Chapter 6
Hardware Overview

This chapter provides a hardware overview of the HP ProCurve 9308M, 9304M, and 6308M-SX routing switches, and the HP ProCurve 6208M-SX switch.

- For information about specific hardware standards and specifications, see “Standards and Specifications” on page E-1.
- For a detailed summary and description of software features, see “Software Overview” on page 5-1.

The 6208M-SX switch provides support for Layer 2 switching within one platform. The 6208M-SX routing switch provides both Layer 2 switching and Layer 3 routing in a single device.

The 9308M and 9304M also provide Layer 2 switching and Layer 3 routing in a single device and support hardware-based Layer 2/3/4 switching and multi-protocol routing on a single, chassis-based platform.

Chassis Devices

The 9308M and 9304M routing switches provide second generation, hardware-based Layer 2/3/4 switching and multi-protocol routing on a single, chassis-based platform, as shown in Figure 6.1 and Figure 6.13, respectively.

Enterprises and Internet service providers (ISPs) can use these routing switches to build very high-performance, end-to-end packet networks that provide the Quality of Service (QoS) needed to support delay-sensitive traffic. Designed for use in collapsed backbone data centers, server farms, and wiring closets, the 9304M and 9308M deliver high-density Gigabit Ethernet ports and 10/100 Mbps ports and provides performance of up to 100,000,000 packets per second.

Chassis Modules

Each slot of the 9308M and 9304M can be populated by either a switch module or a management module. All non-management modules (those without a serial management port), are referred to as ***switch*** modules.

Each system requires at least one ***management module***. Management modules are available with 10/100 Mbps, 100 Mbps fiber ports or Gigabit Ethernet ports and provide a serial port for console access. Management modules also provide additional port density to the system. The management module can be installed within any slot.

For added redundancy and reliability, you can install two Redundant Management modules in a chassis. One of the Redundant Management modules is the active module while the other waits in standby mode to assume operation if the active module becomes unavailable. See “Redundant Management Module” on page 6-11 and “Using Redundant Management Modules” on page 3-1 for more information.

The HP 9304M and 9308M can be populated with any of the following modules:

- Redundant Management modules
  - J4845A HP ProCurve 9300 GigLX Redundant Management Module (8-port) (Figure 6.2)
  - J4846A HP ProCurve 9300 GigSX Redundant Management Module (8-port) (Figure 6.3)
  - J4847A HP ProCurve 9300 Redundant Management Module (0-port) (Figure 6.4)
- Management modules
  - J4141A HP ProCurve 9300 10/100 Management Module (16-port) (Figure 6.5)
  - J4144A HP ProCurve 9300 Gigabit SX Management Module (8-port) (Figure 6.6)
  - J4146A HP ProCurve 9300 Gigabit 4LX/4SX Management Module (8-port) (Figure 6.7)
- Non-Management modules
  - J4140A HP ProCurve 9300 10/100 Module (24-port) (Figure 6.8)
  - J4142A HP ProCurve 9300 100Base FX Module (24-port MT-RJ) (Figure 6.9)
  - J4143A HP ProCurve 9300 Gigabit SX Module (8-port) (Figure 6.10)
  - J4145A HP ProCurve 9300 Gigabit 4LX/4SX Module (8-port) (Figure 6.11)
  - J4844A HP ProCurve 9300 GigLX Module (8-port) (Figure 6.12)

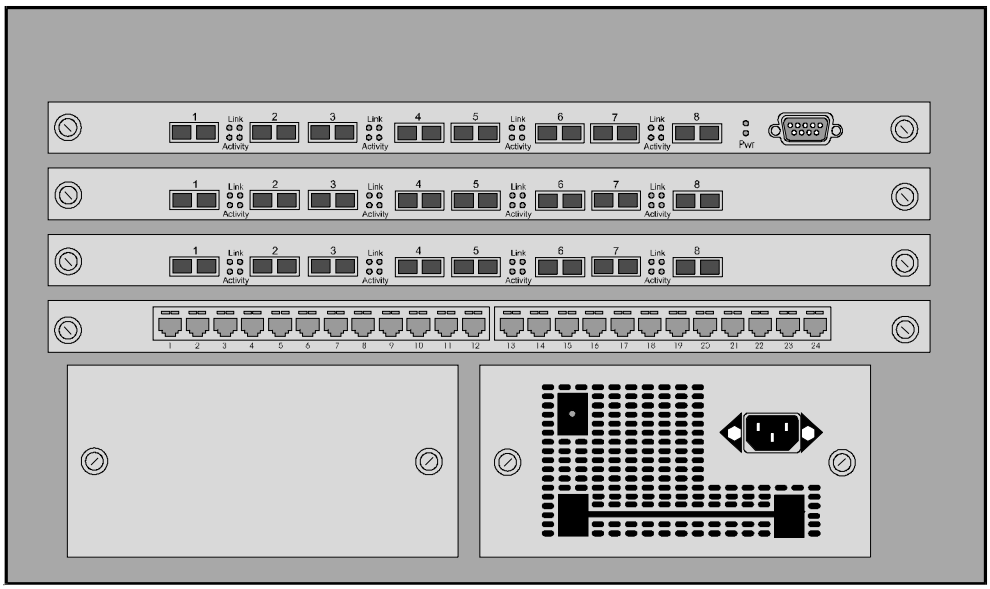

Figure 6.1 Example of an HP 9304M Routing Switch (4-slot)

Figure 6.2 J4845A HP ProCurve 9300 GigLX Redundant Management Module (8-port)

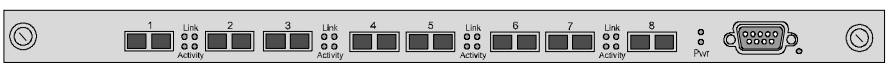

Figure 6.3 J4846A HP ProCurve 9300 GigSX Redundant Management Module (8-port)

Figure 6.4 J4847A HP ProCurve 9300 Redundant Management Module (0-port)

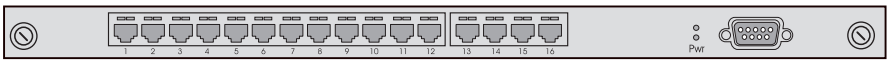

Figure 6.5 J4141A HP ProCurve 9300 10/100 Management Module (16-port)

Figure 6.6 J4144A HP ProCurve 1000BaseSX Management Module (8-port)

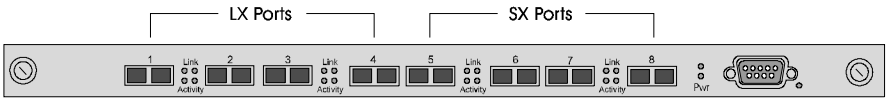

Figure 6.7 J4146A HP ProCurve 1000Base 4LX/4SX Management Module (8-port)

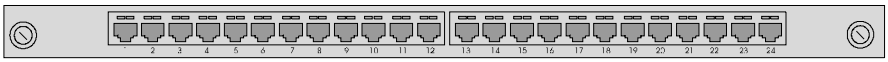

Figure 6.8 J4140A HP ProCurve 9300 10/100 Module (24-port)

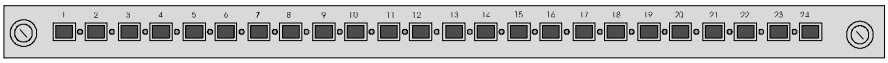

Figure 6.9 J4142A HP ProCurve 9300 100Base FX Module (24-port MT-RJ)

Figure 6.10 J4143A HP ProCurve 9300 Gigabit SX Module (8-port)

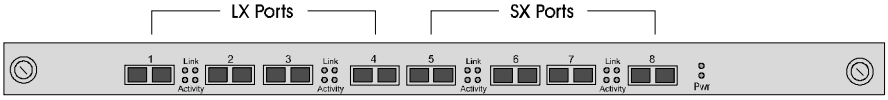

Figure 6.11 J4145A HP ProCurve 9300 Gigabit 4LX/4SX Module (8-port)

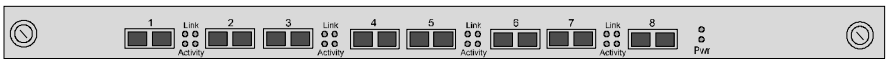

Figure 6.12 J4844A HP ProCurve 9300 GigLX Module (8-port)

NOTE: All 10/100 ports are auto-sensing and auto-negotiating for easy deployment into existing network topologies. Gigabit Ethernet interfaces are available in both multi-mode 1000BaseSX and single-mode/multi-mode 1000BaseLX.

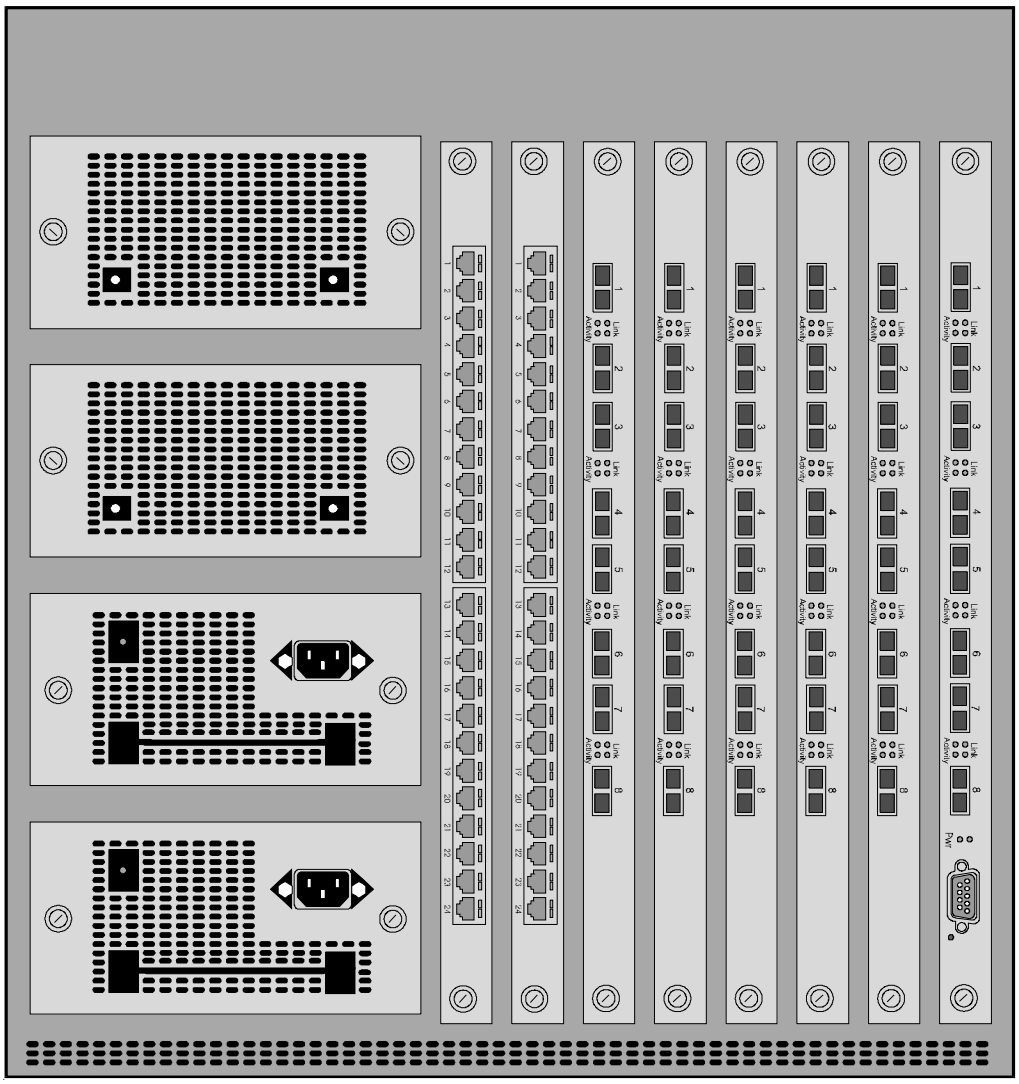

Figure 6.13 Example of a HP 9308M Routing Switch (8-slot)

Fixed-Port Switch 6208M-SX and Routing Switch 6308M-SX

Figure 6.14 shows the 6308M-SX. Figure 6.15 shows the 6208M-SX. Each device provides a serial port for CLI management and eight 100Mbps SX fiber ports for connection to Gigabit Ethernet links.

The 6308M-SX routing switch provides both Layer 2 switching and Layer 3 routing in a single device and supports all of the most popular standards-based protocols—IP, IP/RIP, IPX, OSPF, BGP4, and AppleTalk. HP routing switches also support two IP multicasting protocols—Distance Vector Multicast Routing Protocol (DVMRP) and Protocol Independent Management (PIM). The routing switches also support path redundancy for hosts within a network provided by the Standby Router Protocol (SRP).

6308M-SX routing switches can be concentrated in a data center to provide additional port density for very high-performance, centralized routing. A stack of 6308M-SX routing switches can provide connections to routers, switches, and servers.

The 6208M-SX switch provides support for Layer 2 and Layer 3 switching within one platform.

The 6208M-SX switch can be used to interconnect a stack of backbone switches for faster switching and access over Gigabit links. This switch also can be stacked with other 6208M-SX switches in a network center to provide Gigabit link connections to switches and server farms through the riser.

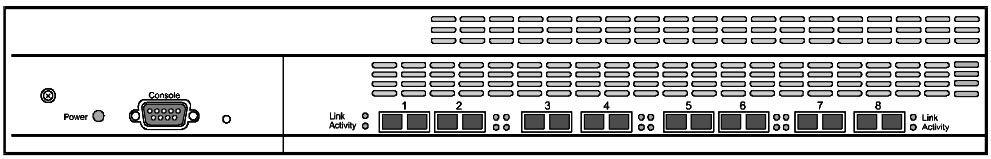

Figure 6.14 HP ProCurve Routing Switch 6308M-SX

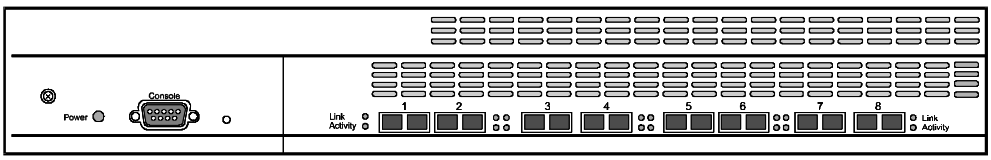

Figure 6.15 HP ProCurve Switch 6208M-SX

System Architecture

Chassis Architecture

Built on a fully non-blocking architecture, the chassis platform provides switching capacity in the core and on each interface module of up to 128 Gbps for the 9304M and 256 Gbps for the 9308M.

The chassis core consists of a backplane and crosspoint switching fabric that supports four interfaces modules on the 9304M. The 9308M supports eight interface modules.

Each interface module utilizes a high bandwidth, shared memory switching fabric that switches up to 32 Gbps of bandwidth. This local switching fabric houses the forwarding engines and includes Application Specific Integrated Circuits (ASICs) that provide packet switching functions such as priority handling. Each interface module also contains ASICs that perform high speed Layer 2, Layer 3, and Layer 4 lookups and forwarding, including IP sub-net look ups and packet modifications of IP and IPX packets. Additionally, each interface module has an 8 Gbps full-duplex data path to the backplane that provides separate priority queues for each module destination.

Fixed-Port Architecture

Layer 2 Architecture

When a packet arrives at an HP 6208M-SX switch, a search for the MAC destination address is initiated. If the MAC destination address is found, the packet's priority is determined. The packet is then forwarded to the appropriate output port.

Packets that are not located in the address table are forwarded to all other switch ports unless VLANs are operating on the switch. If the switch is operating with VLANs, then the packet is forwarded only to other ports within its VLAN.

If the source address of the packet received at the switch is not resident in its address table, or if the source port of the packet has changed, both the source address and its source port will be programmed into the address table.

Layer 3 Architecture

When a packet arrives at an HP 9304M, 9308M, or 6308M-SX routing switch, an address lookup is initiated.

IP Version 4 Packets

If the IP address is located, then the device performs the following Layer 3 IP operations on the IP packet:

- Decrements the TTL value.
- Checks to see if TTL value is greater than zero. If so, the packet will be forwarded.
- Performs destination MAC address substitution of the next hop router or end station. The source MAC address will be replaced by the MAC address of the interface.
- Updates the header checksum.

Once Layer 3 operations are completed, the packet's priority is determined, and it is placed in the appropriate buffer for forwarding to the target output port.

IPX Packets

When an IPX packet is received, the frame type is determined. When the incoming and outgoing frame types are Ethernet 802.2 or 802.3, the device will perform hardware forwarding:

- If the destination network number is an internal or remote network number.
- If the destination network number is an internal or remote network number, the system will provide network assistance.
- If the frame type is Ethernet II or Ethernet SNAP, the packet is sent directly to the CPU. The CPU will increment the transport control count and forward it to its target output port.

Other Protocol Packets

Protocols not supported by the routing switches will be switched at Layer 2.

Physical View

This section describes the external features of the HP 9304M, 9308M, 6308M-SX, and 6208M-SX.

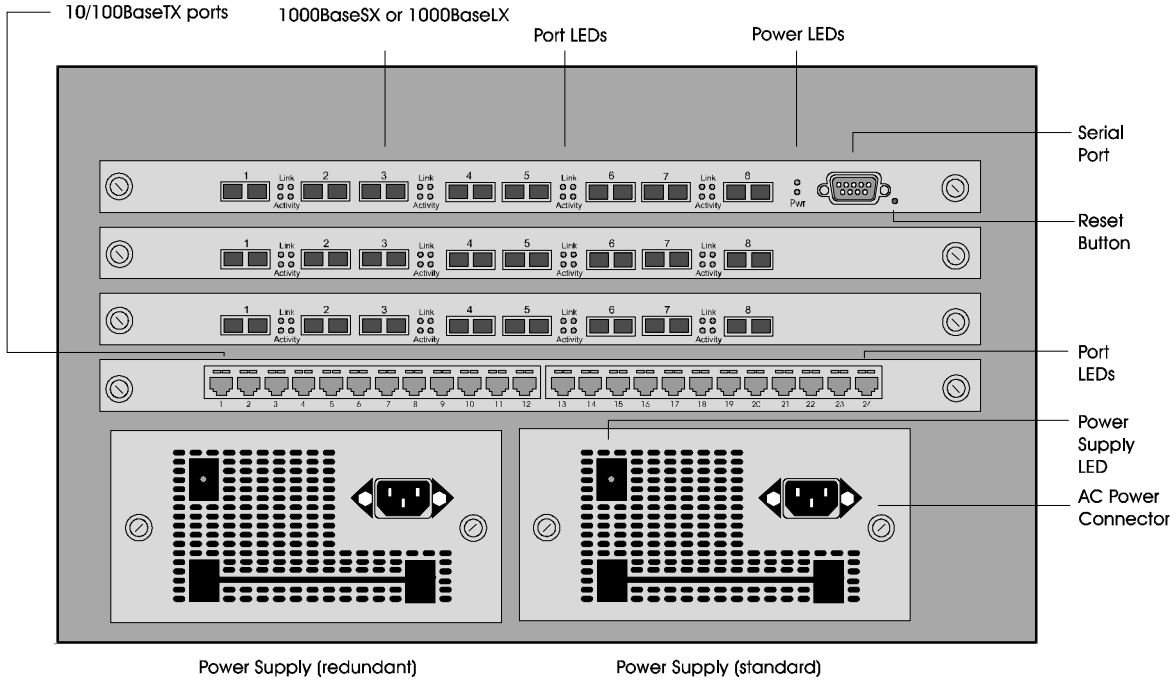

Figure 6.16 Example front panel of an HP 9304M routing switch

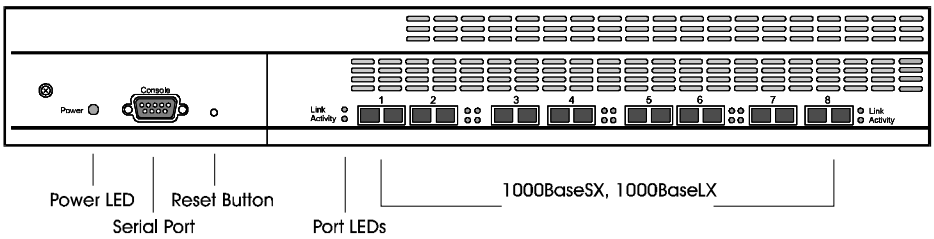

Figure 6.17 Front panel of an HP ProCurve Routing Switch 6308M-SX

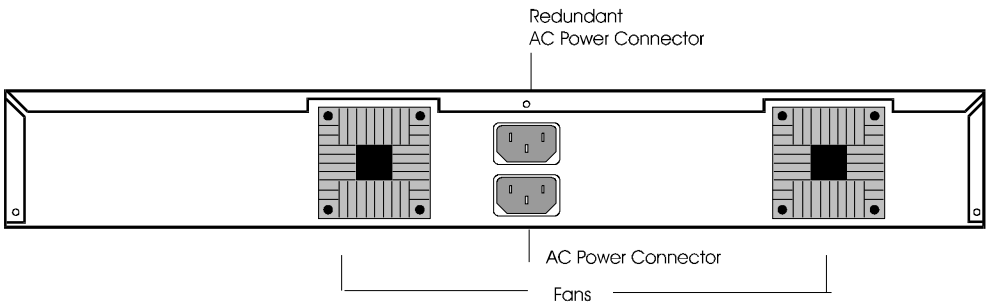

Figure 6.18 Rear panel of an HP ProCurve 6208M-SX Switch or 6308M-SX Routing Switch

NOTE: The rear panel of chassis systems, HP 9304M and 9308M, provide no network or power connections and therefore are not shown.

Slot and Port Numbers

The port numbers on all fixed-port and chassis-based systems are labeled on the hardware. However, the method you use to enter or select a port number differs depending on whether you are managing a fixed-port device or a chassis-based device.

Fixed-Port Devices

To specify a port number in the software, enter or select the number associated with the port on the device's front panel. For example, to assign a name to port 8 on a fixed-port device, enter the following CLI commands:

```
HP6308(config)# interface e 8
HP6308(config-if-8)# port-name pdtmarketing
```

Syntax: interface ethernet <port-number>

Syntax: port-name <string>

Chassis Devices

The port numbers on the modules in chassis-based devices are labeled, but the slot numbers are not labeled.

- Slots on the HP 9304M are numbered 1 – 4, from top to bottom.
- Slots on the HP 9308M are numbered 1 – 8, from left to right.

You can place the management module in any slot. The slot numbers are absolute and do not change based on the position of the management module.

To specify a port on a chassis-based system, enter the slot number, a forward slash (/), and the number associated with the port on the device's front panel. For example, to assign a name to port 8 on the module installed in chassis slot 2, enter the following commands:

```
HP9300(config)# interface e 2/8
HP9300(config-if-2/8)# port-name pdtmarketing
```

Syntax: interface ethernet <slot/port-num>

Syntax: port-name <string>

NOTE: The fixed-port devices do not contain separate slots and thus do not use slot numbers.

AC Power Connector

The AC power connectors are located at the rear of the fixed-port devices. Because a redundant supply is installed, the rear panel contains two AC connectors.

On chassis devices, the power supplies are accessible from the front of the chassis, and the power supply connector is embedded within the power supply.

Buffering

Fixed-port devices provide a pool of 2 Megabytes (MB) of buffering memory for their ports. Buffering memory for each chassis module is also 2 MB.

Fans

The 6308M-SX routing switch and 6208M-SX switch come standard with two fans to provide additional cooling for the internal components of the device.

The fixed-port devices, the HP 9208M-SX and 9308M-SX, come standard with four fans. The HP 9304M also comes standard with four fans. The 9308M comes standard with six fans.

LEDs

Each device is equipped with LEDs that denote port and power supply status. The tables below reflect the different port and expansion module port states.

Fixed-Port Devices

The 9208M-SX and 9308M-SX devices come equipped with three LEDs per Ethernet port, as highlighted in Table 6.1 below. Gigabit Ethernet ports have two LED indicators, as defined in Table 6.2.

Chassis Devices

Chassis support two different modules with two different LED indicator types, Ethernet/Fast Ethernet and Gigabit Ethernet. Ethernet modules have two port LED indicators, as defined in Table 6.2. LEDs for Gigabit Ethernet ports are defined in Table 6.3.

Table 6.1: Port LED indicators for a fixed-port 10BaseT/100BaseTX system

LED	Position	State	Meaning
FDX/HDX	Top	On	The port is operating at full-duplex.
		Off	The port is operating at half-duplex.
100	Middle	On	The port is operating at 100 Mbps.
		Off	The port is not operating at 100 Mbps.
Link/Act	Bottom	On	Port is connected.
		Off	No port connection exists.
		Blinking	Traffic is being transmitted or received on that port.

Table 6.2: Port LED indicators for 100BaseFX or 1000BaseSX/LX ports

LED	Position	State	Meaning
Link	Top	On	Port is connected.
		Off	No port connection exists.
Activity	Bottom	On	Traffic is being transmitted and received on that port.
		Off	No traffic is being transmitted.
		Blinking	Traffic is being transmitted and received on that port.

Table 6.3: Port LED indicators for 10BaseT/100BaseTX chassis modules

LED	Position	State	Meaning
Link/Activity	Left	On	Port is connected.
		Off	No port connection exists.
		Blinking	Traffic is being transmitted and received on that port.
FDX	Right	On	The port is operating at full-duplex.
		Off	The port is operating at half-duplex.

Ports

The following port types are supported on the HP 9304M, 9308M, 6208M-SX, and 6308M-SX devices.

10BaseT/100BaseTX Ports

The 10BaseT/100BaseTX ports are auto-sensing, auto-negotiating ports with RJ-45 UTP connectors. These ports accept Category 5 Unshielded Twisted Pair (UTP) cables.

See “Connecting Network Devices” on page 2-18 for cabling pinouts and signalling specifics. If you prefer to avoid assembling cables by hand, you can order the proper cables from HP.

100BaseFX Ports

The 100BaseFX ports are equipped with SC connectors and operate at 100 Mbps in full-duplex mode.

1000BaseSX Ports

The 1000BaseSX ports operate in full-duplex mode and are equipped with SC connectors. Multi-mode fiber cabling is supported.

1000BaseLX

The 1000BaseLX ports operate in full-duplex mode and are equipped with SC connectors. Both single-mode fiber (SMF) and multi-mode fiber (MMF) cabling is supported. The 1000BaseLX ports must be connected to another 1000BaseLX port. Connection to a 1000BaseSX port is not supported.

NOTE: 1000BaseSX and 1000BaseLX ports also support auto-negotiation when the auto-gig option is enabled on the system.

NOTE: 1000BaseSX and 1000BaseLX ports operate only at full-duplex.

Port Connectors

100BaseFX, 1000BaseSX, and 1000BaseLX ports come with dual SC connectors.

10/100BaseTX ports come with RJ-45 connectors.

Processors

The HP 9304M, 9308M, 6308M-SX, and 6208M-SX devices come standard with a 240 MHz processor.

Modules

This section describes the modules designed for the 9304M and 9308M routing switches.

Chassis Modules

Chassis modules are available with either 10/100BaseTX ports or Gigabit Ethernet ports:

- 8-port Gigabit Ethernet management module
- 8-port Gigabit Ethernet switch module
- 16-port fiber 100BaseFX switch module
- 16-port 10/100 BaseT/BaseTX Ethernet management module
- 24-port 10/100 BaseT/BaseTX Ethernet switch module

NOTE: The chassis devices support 1000BaseSX and 1000BaseLX ports.

Redundant Management Module

The Redundant Management modules provide increased route capacity for routing switched running Border Gateway Protocol Version 4 (BGP4). In addition, the Redundant Management modules contain a configurable temperature sensor that sends a Syslog message and SNMP trap if the temperature on the module exceeds a specified warning level. The temperature sensor also can shut the module down automatically to prevent damage.

You can use one or two Redundant Management modules in a chassis device. Using two Redundant Management modules adds fault protection against system outage. The two modules work together as active and standby management modules. If the active module becomes unavailable, the standby module automatically takes over system operation.

For more information and complete configuration and management information, see “Using Redundant Management Modules” on page 3-1.

AC Power Supply

The fixed-port 6208M-SX switch and 6308M-SX routing switch are equipped with an autoranging 100-250 VAC power supply rated at 5 – 2.5A and 50 – 60 Hz.

The 9304M and 9308M routing switches are equipped with an autoranging 100 – 120/200 – 240 VAC power supply rated at 8A/4A and 50 – 60 Hz.

Standard and Redundant Power Options

The fixed-port devices come standard with two power supplies. Redundant power is an option for the chassis devices. Each power supply can be connected to a separate AC power source for additional power redundancy.

Fixed-Port Devices

These systems come standard with two power supplies.

Chassis Devices

The 9304M comes standard with one power supply, which is enough to provide adequate power for any combination of modules. You can order an additional power supply for redundancy.

The 9308M can contain from one to four power supplies and comes standard with one power supply.

- One supply is adequate for devices with one, two, or three modules (including the management module).
- If the chassis contains four or more modules, you need at least two power supplies. Two power supplies is sufficient if the chassis contains fewer than four 24-port 10/100 FX modules.
- If the chassis contains four or more 24-port 10/100 FX modules, you need at least three power supplies.

You can order additional power supplies over your systems’ minimum requirement for redundancy. If fewer than four power supplies are installed, the empty slots will be covered by safety covers.

Temperature Sensor

The Redundant Management modules for the 9204M and 9308M routing switches contain an on-board temperature sensor. The software reads the sensor based on the chassis poll-time, a configurable parameter that determines how often the software polls the chassis for hardware status information.

The software is configured with a warning temperature (default 45 degrees Celsius) and a shutdown temperature (default 55 degrees Celsius). When the software reads the temperature sensor, if the temperature equals or exceeds the warning or shutdown temperature, the software does the following:

- Warning message – If the temperature of the module reaches the warning value, the software sends a Syslog message to the Syslog buffer and also to the SyslogD server, if configured. In addition, the software sends an SNMP trap to the SNMP trap receiver, if you have configured the device to use one.
- Shutdown – If the temperature matches or exceeds the shutdown temperature, the software sends a Syslog message to the Syslog buffer and also to the SyslogD server if configured. The software also sends an SNMP trap to the SNMP trap receiver, if you have configured the device to use one.

If the temperature equals or exceeds the shutdown temperature for five consecutive polls of the temperature by the software, the software shuts down the module to prevent damage.

For more information and configuration information, see “Temperature Sensor” on page 3-14.

Reset Button

The reset button allows you to restart the system. The reset button is recessed to prevent it from being pushed accidentally.

- For chassis systems, the reset button is located to the right of the serial port on the management module as labeled in Figure 6.16.
- On the 9304M and 9308M, the reset button is located to the right of the serial port as labeled in Figure 6.17.

Standards and Specifications

This section lists the hardware and software specifications for the HP ProCurve 9304M, 9308M, and 6308M-SX routing switches and the 6208M-SX switch.

Hardware Specifications

Electrical Specifications

Table 6.4: Electrical specifications

Device	Input Voltage Range	Current Rating	Line Frequency
HP 6208M-SX HP 6308M-SX	100 – 250 VAC Autoranging	5 – 2.5 Amps	50 – 60 Hz
HP 9304M HP 9308M	100 – 120 / 200 – 240 VAC Autoranging	8 / 4 Amps	50 – 60 Hz

Physical Dimensions

Table 6.5: Physical dimensions

Depth	Width	Length (Height)	Weight
15"	17.5"	23"	69.1 lbs. fully populated
15"	17.5"	9"	47.7 lbs. fully populated
16.75"	17.5"	2.75"	18 – 22 lbs.

Operating Environment

- Operating Temperature: 32° – 104° F, 0° – 40° C
- Relative Humidity: 5% – 90%, non-condensing
- Operating Altitude: 0 – 10,000 feet

Storage Environment

- Storage Temperature: -40° – 158° F, -40° – 70° C
- Storage Humidity: 95% maximum, non-condensing
- Storage Altitude: 10,000 feet (3,000 meter) maximum

Electromagnetic Emissions

- FCC Class A, Part 15, Subpart B
- EN 55022A Class A
- VCCI Class A
- EN50082-1

Safety Agency Approvals

- UL 1950
- CSA-C22.2 No. 950 93
- TUV EN 60950, EN 60825

Laser

Class 1 Laser Product

Laser Klasse 1

Complies with IEC 825-2:1993

Software Specifications

This section lists the following information:

- Standards compliance
- RFC support
- Internet drafts support

Standards Compliance

The 9304M, 9308M, and 6308M-SX routing switches and the 6208M-SX switch support the following standards.

NOTE: The routing protocol standards apply only to the routing switches.

- IEEE 802.3, 10BaseT
- IEEE 802.3u, 100BaseTX, 100BaseFX
- 802.3z 1000BaseSX, 1000BaseLX
- 802.3x Flow Control
- 802.1p/q VLAN Tagging
- 802.1d Bridging
- 802.3 Ethernet-like MIB
- Repeater MIB
- Ethernet Interface MIB
- SNMPV1
- SNMP MIB II

RFC Support

The following table lists the RFCs supported by the 9304M, 9308M, and 6308M-SX routing switches and the 6208M-SX switch.

NOTE: Some devices support only a subset of the RFCs. For example, the 6308M-SX switch does not support router-specific RFCs.

Table D.2: RFC Support

RFC Number	Protocol or Standard
768	User Datagram Protocol (UDP)
783	Trivial File Transfer Protocol (TFTP)
791	Internet Protocol (IP)
792	Internet Control Message Protocol (ICMP)
793	Transmission Control Protocol (TCP)
826	Ethernet Address Resolution Protocol (ARP)
854, 855, and 857	Telnet
894	IP over Ethernet frames

Table D.2: RFC Support (Continued)

RFC Number	Protocol or Standard
903	Reverse ARP (RARP)
906	Bootstrap loading using TFTP
919	Broadcast Internet datagrams
920	Domain requirements
922	Broadcast Internet datagrams in the presence of subnets
950	Internet standard subnetting procedure
951	Bootstrap Protocol (BootP)
1027	Proxy ARP
1042	IP datagrams over IEEE 802 networks (for Ethernet)
1058	Route Information Protocol (RIP) version 1
1060	Assigned numbers (where applicable)
1112	Internet Gateway Management Protocol (IGMP)
1122 and 1123	Requirements for Internet hosts (routers)
1141	Incremental updating of the Internet checksum
1155	Structure and Identification of Management Information (SMI)
1157	Simple Network Management Protocol (SNMP) version 1
1212	Concise MIB Definitions
1213	MIB II Definitions
1215	SNMP generic traps
1256	ICMP Router Discovery Protocol (IRDP)
1267	Border Gateway Protocol version 4 (BGP4) MIB
1354	IP Forwarding Table MIB
1398	Ethernet-Like MIB
1493	Bridge MIB (excluding filtering of objects)
1541 and 1542	Dynamic Host Configuration Protocol (DHCP)
1583	Open Shortest Path First (OSPF)
1643	Ethernet Like MIB (incorporates RFC 1398)
1723	RIP version 2
1745	OSPF Interactions
1757	Remote Monitoring (RMON) groups 1, 2, 3, 9
1771	Border Gateway Protocol (BGP) version 4

Table D.2: RFC Support (Continued)

RFC Number	Protocol or Standard
1812	Requirements for IP version 4 routers
1850	Open Shortest Path First (OSPF) version 2 MIB
1997	BGP Communities Attributes
2003	IP Tunneling
2030	Simple Network Time Protocol (SNTP) version 4
2068	HTTP
2138	Remote Authentication Dial In User Server (RADIUS)
2338	Virtual Router Redundancy Protocol (VRRP)

Internet Drafts

In addition to the RFCs listed in “RFC Support” on page 6-14, the routing switches support the following Internet drafts:

- IETF-IDMR-DVMRP version 3.05, obsoletes RFC 1075
- IETF-IDMR-PIM-DM 05 (version 1 format)