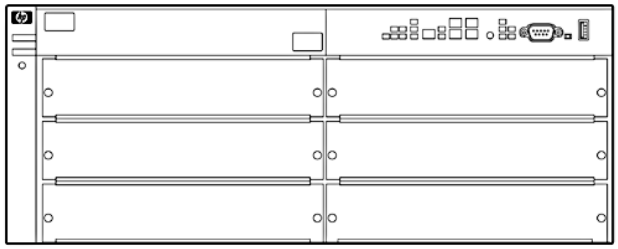
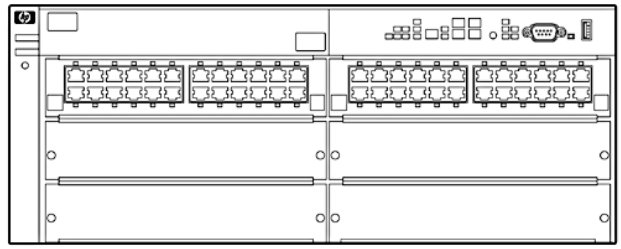
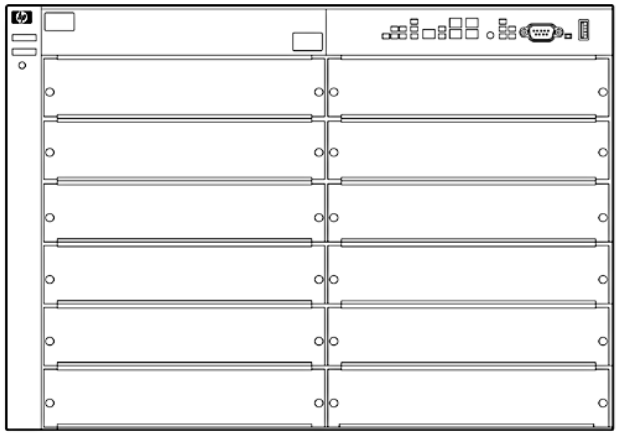
Overview



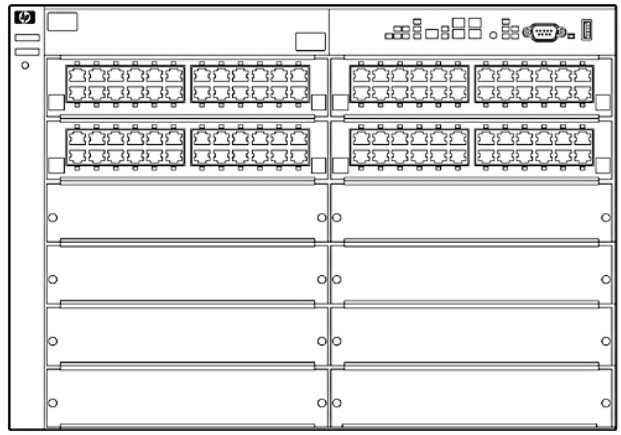
ProCurve Switch 5406zl Intelligent Edge



ProCurve Switch 5406zl-48G Intelligent Edge



ProCurve Switch 5412zl Intelligent Edge



ProCurve Switch 5412zl-96G Intelligent Edge

Models

HP ProCurve Switch 5406zl Intelligent Edge	J8697A
HP ProCurve Switch 5412zl Intelligent Edge	J8698A
HP ProCurve Switch 5406zl-48G Intelligent Edge	J8699A
HP ProCurve Switch 5412zl-96G Intelligent Edge	J8700A
HP ProCurve 5406zl-48G-PoE+ Switch	J9447A
HP ProCurve 5412zl-96G-PoE+ Switch	J9448A

Key Features

- Core, distribution, and advanced access layer
- Layer 2 to 4 and intelligent edge feature set
- Enterprise-class performance and security
- HP ProCurve ONE integrated
- Scalable 10/100/1000 and 10-GbE connectivity

Overview

Introduction

he HP ProCurve Switch 5400zl Series consists of the most advanced intelligent switches in the HP ProCurve Networking product line. The 5400zl series includes 6-slot and 12-slot chassis and associated zl modules and bundles. The foundation for all of these switches is a purpose-built, programmable ProVision ASIC that allows the most demanding networking features, such as Quality of Service (QoS) and security, to be implemented in a scalable yet granular fashion. With 10/100, Gigabit and 10-Gigabit interfaces, integrated PoE+ on 10/100 and 10/100/1000Base-T ports, and a choice of form factors, the 5400zl switches offer excellent investment protection, flexibility, and scalability, as well as ease of deployment, operation, and maintenance.

Features and Benefits

Management

- Remote Intelligent Mirroring: mirrors selected ingress/egress traffic based on ACL, port, MAC address, or VLAN to a local or remote 8200zl/6200yl/5400zl/3500yl switch anywhere on the network
- RMON, XRMON, and sFlow v5: provide advanced monitoring and reporting capabilities for statistics, history, alarms, and events
- IEEE 802.1AB Link Layer Discovery Protocol (LLDP): automated device discovery protocol for easy mapping by network management applications
- Uni-Directional Link Detection (UDLD): monitors cable between two switches and shuts down the ports on both ends if the cable is broken turning the bi-directional link into uni-directional; this prevents network problems such as loops
- Management simplicity: ProCurve-common networking features and CLI implementation (common across ProCurve zl and yl switches)
- Command authorization: leverages RADIUS to link a custom list of CLI commands to individual network administrator's login; also provides an audit trail
- Friendly port names: allow assignment of descriptive names to ports
- Dual flash images: provides independent primary and secondary OS files for backup while upgrading
- Multiple configuration files: multiple configuration files can be stored to the flash image

Connectivity

- NEW IPv6:
  - IPv6 host: the switches can be managed and deployed at the edge of IPv6 networks
  - Dual stack (IPv4/IPv6): provides transition mechanism from IPv4 to IPv6; supports connectivity for both protocols
  - MLD snooping: forwards IPv6 multicast traffic to the appropriate interface; prevents IPv6 multicast traffic from flooding the network
  - IPv6 ACL/QoS: supports ACL and QoS for IPv6 network traffic
  - IPv6 ready: the switch hardware can support IPv6 routing, tunneling, and security; these features will be available when enabled via software update in follow-on releases
- IEEE 802.3af Power over Ethernet: provides up to 15.4 W per port to IEEE 802.3af-compliant PoE powered devices such as IP phones, wireless access points, and security cameras
- NEW IEEE 802.3at Power Over Ethernet Plus: provides up to 30 W per port to IEEE 802.3 for PoE/PoE+ powered devices such as video IP phones, IEEE 802.11n wireless access points, and advanced pan/zoom/tilt security cameras
- Pre-standard PoE support: detects and provides power to pre-standard PoE devices; see list of supported devices in the product FAQ at: www.ProCurve.com
- High-density port connectivity: up to 12 interface module slots and up to 288 wire-speed 10/100/1000 PoE-enabled ports or 48 10-GbE ports per system
- Jumbo frames: on Gigabit and 10-Gb ports, allow high-performance remote backup and disaster-recovery services
- Auto-MDIX: automatically adjusts for straight-through or crossover cables on all 10/100 and 10/100/1000 ports

Performance

Overview

- High-speed/capacity architecture: 691.2 Gbps crossbar switching fabric provides intra- and inter-module switching with 480.3 million pps throughput on the purpose-built ProVision ASICs
- Selectable queue configurations: increase performance by selecting the number of queues and associated memory buffering that best meet the requirements of your network applications

Resiliency and high availability

- Virtual Router Redundancy Protocol (requires Premium License): VRRP allows groups of two routers to dynamically back each other up to create highly available routed environments
- IEEE 802.1s Multiple Spanning Tree Protocol: provides high link availability in multiple VLAN environments by allowing multiple spanning trees; encompasses IEEE 802.1D Spanning Tree Protocol and IEEE 802.1w Rapid Spanning Tree Protocol
- NEW Server-to-switch distributed trunking: allows a server to connect to two switches with one logical trunk that consists of multiple physical connections; enables load-balancing and increases resiliency
- IEEE 802.3ad Link Aggregation Control Protocol (LACP) and ProCurve trunking: support up to 60 trunks, each with up to 8 links (ports) per trunk
- Optional redundant power supply (5400zl series): provides uninterrupted power and allows hot-swapping of the redundant power supplies when installed
- Hot-swappable modules (5400zl series): permits modules, mini-GBICs, and power supplies in a redundant power supply configuration to be added or swapped without interrupting the network
- Sparing simplicity: ProCurve zl-common accessories (interface modules, power supplies)

Layer 2 switching

- IEEE 802.1ad Q-in-Q (requires Premium License): increases the scalability of Ethernet network by providing a hierarchical structure; connects multiple LANs on high-speed campus or metro network
- ProCurve switch meshing: dynamically load-balances across multiple active redundant links to increase available aggregate bandwidth
- VLAN support and tagging: supports the IEEE 802.1Q standard and 2,048 VLANs simultaneously
- IEEE 802.1v protocol VLANs: isolate select non-IPv4 protocols automatically into their own VLANs
- GARP VLAN Registration Protocol: allows automatic learning and dynamic assignment of VLANs

Layer 3 services

- UDP helper function: UDP broadcasts can be directed across router interfaces to specific IP unicast or subnet broadcast addresses and prevent server spoofing for UDP services such as DHCP
- Loopback interface address: defines an address in RIP and OSPF that can always be reachable, improving diagnostic capability

Layer 3 routing

- NEW Static IP routing: provides manually configured routing; includes ECMP capability
- RIP: provides RIPv1 and RIPv2 routing
- OSPF (requires Premium License): includes host-based ECMP to provide link redundancy/scalable bandwidth and NSSA

Security

- Access control lists (ACLs): provide filtering based on the IP field, source/destination IP address/subnet, and source/destination TCP/UDP port number on a per-VLAN or per-port basis
- Multiple user authentication methods:
  - IEEE 802.1X users per port: provides authentication of multiple IEEE 802.1X users per port; prevents user "piggybacking" on another user's IEEE 802.1X authentication
  - Web-based authentication: authenticates from Web browser for clients that do not support IEEE 802.1X supplicant; customized remediation can be processed on an external Web server

Overview

  - MAC-based authentication: client is authenticated with the RADIUS server based on client's MAC address
  - Concurrent IEEE 802.1X, Web, and MAC authentication schemes per port: switch port will accept up to 32 sessions of IEEE 802.1X, Web, and MAC authentications
- Virus throttling: detects traffic patterns typical of WORM-type viruses and either throttles or entirely prevents the ability of the virus to spread across the routed VLANs or bridged interfaces, without requiring external appliances
- DHCP protection: blocks DHCP packets from unauthorized DHCP servers, preventing denial-of-service attacks
- Secure management access: all access methods--CLI, GUI, or MIB--are securely encrypted through SSHv2, SSL, and/or SNMPv3
- USB Secure Autorun (requires HP ProCurve Manager Plus): deploys, diagnoses, and updates switch using USB flash drive; works with secure credential to prevent tampering
- Switch CPU protection: provides automatic protection against malicious network traffic trying to shut down the switch
- ICMP throttling: defeats ICMP denial-of-service attacks by enabling any switch port to automatically throttle ICMP traffic
- Identity-driven ACL: enables implementation of a highly granular and flexible access security policy and VLAN assignment specific to each authenticated network user
- STP BPDU port protection: blocks Bridge Protocol Data Units (BPDUs) on ports that do not require BPDUs, preventing forged BPDU attacks
- Dynamic IP lockdown: works with DHCP protection to block traffic from unauthorized hosts, preventing IP source address spoofing
- Dynamic ARP protection: blocks ARP broadcasts from unauthorized hosts, preventing eavesdropping or theft of network data
- STP Root Guard: protects root bridge from malicious attack or configuration mistakes
- Detection of malicious attacks: monitors 10 types of network traffic and sends a warning when an anomaly that potentially can be caused by malicious attacks is detected
- Port security: allows access only to specified MAC addresses, which can be learned or specified by the administrator
- MAC address lockout: prevents particular configured MAC addresses from connecting to the network
- Source-port filtering: allows only specified ports to communicate with each other
- RADIUS/TACACS+: eases switch management security administration by using a password authentication server
- Secure Shell (SSHv2): encrypts all transmitted data for secure, remote command-line interface (CLI) access over IP networks
- Secure Sockets Layer (SSL): encrypts all HTTP traffic, allowing secure access to the browser-based management GUI in the switch
- Secure FTP: allows secure file transfer to and from the switch; protects against unwanted file downloads or unauthorized copying of switch configuration file
- NEW Management Interface Wizard: CLI-based step-by-step configuration tool to help ensure that management interfaces such as SNMP, telnet, SSH, SSL, Web, and USB are secured to desired level
- Switch management logon security: can require either RADIUS or TACACS+ authentication for secure switch CLI logon
- Security banner: displays a customized security policy when users log in to the switch

Convergence

- IP multicast routing (requires Premium License): includes PIM Sparse and Dense modes to route IP multicast traffic
- IP multicast snooping (data-driven IGMP): automatically prevents flooding of IP multicast traffic
- LLDP-MED (Media Endpoint Discovery): a standard extension of LLDP that stores values for parameters such as QoS and VLAN to automatically configure network devices such as IP phones
- RADIUS VLAN for voice: uses standard RADIUS attribute and LLDP-MED to automatically configure VLAN for IP phones
- PoE allocations: supports multiple methods (automatic, IEEE 802.3af class, LLDP-MED, or user specified) to allocate PoE power for more efficient energy savings

Quality of Service (QoS)

- NEW Advanced classifier-based QoS: classifies traffic using multiple match criteria based on L2/3/4 information; applies QoS policies such as setting priority level and rate limit to selected traffic per port or per VLAN
- Layer 4 prioritization: enables prioritization based on TCP/UDP port numbers
- Traffic prioritization: allows real-time traffic classification into eight priority levels mapped to eight queues

Overview

- Bandwidth shaping:
  - Port-based rate limiting: per-port ingress/egress enforced maximum bandwidth
  - Classifier-based rate limiting: uses ACL to enforce maximum bandwidth for ingress traffic on each port
  - Guaranteed minimum: per-port, per-queue egress-based guaranteed minimum bandwidth
- Class of Service (CoS): sets the IEEE 802.1p priority tag based on IP address, IP Type of Service (ToS), L3 protocol, TCP/UDP port number, source port, and DiffServ

Warranty and support*

- ProCurve Lifetime Warranty: for as long as you own the product, with next-business-day advance replacement (available in most countries)
- Electronic and telephone support: limited electronic and telephone support is available from HP; refer to the HP website at www.procurve.com/support for details on the support provided and the period during which support is available
- Software releases: refer to the HP website at www.procurve.com/support for details on the software releases provided and the period during which software releases are available

* For as long as you own the product, with next-business-day advance replacement (available in most countries). The following hardware products have a five-year hardware warranty for the disk drive and lifetime hardware warranty (for as long as you own the product) for the rest of the module: HP ProCurve ONE Services zl Module, HP ProCurve Threat Management Services zl Module, and HP ProCurve MSM765zl Mobility Controller. The following hardware products and their related series modules have a one-year hardware warranty with extensions available: HP ProCurve Routing Switch 9300m series, HP ProCurve Switch 8100fl series, HP ProCurve Network Access Controller 800, and HP ProCurve DCM Controller. The following hardware products have a one-year hardware warranty with extensions available: HP ProCurve M111 Client Bridge, HP ProCurve MSM3xx-R Access Points, HP ProCurve MSM7xx Mobility and Access Controllers, HP ProCurve RF Manager IDS/IPS Systems, HP ProCurve MSM Power Supplies, HP ProCurve 1-Port Power Injector, HP ProCurve CNMS Appliances, and HP ProCurve MSM317 Access Device. Standalone software, upgrades, or licenses may have a different warranty duration. For details, refer to the ProCurve Software License, Warranty, and Support booklet at: www.procurve.com/warranty.

Technical Specifications

HP ProCurve Switch 5406zl Intelligent Edge (J8697A)	Ports	6 open module slots 1 RS-232C DB-9 console port	
		Maximum ports	Supports a maximum of 144 auto-sensing 10/100/1000 ports or 24 10-GbE ports or 144 mini-GBICs, or a combination
	Power supplies	2 open power supply slots	
	Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)
		Weight	23.55 lb. (10.68 kg)
	Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
		10G module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
		Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM
	Mounting	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	
	Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)
		Throughput	up to 240.2 million pps
		Routing/Switching capacity	322.8 Gbps
		Switch fabric speed	345.6 Gbps
		Routing table size	10,000 entries
	Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed
		Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
		Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
		Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
		Altitude	up to 10000 ft. (3 km)
		Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
	Electrical characteristics	Achieved Miercom Certified Green Award*	
		* Products within this series have achieved sufficient scores in each of the rated criteria to achieve the Miercom Certified Green distinction Award. See the Specifications section of this series for more information.	
		Description	Chassis ships without power supplies. Two power-supply slots available; two different power supplies available. See power-supply products for additional specifications.

	Maximum heat dissipation	2450 BTU/hr (2584 kJ/hr), (max non-PoE); 3700 BTU/hr (3903 kJ/hr) (max using PoE)
	Voltage	100-127 / 200-240 VAC
	Frequency	50 / 60 Hz
	Notes	Power supplies must be ordered separately. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	
Notes	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UE250E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE252E) 3-year, 24x7 SW phone support, software updates (UF786E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR900E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UR901E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR902E) 4-year, 24x7 SW phone support, software updates (UR903E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UR904E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UR905E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR906E) 5-year, 24x7 SW phone support, software updates (UR907E) Refer to the HP website at: www.procurve.com/services for details on the	

service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

Standards and protocols	Device Management	RFC 1591 DNS (client) HTML and telnet management
	General Protocols	IEEE 802.1ad Q-in-Q (Premium License) IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q VLANs IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only) RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
	IP Multicast	RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode (Premium License) RFC 4601 Draft 10 PIM Sparse Mode (Premium License)
	IPv6	RFC 1981 IPv6 Path MTU Discovery RFC 2460 IPv6 Specification RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Remote Operations MIB (Ping only) RFC 3019 MLDv1 MIB

	RFC 3315 DHCPv6 (client only) RFC 3513 IPv6 Addressing Architecture RFC 3596 DNS Extension for IPv6 RFC 3810 MLDv2 (host joins only) RFC 4022 MIB for TCP RFC 4113 MIB for UDP RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication RFC 4253 SSHv6 Transport Layer RFC 4254 SSHv6 Connection RFC 4293 MIB for IP RFC 4419 Key Exchange for SSH RFC 4443 ICMPv6 RFC 4541 IGMP & MLD Snooping Switch RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration
MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 2021 RMONv2 MIB RFC 2096 IP Forwarding Table MIB RFC 2613 SMON MIB RFC 2618 RADIUS Client MIB RFC 2620 RADIUS Accounting MIB RFC 2665 Ethernet-Like-MIB RFC 2668 802.3 MAU MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2787 VRRP MIB RFC 2863 The Interfaces Group MIB RFC 2925 Ping MIB
Network Management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3176 sFlow ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2c/v3 XRMON
OSPF	RFC 2328 OSPFv2 (Premium License) RFC 3101 OSPF NSSA
QoS/Cos	RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF)

		Security	IEEE 802.1X Port Based Network Access Control RFC 1492 TACACS+ Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting
HP ProCurve Switch 5412zl Intelligent Edge (J8698A)	Ports	12 open module slots 1 RS-232C DB-9 console port	
		Maximum ports	Supports a maximum of 288 auto-sensing 10/100/1000 ports or 48 10-GbE ports or 288 mini-GBICs, or a combination
	Power supplies	4 power supply slots	
	Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
		Weight	34.94 lb. (15.85 kg)
	Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
		10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
		Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM
	Mounting	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	
	Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)
		Throughput	up to 480.3 million pps
		Routing/Switching capacity	645.6 Gbps
		Switch fabric speed	691.2 Gbps
		Routing table size	10,000 entries
	Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed
		Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
		Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
		Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
		Altitude	up to 10000 ft. (4.6 km)
		Acoustic	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
	Electrical characteristics	Description	Chassis ships without power supplies. Four power supply slots available; two different power

		supplies available. See power-supply products for additional specifications.
	Maximum heat dissipation	4900 BTU/hr (5169 kJ/hr), (max non-PoE); 7400 BTU/hr (7,807 kJ/hr) (max using PoE)
	Voltage	100-127 / 200-240 VAC
	Frequency	50 / 60 Hz
	Notes	Power supplies must be ordered separately. Two power supplies are required to power the J8698A chassis. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	
Notes	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UE253E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE255E) 3-year, 24x7 SW phone support, software updates (UF788E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR900E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR916E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UR917E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR918E) 4-year, 24x7 SW phone support, software updates (UR919E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UR920E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UR921E)	

		5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR922E) 5-year, 24x7 SW phone support, software updates (UR923E) Refer to the HP website at: www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.
Standards and protocols	Device Management	RFC 1591 DNS (client) HTML and telnet management
	General Protocols	IEEE 802.1ad Q-in-Q (Premium License) IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q VLANs IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only) RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
	IP Multicast	RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode (Premium License) RFC 4601 Draft 10 PIM Sparse Mode (Premium License)
	IPv6	RFC 1981 IPv6 Path MTU Discovery

	RFC 2460 IPv6 Specification RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Remote Operations MIB (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client only) RFC 3513 IPv6 Addressing Architecture RFC 3596 DNS Extension for IPv6 RFC 3810 MLDv2 (host joins only) RFC 4022 MIB for TCP RFC 4113 MIB for UDP RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication RFC 4253 SSHv6 Transport Layer RFC 4254 SSHv6 Connection RFC 4293 MIB for IP RFC 4419 Key Exchange for SSH RFC 4443 ICMPv6 RFC 4541 IGMP & MLD Snooping Switch RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration
MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 2021 RMONv2 MIB RFC 2096 IP Forwarding Table MIB RFC 2613 SMON MIB RFC 2618 RADIUS Client MIB RFC 2620 RADIUS Accounting MIB RFC 2665 Ethernet-Like-MIB RFC 2668 802.3 MAU MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2787 VRRP MIB RFC 2863 The Interfaces Group MIB RFC 2925 Ping MIB
Network Management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3176 sFlow ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2c/v3 XRMON
OSPF	RFC 2328 OSPFv2 (Premium License) RFC 3101 OSPF NSSA

		QoS/Cos	RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF)
		Security	IEEE 802.1X Port Based Network Access Control RFC 1492 TACACS+ Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting
HP ProCurve Switch 5406zl-48G Intelligent Edge (J8699A)	Included accessories		2 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 1 HP ProCurve Switch zl 875W Power Supply (J8712A)
	Ports		4 open module slots 48 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 1 RS-232C DB-9 console port
		Maximum ports	Supports a maximum of 144 auto-sensing 10/100/1000 ports or 16 10-GbE ports or 96 mini-GBICs, or a combination
	Power supplies		includes: 1 x J8712AHP ProCurve Switch zl 875 W Power Supply 1 open power supply slots
	Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)
		Weight	34.26 lb. (15.54 kg)
	Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
		10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
		Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM
	Mounting		Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
	Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)
		Throughput	up to 240.2 million pps
		Routing/Switching capacity	322.8 Gbps
		Switch fabric speed	345.6 Gbps
		Routing table size	10,000 entries
	Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed

	Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
	Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
	Altitude	up to 10000 ft. (4.6 km)
	Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
Electrical characteristics	Description	One J8712A installed. One open power supply slot available; two different power supplies available. See power supply products for additional specifications.
	Maximum heat dissipation	2450 BTU/hr (2584 kJ/hr), (max non-PoE); 3700 BTU/hr (3903 kJ/hr) (max using PoE)
	Voltage	100-127 / 200-240 VAC
	Idle power	166 W
	Frequency	50 / 60 Hz
	Notes	Idle power is the actual power consumption of the device with no ports connected. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	
Notes	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UE250E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E)	

3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE252E)
3-year, 24x7 SW phone support, software updates (UF786E)
Installation with minimum configuration, system-based pricing (U4828E)
Installation with HP-provided configuration, system-based pricing (U4832E)
4-year, 4-hour onsite, 24x7 coverage for hardware (UR901E)
4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR902E)
4-year, 24x7 SW phone support, software updates (UR903E)
5-year, 4-hour onsite, 13x5 coverage for hardware (UR904E)
5-year, 4-hour onsite, 24x7 coverage for hardware (UR905E)
5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR906E)
5-year, 24x7 SW phone support, software updates (UR907E)

Refer to the HP website at: www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

Standards and protocols	Device Management	RFC 1591 DNS (client) HTML and telnet management
	General Protocols	IEEE 802.1ad Q-in-Q (Premium License) IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q VLANs IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only)

	RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
IP Multicast	RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode (Premium License) RFC 4601 Draft 10 PIM Sparse Mode (Premium License)
IPv6	RFC 1981 IPv6 Path MTU Discovery RFC 2460 IPv6 Specification RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Remote Operations MIB (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client only) RFC 3513 IPv6 Addressing Architecture RFC 3596 DNS Extension for IPv6 RFC 3810 MLDv2 (host joins only) RFC 4022 MIB for TCP RFC 4113 MIB for UDP RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication RFC 4253 SSHv6 Transport Layer RFC 4254 SSHv6 Connection RFC 4293 MIB for IP RFC 4419 Key Exchange for SSH RFC 4443 ICMPv6 RFC 4541 IGMP & MLD Snooping Switch RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration
MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 2021 RMONv2 MIB RFC 2096 IP Forwarding Table MIB RFC 2613 SMON MIB RFC 2618 RADIUS Client MIB RFC 2620 RADIUS Accounting MIB RFC 2665 Ethernet-Like-MIB RFC 2668 802.3 MAU MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2787 VRRP MIB RFC 2863 The Interfaces Group MIB RFC 2925 Ping MIB
Network Management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP)

			RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3176 sFlow ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2c/v3 XRMON
		OSPF	RFC 2328 OSPFv2 (Premium License) RFC 3101 OSPF NSSA
		QoS/Cos	RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF)
		Security	IEEE 802.1X Port Based Network Access Control RFC 1492 TACACS+ Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting
HP ProCurve Switch 5412zl-96G Intelligent Edge (J8700A)	Included accessories		4 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 2 HP ProCurve Switch zl 875W Power Supply (J8712A)
	Ports		8 open module slots 96 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 1 RS-232C DB-9 console port
		Maximum ports	Supports a maximum of 288 auto-sensing 10/100/1000 ports or 32 10-GbE ports or 192 mini-GBICs, or a combination
	Power supplies		includes: 2 x J8712AHP ProCurve Switch zl 875 W Power Supply 2 power supply slots
	Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
		Weight	58 lb. (26.31 kg)
	Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
		10G Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
		Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM
	Mounting		Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
	Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)

	Throughput	up to 480.3 million pps
	Routing/Switching capacity	645.6 Gbps
	Switch fabric speed	691.2 Gbps
	Routing table size	10,000 entries
Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed
	Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
	Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
	Altitude	up to 10000 ft. (4.6 km)
	Acoustic	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
Electrical characteristics	Description	Two J8712A installed. Two open power supply slots available; three different power supplies available. See power supply products for additional specifications.
	Maximum heat dissipation	4900 BTU/hr (5169 kJ/hr), (max non-PoE); 7400 BTU/hr (7,807 kJ/hr) (max using PoE)
	Voltage	100-127 / 200-240 VAC
	Idle power	299 W
	Frequency	50 / 60 Hz
	Notes	Idle power is the actual power consumption of the device with no ports connected. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3

Management		HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)
Notes		When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.
Services		3-year, 4-hour onsite, 13x5 coverage for hardware (UE253E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE255E) 3-year, 24x7 SW phone support, software updates (UF788E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR916E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UR917E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR918E) 4-year, 24x7 SW phone support, software updates (UR919E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UR920E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UR921E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR922E) 5-year, 24x7 SW phone support, software updates (UR923E) Refer to the HP website at: www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.
Standards and protocols	Device Management	RFC 1591 DNS (client) HTML and telnet management
	General Protocols	IEEE 802.1ad Q-in-Q (Premium License) IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q VLANs IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol

	RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only) RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
IP Multicast	RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode (Premium License) RFC 4601 Draft 10 PIM Sparse Mode (Premium License)
IPv6	RFC 1981 IPv6 Path MTU Discovery RFC 2460 IPv6 Specification RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Remote Operations MIB (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client only) RFC 3513 IPv6 Addressing Architecture RFC 3596 DNS Extension for IPv6 RFC 3810 MLDv2 (host joins only) RFC 4022 MIB for TCP RFC 4113 MIB for UDP RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication RFC 4253 SSHv6 Transport Layer RFC 4254 SSHv6 Connection RFC 4293 MIB for IP RFC 4419 Key Exchange for SSH RFC 4443 ICMPv6 RFC 4541 IGMP & MLD Snooping Switch RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration
MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 2021 RMONv2 MIB RFC 2096 IP Forwarding Table MIB RFC 2613 SMON MIB RFC 2618 RADIUS Client MIB

		RFC 2620 RADIUS Accounting MIB RFC 2665 Ethernet-Like-MIB RFC 2668 802.3 MAU MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2787 VRRP MIB RFC 2863 The Interfaces Group MIB RFC 2925 Ping MIB
	Network Management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3176 sFlow ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2c/v3 XRMON
	OSPF	RFC 2328 OSPFv2 (Premium License) RFC 3101 OSPF NSSA
	QoS/Cos	RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF)
	Security	IEEE 802.1X Port Based Network Access Control RFC 1492 TACACS+ Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting
HP ProCurve 5406zl-48G-PoE+ Switch (J9447A)	Included accessories	1 HP ProCurve 24-Port 10/100/1000 PoE+ zl Module (J9307A) 1 HP ProCurve 20-Port 10/100/1000 PoE+ and 4-Port Mini-GBIC zl Module (J9308A) 1 HP ProCurve 1500W PoE+ zl Power Supply (J9306A)
	Ports	4 open module slots 44 RJ-45 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 4 open mini-GBIC (SFP) slots 1 RS-232C DB-9 console port
	Maximum ports	Supports a maximum of 144 auto-sensing 10/100/1000 ports or 16 10-GbE ports or 96 mini-GBICs, or a combination
	Power supplies	includes: 1 x J9306AHP ProCurve 1500W PoE+ zl Power Supply 1 power-supply slots

Technical Specifications

Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)
	Weight	34.9 lb. (15.83 kg)
Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
	10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
	Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM
Mounting	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	
Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)
	Throughput	up to 240.2 million pps
	Routing/Switching capacity	322.8 Gbps
	Switch fabric speed	345.6 Gbps
	Routing table size	10,000 entries
Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed
	Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
	Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
	Altitude	up to 10000 ft. (4.6 km)
	Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
Electrical characteristics	Description	One J9306A installed. One open power supply slot available; three different power supplies available. See power supply products for additional specifications.
	Maximum heat dissipation	2450 BTU/hr (2584.75 kJ/hr), (max. non-PoE); 3700 BTU/hr (3903 kJ/hr) (max. using PoE)
	Voltage	100-127 / 200-240 VAC
	Idle power	215 W
	Frequency	50 / 60 Hz
	Notes	Idle power is the actual power consumption of the device with no ports connected. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	

Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	
Notes	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UE250E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE252E) 3-year, 24x7 SW phone support, software updates (UF786E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR900E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UR901E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR902E) 4-year, 24x7 SW phone support, software updates (UR903E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UR904E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UR905E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR906E) 5-year, 24x7 SW phone support, software updates (UR907E) Refer to the HP website at: www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	
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	IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only) RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
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IPv6	RFC 1981 IPv6 Path MTU Discovery RFC 2460 IPv6 Specification RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Remote Operations MIB (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client only) RFC 3513 IPv6 Addressing Architecture RFC 3596 DNS Extension for IPv6 RFC 3810 MLDv2 (host joins only) RFC 4022 MIB for TCP RFC 4113 MIB for UDP RFC 4251 SSHv6 Architecture RFC 4252 SSHv6 Authentication RFC 4253 SSHv6 Transport Layer

		RFC 4254 SSHv6 Connection RFC 4293 MIB for IP RFC 4419 Key Exchange for SSH RFC 4443 ICMPv6 RFC 4541 IGMP & MLD Snooping Switch RFC 4861 IPv6 Neighbor Discovery RFC 4862 IPv6 Stateless Address Auto-configuration
	MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 2021 RMONv2 MIB RFC 2096 IP Forwarding Table MIB RFC 2613 SMON MIB RFC 2618 RADIUS Client MIB RFC 2620 RADIUS Accounting MIB RFC 2665 Ethernet-Like-MIB RFC 2668 802.3 MAU MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2787 VRRP MIB RFC 2863 The Interfaces Group MIB RFC 2925 Ping MIB
	Network Management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3176 sFlow ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2c/v3 XRMON
	OSPF	RFC 2328 OSPFv2 (Premium License) RFC 3101 OSPF NSSA
	QoS/Cos	RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF)
	Security	IEEE 802.1X Port Based Network Access Control RFC 1492 TACACS+ Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting
HP ProCurve 5412zl-96G-PoE+ Switch (J9448A)	Included accessories	3 HP ProCurve 24-Port 10/100/1000 PoE+ zl Module (J9307A) 1 HP ProCurve 20-Port 10/100/1000 PoE+ and 4-Port Mini-GBIC zl Module (J9308A)

	2 HP ProCurve 1500W PoE+ zl Power Supply (J9306A)	
Ports	8 open module slots 92 RJ-45 auto-sensing 10/100/1000 ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 4 open mini-GBIC (SFP) slots 1 RS-232C DB-9 console port	
	Maximum ports	Supports a maximum of 288 auto-sensing 10/100/1000 ports or 32 10-GbE ports or 192 mini-GBICs, or a combination
Power supplies	includes: 2 x J9306AHP ProCurve 1500W PoE+ zl Power Supply 2 power-supply slots	
Physical characteristics	Dimensions	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
	Weight	58.18 lb. (26.39 kg)
Memory and processor	Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
	10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM
	Management Module	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM
Mounting	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	
Performance	Latency	1000 Mb: < 3.7 μs (FIFO 64-byte packets); 10 Gbps: < 2.1 μs (FIFO 64-byte packets)
	Throughput	up to 480.3 million pps
	Routing/Switching capacity	645.6 Gbps
	Switch fabric speed	691.2 Gbps
	Routing table size	10,000 entries
Environment	Operating temperature	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed
	Operating relative humidity	15% to 95% @ 131°F (55°C), non-condensing
	Non-operating/ Storage temperature	-40°F to 158°F (-40°C to 70°C)
	Non-operating/ Storage relative humidity	15% to 95% @ 149°F (65°C), non-condensing
	Altitude	up to 10000 ft. (4.6 km)
	Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
Electrical characteristics	Description	Two J9306A installed. Two open power supply

		slots available; three different power supplies available. See power supply products for additional specifications.
	Maximum heat dissipation	4900 BTU/hr (5169.5 kJ/hr), (max. non-PoE); 7400 BTU/hr (7807 kJ/hr) (max. using PoE)
	Voltage	100-127 / 200-240 VAC
	Idle power	312 W
	Frequency	50 / 60 Hz
	Notes	Idle power is the actual power consumption of the device with no ports connected. Heat dissipation does not include heat dissipated by the PoE powered devices themselves.
Safety	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	
Immunity	EN	EN 55024, CISPR 24
	ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD
	Radiated	IEC 61000-4-3; 3 V/m
	EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
	Surge	IEC 61000-4-5; 1 kV/2 kV AC
	Conducted	IEC 61000-4-6; 3 V
	Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz
	Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
	Harmonics	EN 61000-3-2, IEC 61000-3-2
	Flicker	EN 61000-3-3, IEC 61000-3-3
Management	HP ProCurve Manager Plus; HP ProCurve Manager (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	
Notes	When using mini-GBICs with this product, mini-GBICs with revision "B" or later (product number ends with the letter "B" or later, e.g., J4858B, J4859C) are required.	
Services	3-year, 4-hour onsite, 13x5 coverage for hardware (UE253E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (UE255E) 3-year, 24x7 SW phone support, software updates (UF788E) Installation with minimum configuration, system-based pricing (U4828E) Installation with HP-provided configuration, system-based pricing (U4832E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UR916E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UR917E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR918E) 4-year, 24x7 SW phone support, software updates (UR919E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UR920E)	

		5-year, 4-hour onsite, 24x7 coverage for hardware (UR921E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR922E) 5-year, 24x7 SW phone support, software updates (UR923E) Refer to the HP website at: www.procurve.com/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.
Standards and protocols	Device Management	RFC 1591 DNS (client) HTML and telnet management
	General Protocols	IEEE 802.1ad Q-in-Q (Premium License) IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q VLANs IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3af Power over Ethernet IEEE 802.3x Flow Control RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 792 ICMP RFC 793 TCP UDLD (Uni-directional Link Detection) RFC 826 ARP RFC 854 TELNET RFC 868 Time Protocol RFC 951 BOOTP RFC 1058 RIPv1 RFC 1350 TFTP Protocol (revision 2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 2030 Simple Network Time Protocol (SNTP) v4 RFC 2131 DHCP RFC 2453 RIPv2 RFC 2548 (MS-RAS-Vendor only) RFC 3046 DHCP Relay Agent Information Option RFC 3576 Ext to RADIUS (CoA only) RFC 3768 VRRP (Premium License) RFC 4675 RADIUS VLAN & Priority
	IP Multicast	RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode (Premium License) RFC 4601 Draft 10 PIM Sparse Mode (Premium License)

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Accessories

HP ProCurve Switch 5400zl Series accessories	**Modules**	
	HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module	J8702A
	HP ProCurve Switch zl 4-Port 10-GbE CX4 Module	J8708A
	HP ProCurve Switch zl 20-Port 10/100/1000 + 4-Port Mini-GBIC Module	J8705A
	HP ProCurve Switch zl 24-Port Mini-GBIC Module	J8706A
	HP ProCurve Switch zl 4-Port 10-GbE X2 Module	J8707A
	NEW HP ProCurve 24-Port 10/100/1000 PoE+ zl Module	J9307A
	NEW HP ProCurve 24-Port 10/100 PoE+ zl Module	J9478A
	NEW HP ProCurve 20-Port 10/100/1000 PoE+ and 4-Port Mini-GBIC zl Module	J9308A
	NEW HP ProCurve 4-Port 10GbE SFP+ zl Module	J9309A
	Appliance	
	HP ProCurve ONE Services zl Module	J9289A
	HP ProCurve Threat Management Services zl Module	J9155A
	HP ProCurve Threat Management Services zl Module with 1-year IDS/IPS subscription	J9156A
	NEW HP ProCurve Manager Plus Agent with ProCurve ONE Services zl Module	J9496A
	License	
	Premium License for Switch 5400 Series	J8994A
	NEW HP ProCurve MSM760/765 40-access point license	J9371A
	Power Supply	
	HP ProCurve Switch zl 875 W Power Supply	J8712A
	HP ProCurve Switch zl 1500 W Power Supply	J8713A
	NEW HP ProCurve 1500W PoE+ zl Power Supply	J9306A
	EPS/RPS	
	HP ProCurve Switch zl Power Supply Shelf	J8714A
	Transceivers	
	HP ProCurve 10-GbE X2-SC ER Optic	J8438A
	HP ProCurve 10-GbE CX4 Media Converter	J8439A
	HP ProCurve 10-GbE X2-SC SR Optic	J8436A
	HP ProCurve 10-GbE X2-CX4 Transceiver	J8440B
	HP ProCurve 100-FX SFP-LC Transceiver	J9054B
	HP ProCurve 10-GbE X2-SC LR Optic	J8437A
	HP ProCurve 10-GbE X2-SC LRM Optic	J9144A
	HP ProCurve 100-BX-D SFP-LC Transceiver	J9099B
	HP ProCurve 100-BX-U SFP-LC Transceiver	J9100B
	HP ProCurve 10-GbE SFP+ SR Transceiver	J9150A
	HP ProCurve 10-GbE SFP+ LR Transceiver	J9151A
	HP ProCurve 10-GbE SFP+ LRM Transceiver	J9152A
	Mini-GBICs	
	HP ProCurve Gigabit-LH-LC Mini-GBIC	J4860C
	HP ProCurve Gigabit-SX-LC Mini-GBIC	J4858C

Accessories

HP ProCurve Gigabit-LX-LC Mini-GBIC	J4859C
HP ProCurve Gigabit 1000Base-T Mini-GBIC	J8177C
HP ProCurve 1000-BX-D SFP-LC Mini-GBIC	J9142B
HP ProCurve 1000-BX-U SFP-LC Mini-GBIC	J9143B
Cables	
HP ProCurve 10-GbE SFP+ 1m Direct Attach Cable	J9281B
HP ProCurve 10-GbE SFP+ 3m Direct Attach Cable	J9283B
HP ProCurve 10-GbE SFP+ 7m Direct Attach Cable	J9285B
NEW HP ProCurve 10-GbE XFP-SFP+ 1m Direct Attach Cable	J9300A
NEW HP ProCurve 10-GbE XFP-SFP+ 3m Direct Attach Cable	J9301A
NEW HP ProCurve 10-GbE XFP-SFP+ 5m Direct Attach Cable	J9302A
Software	
HP ProCurve Manager 3.1	--
WLAN	
HP ProCurve Wireless Edge Services zl Module	J9051A
HP ProCurve Redundant Wireless Services zl Module	J9052A
HP ProCurve MSM765zl Mobility Controller	J9370A

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