Network Connections

Because of the HP Auto-MDIX operation of the 10/100 ports on the switch, for all network connections, to PCs, servers or other end nodes, or to hubs or other switches, you can use straight-through cables.

If any of these ports are given a fixed configuration, for example 100 Mbps/ Full Duplex, the ports operate as MDI-X ports, and straight-through cables must be then used for connections to PC NICs and other MDI ports.

Cable Diagram
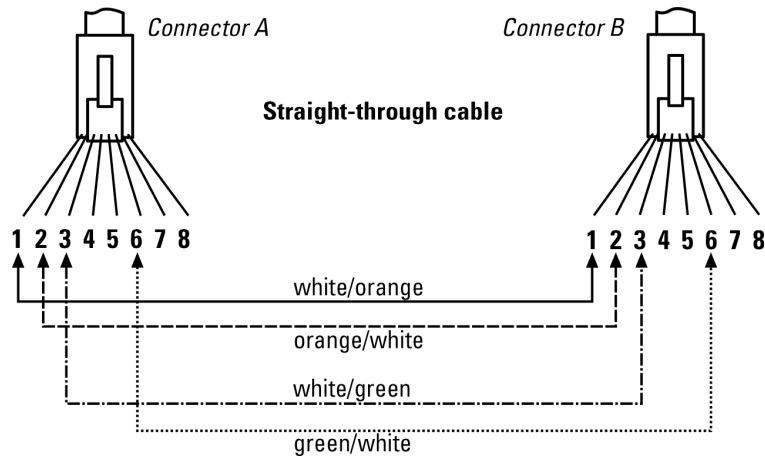
Note	
N o t e	Pins 1 and 2 on connector "A" *must* be wired as a twisted pair to pins 1 and 2 on connector "B".

Pins 3 and 6 on connector "A" *must* be wired as a twisted pair to pins 3 and 6 on connector "B".

Pins 4, 5, 7, and 8 are not used in this application, although they may be wired in the cable.

Pin Assignments

Switch End (MDI-X)			Computer, Transceiver, or Other End	
Signal	Pins		Pins	Signal
receive +	1	←	1	transmit +
receive -	2	←	2	transmit -
transmit +	3	→	3	receive +
transmit -	6	→	6	receive -

Crossover Twisted-Pair Cable for 10 Mbps or 100 Mbps Network Connection

The HP Auto-MDIX operation of the 10/100 ports on the switch also allows you to use crossover cables for all network connections, to PCs, servers or other end nodes, or to hubs or other switches.

If any of these ports are given a fixed configuration, for example 100 Mbps/ Full Duplex, the ports operate as MDI-X ports, and crossover cables *must* be then used for connections to hubs or switches or other MDI-X network devices.

Cable Diagram
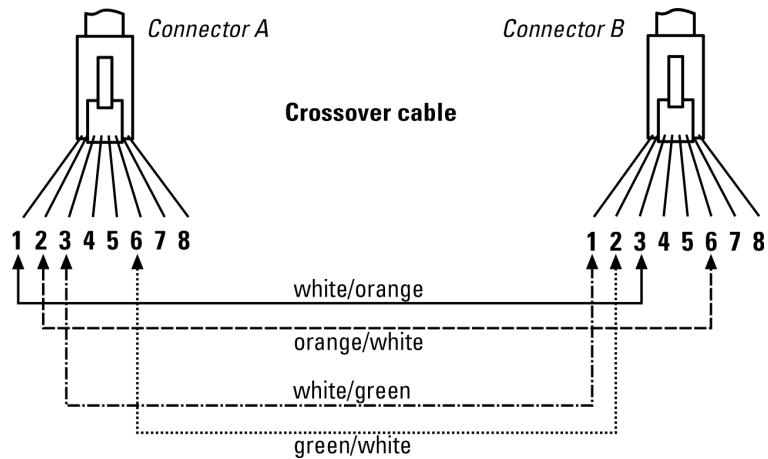
Note   Pins 1 and 2 on connector "A" *must* be wired as a twisted pair to pins 3 and 6 on connector "B".
Pins 3 and 6 on connector "A" *must* be wired as a twisted pair to pins 1 and 2 on connector "B".
Pins 4, 5, 7, and 8 are not used in this application, although they may be wired in the cable.

Pin Assignments

Switch End (MDI-X)		Hub or Switch Port, or Other MDI-X Port End	
Signal	**Pins**	**Pins**	**Signal**
receive +	1	6	transmit -
receive -	2	3	transmit +
transmit +	3	2	receive -
transmit -	6	1	receive +

Straight-Through Twisted-Pair Cable for 1000 Mbps Network Connections

1000Base-T connections require that all four pairs or wires be connected.

Cable Diagram
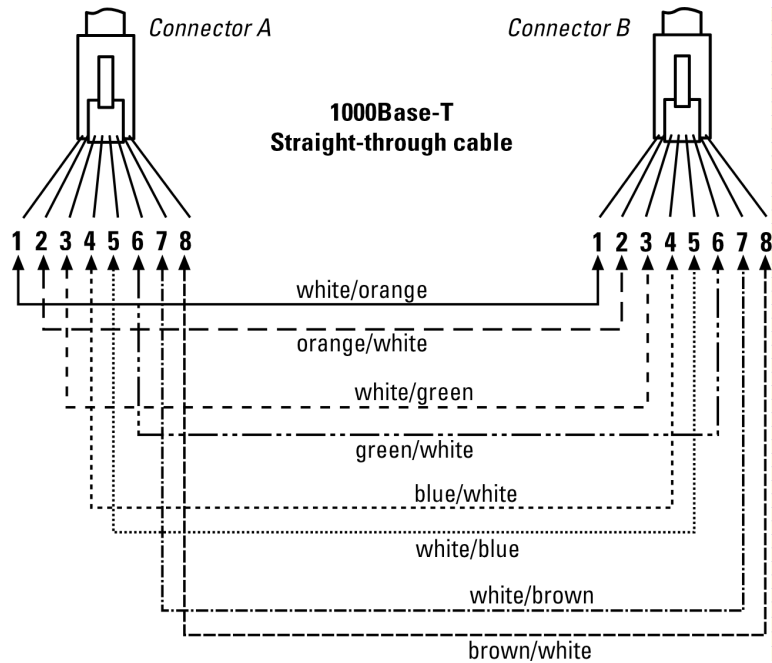
Note

Pins 1 and 2 on connector "A" *must* be wired as a twisted pair to pins 1 and 2 on connector "B".

Pins 3 and 6 on connector "A" *must* be wired as a twisted pair to pins 3 and 6 on connector "B".

Pins 4 and 5 on connector "A" *must* be wired as a twisted pair to pins 4 and 5 on connector "B".

Pins 7 and 8 on connector "A" *must* be wired as a twisted pair to pins 7 and 8 on connector "B".

Pin Assignments

For 1000Base-T operation, all four pairs of wires are used for both transmit and receive.

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