HP E5400 zl Switch Series

Data sheet

Product overview

The HP E5400 zl Switch Series consists of advanced intelligent switches in the HP E-Series product-line. The E5400 zl 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 Ethernet and 10 Gigabit Ethernet interfaces, choice of PoE+ & Non-PoE, integrated layer 3 features and HP allianceONE Solutions, the E5400 zl switches offer excellent investment protection, flexibility, and scalability, as well as ease of deployment, operation, and maintenance.

Key features

- Advanced access layer, distribution & Core
- Integrated L2 to L4 intelligent edge feature set
- Enterprise-class performance and security
- HP Alliance ONE integrated
- Scalable 10/100/1000 and 10 GbE connectivity

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Features and benefits

Quality of Service (QoS)

- **Advanced classifier-based QoS:** classifies traffic using multiple match criteria based on Layer 2, 3, and 4 information; applies QoS policies such as setting priority level and rate limit to selected traffic on a per-port or per-VLAN basis
- **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
- **Bandwidth shaping:**
  - **Port-based rate limiting:** provides per-port ingress/egress enforced maximum bandwidth
  - **Classifier-based rate limiting:** uses access control list (ACL) to enforce maximum bandwidth for ingress traffic on each port
  - **Guaranteed minimum:** provides 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), Layer 3 protocol, TCP/UDP port number, source port, and DiffServ

Management

- **Remote Intelligent Mirroring:** mirrors selected ingress/egress traffic based on ACL, port, MAC address, or VLAN to a local or remote E8200, E6200, E5400, or E3500 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 provides 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:** includes HP E-Series common networking features and CLI implementation (common across HP E5400/E8200/E6200/E6600/E3500 switches)
- **Command authorization:** leverages RADIUS to link a custom list of CLI commands to an individual network administrator's login; also provides an audit trail
- **Friendly port names:** allow assignment of descriptive names to ports
- **Dual flash images:** provide independent primary and secondary operating system files for backup while upgrading
- **Multiple configuration files:** can be stored to the flash image

Connectivity

- **NEW IEEE 802.3az Energy Efficient Ethernet:** Lowers power consumption in periods of low link usage. (Supported on v2 zl 10/100/1000 & 10/100 modules)
- **IEEE 802.3af Power over Ethernet (PoE):** 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
- **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
- **Prestandard PoE support:** detects and provides power to prestandard PoE devices; see list of supported devices in the product FAQ at www.hp.com/networking
- **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-Gigabit 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
- **ipv6:** IPv6 host: enables switches to be managed and deployed at the IPv6 network's edge - Dual stack (IPv4 and IPv6): transitions from IPv4 to IPv6, supporting connectivity for both protocols - MLD snooping: forwards IPv6 multicast traffic to the appropriate interface - IPv6 ACL/QoS: supports ACL and QoS for IPv6 network traffic, preventing traffic flooding - IPv6 routing: supports static and OSPFv3 routing protocols

Performance

- **High-speed/capacity architecture:** 1 Tbps crossbar switching fabric provides intra-module and inter-module switching with 585.6 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:** 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
- **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 HP port trunking:** support up to 60 trunks, each with up to 8 links (ports) per trunk
- **Optional redundant power supply (HP E5400 series):** provides uninterrupted power and allows hot-swapping of the redundant power supplies when installed
- **Hot-swappable modules (E5400 zl 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:** HP zl-common accessories (interface modules, power supplies)

Layer 2 switching

- **HP's 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 (GVRP):** allows automatic learning and dynamic assignment of VLANs
- **802.1ad QinQ:** increases the scalability of an Ethernet network by providing a hierarchical structure; connects multiple LANs on high-speed campus or metro network

Layer 3 services

- **User Datagram Protocol (UDP) helper function:** allows UDP broadcasts to be directed across router interfaces to specific IP unicast or subnet broadcast addresses and prevents server spoofing for UDP services such as DHCP
- **Loopback interface address:** defines an address in Routing Information Protocol (RIP) and OSPF that can always be reachable, improving diagnostic capability
- **NEW Route maps:** provide more control during route redistribution; allow filtering and altering of route metrics

Layer 3 routing

- **NEW Static IP routing:** provides manually configured routing for both IPv4 and IPv6 networks
- **Routing Information Protocol (RIP):** provides RIPv1 and RIPv2 routing
- **OSPF:** provides OSPFv2 for IPv4 routing and OSPFv3 for IPv6 routing

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
  - **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 virus from spreading 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:** securely encrypts all access methods (CLI, GUI, or MIB) through SSHv2, SSL, and/or SNMPv3
- **USB Secure Autorun (requires HP PCM+):** deploys, diagnoses, and updates switch using a USB flash drive; works with a 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 File Transfer Protocol (FTP):** allows secure file transfer to and from the switch; protects against unwanted file downloads or unauthorized copying of switch configuration file
- **Management Interface Wizard:** helps ensure that management interfaces such as SNMP, telnet, SSH, SSL, Web, and USB are secured to the 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 :** 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):** is 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:** support multiple methods (automatic, IEEE 802.3af class, LLDP-MED, or user specified) to allocate PoE power for more efficient energy savings

Warranty and support

- **Lifetime warranty:** for as long as you own the product with advance replacement and next-business-day delivery (available in most countries)*
- **Electronic and telephone support:** limited electronic and telephone support is available from HP; refer to www.hp.com/networking/warranty for details on the support provided and the period during which support is available

*Hardware warranty replacement for as long as you own the product, with next business day advance replacement (available in most countries) with a five-year hardware warranty replacement for the disk drive included with HP AllianceONE Services zl Module, HP Threat Management Services zl Module, HP PCM+ Agent with AllianceONE Services zl Module, and HP E-MSM765 zl Mobility Controller. For details, refer to the HP Software License, Warranty, and Support booklet at www.hp.com/networking/warranty.

- **Software releases:** refer to www.hp.com/networking/warranty for details on the software releases provided and the period during which software releases are available for your product(s)

Specifications

	HP E5406 zl Switch with Premium Software (J9642A)	**HP E5412 zl Switch with Premium Software (J9643A)**	**HP E5406-44G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9533A)**
Included accessories	1 HP E5400 zl Switch Premium License (J8994A)	1 HP E5400 zl Switch Premium License (J8994A)	1 HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module (J9536A) 1 HP 1500 W PoE+ zl Power Supply (J9306A) 1 HP 24-port Gig-T PoE+ v2 zl Module (J9534A) 1 HP E5400 zl Switch Premium License (J8994A)
Ports	6 open module slots Supports a maximum of 48 10-GbE ports or 144 autosensing 10/100/1000 ports or 144 mini-GBICs, or a combination	12 open module slots Supports a maximum of 96 10-GbE ports or 288 autosensing 10/100/1000 ports or 288 mini-GBICs, or a combination	44 RJ-45 autosensing 10/100/1000 PoE+ ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T, IEEE 802.3at PoE+); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 2 open 10-GbE SFP+ transceiver slots 4 open module slots Supports a maximum of 16 10-GbE ports or 140 autosensing 10/100/1000 ports or 100 mini-GBICs, or a combination
Power supplies	2 power-supply slots	4 power-supply slots	1 power-supply slots includes: 1 x J9306AHP 1500 W PoE+ zl Power Supply
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)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)	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)	34.94 lb. (15.85 kg)	46.08 lb. (20.9 kg)
Memory and processor			
Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	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	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash Mb, 128 MB compact flash, 256 MB DDR SDRAM	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	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance			
1000 Mb Latency	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)
Throughput	up to 282.1 million pps	up to 564.2 million pps	up to 282.1 million pps
Routing/Switching capacity	379.2 Gbps	758.4 Gbps	379.2 Gbps
Switch fabric speed	379.2 Gbps	758.4 Gbps	379.2 Gbps
Routing table size	10,000 entries	10,000 entries	10,000 entries
MAC address table size	64,000 entries	64,000 entries	64,000 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	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed	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), noncondensing	15% to 95% @ 131°F (55°C), noncondensing	15% to 95% @ 131°F (55°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing
Altitude	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)
Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296
Electrical characteristics			
	Achieved Miercom Certified Green Award		
Description	Chassis ships without power supplies. Two power supply slots are available; three different power supplies are available. See power supply products for additional specifications.	Chassis ships without power supplies. Four power supply slots are available; three different power supplies are available. See power supply products for additional specifications.	One J9306A installed. One open power supply slot is available; three different power supplies are 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)	4900 BTU/hr (5169 kJ/hr), (max. non-PoE); 7400 BTU/hr (7,807 kJ/hr) (max. using PoE)	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	100-127 / 200-240 VAC	110-127 / 200-240 VAC
Idle power			215 W
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz

Specifications (continued)

	HP E5406 zl Switch with Premium Software (J9642A)	HP E5412 zl Switch with Premium Software (J9643A)	HP E5406-44G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9533A)
Notes	Power supplies must be ordered separately. Heat dissipation does not include heat dissipated by the PoE-powered devices themselves.	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.	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	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity			
EN	EN 55024, CISPR 24	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	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	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.

Specifications (continued)

	HP E5406 zl Switch with Premium Software (J9642A)	HP E5412 zl Switch with Premium Software (J9643A)	HP E5406-44G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9533A)
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) 3 Yr 6 hr Call-to-Repair Onsite (UW377E) 4 Yr 6 hr Call-to-Repair Onsite (UW378E) 5 Yr 6 hr Call-to-Repair Onsite (UW379E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW380E) 4 Yr 6 hr Call-to-Repair Onsite (UW381E) 5 Yr 6 hr Call-to-Repair Onsite (UW382E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW377E) 4 Yr 6 hr Call-to-Repair Onsite (UW378E) 5 Yr 6 hr Call-to-Repair Onsite (UW379E) Refer to the HP website at www.hp.com/networking/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.

Specifications (continued)

	HP E5406 zl Switch with Premium Software (J9642A)	HP E5412 zl Switch with Premium Software (J9643A)	HP E5406-44G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9533A)
Standards and protocols (applies to all products in series)	**Device management** RFC 1591 DNS (client) HTML and telnet management **General protocols** IEEE 802.1ad Q-in-Q IEEE 802.1AX-2008 Link Aggregation 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 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 RFC 4675 RADIUS VLAN & Priority UDLD (Uni-directional Link Detection) **IP multicast** RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode RFC 4601 Draft 10 PIM Sparse Mode	**IPv6** RFC 1981 IPv6 Path MTU Discovery RFC 2375 IPv6 Multicast Address Assignments RFC 2460 IPv6 Specification RFC 2464 Transmission of IPv6 over Ethernet Networks RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client and relay) RFC 3484 Default Address Selection for IPv6 RFC 3587 IPv6 Global Unicast Address Format 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 4291 IP Version 6 Addressing Architecture RFC 4293 MIB for IP RFC 4294 IPv6 Node Requirements 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 RFC 5095 Deprecation of Type 0 Routing Headers in IPv6 RFC 5340 OSPFv3 for IPv6 RFC 5453 Reserved IPv6 Interface Identifiers RFC 5722 Handling of Overlapping IPv6 Fragments **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 RFC 3101 OSPF NSSA RFC 5340 OSPFv3 for IPv6 **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+ RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell

Specifications (continued)

	HP E5412-92G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9532A)	**HP E5406-44G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9539A)**	**HP E5412-92G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9540A)**
Included accessories	3 HP 24-port Gig-T PoE+ v2 zl Module (J9534A) 1 HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module (J9536A) 2 HP 1500 W PoE+ zl Power Supply (J9306A) 1 HP E5400 zl Switch Premium License (J8994A)	1 HP 24-port Gig-T PoE+ v2 zl Module (J9534A) 1 HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module (J9535A) 1 HP 1500 W PoE+ zl Power Supply (J9306A) 1 HP E5400 zl Switch Premium License (J8994A)	3 HP 24-port Gig-T PoE+ v2 zl Module (J9534A) 1 HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module (J9535A) 2 HP 1500 W PoE+ zl Power Supply (J9306A) 1 HP E5400 zl Switch Premium License (J8994A)
Ports	92 RJ-45 autosensing 10/100/1000 PoE+ ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T, IEEE 802.3at PoE+); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 2 open 10-GbE SFP+ transceiver slots 8 open module slots Supports a maximum of 32 10-GbE ports or 284 autosensing 10/100/1000 ports or 196 mini-GBICs, or a combination	44 RJ-45 autosensing 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 slots 4 open module slots Supports a maximum of 16 10-GbE ports or 140 autosensing 10/100/1000 ports or 100 mini-GBICs, or a combination	92 RJ-45 autosensing 10/100/1000 PoE+ ports (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-TX, IEEE 802.3ab Type 1000Base-T, IEEE 802.3at PoE+); Media Type: Auto-MDIX; Duplex: 10Base-T/100Base-TX: half or full; 1000Base-T: full only 4 open mini-GBIC slots 8 open module slots Supports a maximum of 32 10-GbE ports or 284 autosensing 10/100/1000 ports or 196 mini-GBICs, or a combination
Power supplies	2 power-supply slots includes: 2 x J9306AHP 1500 W PoE+ zl Power Supply	1 power-supply slots includes: 1 x J9306AHP 1500 W PoE+ zl Power Supply	2 power-supply slots includes: 2 x J9306AHP 1500 W PoE+ zl Power Supply
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)	17.75(d) x 17.5(w) x 6.9(h) in. (45.09 x 44.45 x 17.53 cm) (4U height)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
Weight	75.36 lb. (34.18 kg)	45.58 lb. (20.68 kg)	74.86 lb. (33.96 kg)
Memory and processor			
Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	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	Freescale PowerPC 8540 @ 666 MHz, 4 MB flash, 128 MB compact flash, 256 MB DDR SDRAM	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	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance			
1000 Mb Latency	< 3.7 μs (FIFO 64-byte packets)	< 3.7 μs (FIFO 64-byte packets)	< 3.7 μs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 μs (FIFO 64-byte packets)	< 2.1 μs (FIFO 64-byte packets)	< 2.1 μs (FIFO 64-byte packets)
Throughput	up to 564.2 million pps	up to 282.1 million pps	up to 564.2 million pps
Routing/Switching capacity	758.4 Gbps	379.2 Gbps	758.4 Gbps
Switch fabric speed	758.4 Gbps	379.2 Gbps	758.4 Gbps
Routing table size	10,000 entries	10,000 entries	10,000 entries
MAC address table size	64,000 entries	64,000 entries	64,000 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	32°F to 131°F (0°C to 55°C); 0°C to 40°C with J8706A or J8707A modules installed	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), noncondensing	15% to 95% @ 131°F (55°C), noncondensing	15% to 95% @ 131°F (55°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing
Altitude	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)
Acoustic	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
Electrical characteristics			
Description	Two J9306A installed. Two open power supply slots are available; three different power supplies are available. See power supply products for additional specifications.	One J9306A installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J9306A installed. Two open power supply slots are available; three different power supplies are 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)	2450 BTU/hr (2584.75 kJ/hr), (max. non-PoE); 3700 BTU/hr (3903 kJ/hr) (max. using PoE)	4900 BTU/hr (5169.5 kJ/hr), (max. non-PoE); 7400 BTU/hr (7807 kJ/hr) (max. using PoE)
Voltage	110-127 / 200-240 VAC	110-127 / 200-240 VAC	110-127 / 200-240 VAC
Idle power	312 W	215 W	312 W
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz

Specifications (continued)

	HP E5412-92G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9532A)	HP E5406-44G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9539A)	HP E5412-92G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9540A)
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.	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.	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	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity			
EN	EN 55024, CISPR 24	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	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	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.

Specifications (continued)

	HP E5412-92G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9532A)	HP E5406-44G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9539A)	HP E5412-92G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9540A)
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) 3 Yr 6 hr Call-to-Repair Onsite (UW380E) 4 Yr 6 hr Call-to-Repair Onsite (UW381E) 5 Yr 6 hr Call-to-Repair Onsite (UW382E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW377E) 4 Yr 6 hr Call-to-Repair Onsite (UW378E) 5 Yr 6 hr Call-to-Repair Onsite (UW379E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW380E) 4 Yr 6 hr Call-to-Repair Onsite (UW381E) 5 Yr 6 hr Call-to-Repair Onsite (UW382E) Refer to the HP website at www.hp.com/networking/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.

Specifications (continued)

	HP E5412-92G-PoE+/2XG-SFP+ v2 zl Switch with Premium Software (J9532A)	HP E5406-44G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9539A)	HP E5412-92G-PoE+/4G-SFP v2 zl Switch with Premium Software (J9540A)
Standards and protocols (applies to all products in series)	**Device management** RFC 1591 DNS (client) HTML and telnet management **General protocols** IEEE 802.1ad Q-in-Q IEEE 802.1AX-2008 Link Aggregation 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 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 RFC 4675 RADIUS VLAN & Priority UDLD (Uni-directional Link Detection) **IP multicast** RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode RFC 4601 Draft 10 PIM Sparse Mode	**IPv6** RFC 1981 IPv6 Path MTU Discovery RFC 2375 IPv6 Multicast Address Assignments RFC 2460 IPv6 Specification RFC 2464 Transmission of IPv6 over Ethernet Networks RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client and relay) RFC 3484 Default Address Selection for IPv6 RFC 3587 IPv6 Global Unicast Address Format 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 4291 IP Version 6 Addressing Architecture RFC 4293 MIB for IP RFC 4294 IPv6 Node Requirements 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 RFC 5095 Deprecation of Type 0 Routing Headers in IPv6 RFC 5340 OSPFv3 for IPv6 RFC 5453 Reserved IPv6 Interface Identifiers RFC 5722 Handling of Overlapping IPv6 Fragments **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 RFC 3101 OSPF NSSA RFC 5340 OSPFv3 for IPv6 **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+ RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell

Specifications (continued)

	HP E5406-44G-PoE+/4SFP zl Switch (J9447A)	HP E5412-92G-PoE+/4SFP zl Switch (J9448A)
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)	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	44 RJ-45 autosensing 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 slots 4 open module slots Supports a maximum of 16 10-GbE ports or 140 autosensing 10/100/1000 ports or 100 mini-GBICs, or a combination	92 autosensing 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 slots 8 open module slots Supports a maximum of 32 10-GbE ports or 284 autosensing 10/100/1000 ports or 196 mini-GBICs, or a combination
Power supplies	1 power-supply slots includes: 1 x J9306AHP 1500 W PoE+ zl Power Supply	2 power-supply slots includes: 2 x J9306AHP 1500 W PoE+ zl Power Supply
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)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
Weight	34.9 lb. (15.83 kg)	58.18 lb. (26.39 kg)
Memory and processor		
Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	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	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	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance		
1000 Mb Latency	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)
Throughput	up to 282.1 million pps	up to 564.2 million pps
Routing/Switching capacity	379.2 Gbps	758.4 Gbps
Switch fabric speed	379.2 Gbps	758.4 Gbps
Routing table size	10,000 entries	10,000 entries
MAC address table size	64,000 entries	64,000 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	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), noncondensing	15% to 95% @ 131°F (55°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing
Altitude	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)
Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
Electrical characteristics		
Description	One J9306A installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J9306A installed. Two open power supply slots are available; three different power supplies are 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)	4900 BTU/hr (5169.5 kJ/hr), (max. non-PoE); 7400 BTU/hr (7807 kJ/hr) (max. using PoE)
Voltage	110-127 / 200-240 VAC	110-127 / 200-240 VAC
Idle power	215 W	312 W
Frequency	50 / 60 Hz	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.	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	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity		
EN	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)

Specifications (continued)

	HP E5406-44G-PoE+/4SFP zl Switch (J9447A)	HP E5412-92G-PoE+/4SFP zl Switch (J9448A)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	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	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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) 3 Yr 6 hr Call-to-Repair Onsite (UW377E) 4 Yr 6 hr Call-to-Repair Onsite (UW378E) 5 Yr 6 hr Call-to-Repair Onsite (UW379E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW380E) 4 Yr 6 hr Call-to-Repair Onsite (UW381E) 5 Yr 6 hr Call-to-Repair Onsite (UW382E) Refer to the HP website at www.hp.com/networking/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.

Specifications (continued)

	HP E5406-44G-PoE+/4SFP zl Switch (J9447A)	HP E5412-92G-PoE+/4SFP zl Switch (J9448A)
Standards and protocols (applies to all products in series)	**Device management** RFC 1591 DNS (client) HTML and telnet management **General protocols** IEEE 802.1ad Q-in-Q IEEE 802.1AX-2008 Link Aggregation 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 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 RFC 4675 RADIUS VLAN & Priority UDLD (Uni-directional Link Detection) **IP multicast** RFC 3376 IGMPv3 (host joins only) RFC 3973 Draft 2 PIM Dense Mode RFC 4601 Draft 10 PIM Sparse Mode	**IPv6** RFC 1981 IPv6 Path MTU Discovery RFC 2375 IPv6 Multicast Address Assignments RFC 2460 IPv6 Specification RFC 2464 Transmission of IPv6 over Ethernet Networks RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations (Ping only) RFC 3019 MLDv1 MIB RFC 3315 DHCPv6 (client and relay) RFC 3484 Default Address Selection for IPv6 RFC 3587 IPv6 Global Unicast Address Format 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 4291 IP Version 6 Addressing Architecture RFC 4293 MIB for IP RFC 4294 IPv6 Node Requirements 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 RFC 5095 Deprecation of Type 0 Routing Headers in IPv6 RFC 5340 OSPFv3 for IPv6 RFC 5453 Reserved IPv6 Interface Identifiers RFC 5722 Handling of Overlapping IPv6 Fragments **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 RFC 3101 OSPF NSSA RFC 5340 OSPFv3 for IPv6 **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+ RFC 2865 RADIUS (client only) RFC 2866 RADIUS Accounting Secure Sockets Layer (SSL) SSHv1/SSHv2 Secure Shell

Specifications (continued)

	HP E5406-48G zl Switch (J8699A)	HP E5412-96G zl Switch (J8700A)
Included accessories	2 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 1 HP ProCurve Switch zl 875 W Power Supply (J8712A)	4 HP ProCurve Switch zl 24-Port 10/100/1000 PoE Module (J8702A) 2 HP ProCurve Switch zl 875 W Power Supply (J8712A)
Ports	48 autosensing 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 module slots Supports a maximum of 16 10-GbE ports or 144 autosensing 10/100/1000 ports or 96 mini-GBICs, or a combination	96 autosensing 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 8 open module slots Supports a maximum of 32 10-GbE ports or 288 autosensing 10/100/1000 ports or 192 mini-GBICs, or a combination
Power supplies	1 power-supply slots includes: 1 x J8712AHP 875 W zl Power Supply	2 power-supply slots includes: 2 x J8712AHP 875 W zl Power Supply
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)	17.75(d) x 17.5(w) x 12.1(h) in. (45.09 x 44.45 x 30.73 cm) (7U height)
Weight	34.26 lb. (15.54 kg)	58 lb. (26.31 kg)
Memory and processor		
Gigabit Module	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM	ARM9 @ 200 MHz; packet buffer size: 144 Mb QDR SDRAM
10G Module	ARM9 @ 200 MHz; packet buffer size: 36 Mb QDR SDRAM	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	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	Mounts in an EIA-standard 19 in. telco rack or equipment cabinet (hardware included); horizontal surface mounting only
Performance		
1000 Mb Latency	< 3.7 µs (FIFO 64-byte packets)	< 3.7 µs (FIFO 64-byte packets)
10 Gbps Latency	< 2.1 µs (FIFO 64-byte packets)	< 2.1 µs (FIFO 64-byte packets)
Throughput	up to 282.1 million pps	up to 564.2 million pps
Routing/Switching capacity	379.2 Gbps	758.4 Gbps
Switch fabric speed	379.2 Gbps	758.4 Gbps
Routing table size	10,000 entries	10,000 entries
MAC address table size	64,000 entries	64,000 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	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), noncondensing	15% to 95% @ 131°F (55°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing
Altitude	up to 10,000 ft. (3 km)	up to 10,000 ft. (3 km)
Acoustic	Power: 57 dB, Pressure: 40.2 dB ISO 7779, ISO 9296	Power: 64 dB, Pressure: 57.5 dB ISO 7779, ISO 9296
Electrical characteristics		
Description	One J8712A installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J8712A installed. Two open power supply slots are available; three different power supplies are 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)	4900 BTU/hr (5169 kJ/hr), (max. non-PoE); 7400 BTU/hr (7807 kJ/hr) (max. using PoE)
Voltage	100-127 / 200-240 VAC	100-127 / 200-240 VAC
Idle power	166 W	299 W
Frequency	50 / 60 Hz	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.	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	CSA 22.2 No. 60950; UL 60950; IEC 60950; EN 60950
Emissions	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A	FCC Class A; VCCI Class A; EN 55022/CISPR 22 Class A
Immunity		
EN	EN 55024, CISPR 24	EN 55024, CISPR 24
ESD	IEC 61000-4-2; 4 kV CD, 8 kV AD	IEC 61000-4-2; 4 kV CD, 8 kV AD
Radiated	IEC 61000-4-3; 3 V/m	IEC 61000-4-3; 3 V/m
EFT/Burst	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)	IEC 61000-4-4; 1.0 kV (power line), 0.5 kV (signal line)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC
Conducted	IEC 61000-4-6; 3 V	IEC 61000-4-6; 3 V
Power frequency magnetic field	IEC 61000-4-8; 1 A/m, 50 or 60 Hz	IEC 61000-4-8; 1 A/m, 50 or 60 Hz

Specifications (continued)

	HP E5406-48G zl Switch (J8699A)	HP E5412-96G zl Switch (J8700A)
Voltage dips and interruptions	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods	IEC 61000-4-11; >95% reduction, 0.5 period; 30% reduction, 25 periods
Harmonics	EN 61000-3-2, IEC 61000-3-2	EN 61000-3-2, IEC 61000-3-2
Flicker	EN 61000-3-3, IEC 61000-3-3	EN 61000-3-3, IEC 61000-3-3
Management	HP PCM+; HP PCM (included); command-line interface; Web browser; configuration menu; out-of-band management (serial RS-232C)	HP PCM+; HP PCM (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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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.	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. J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500yl series switches. 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) 3 Yr 6 hr Call-to-Repair Onsite (UW377E) 4 Yr 6 hr Call-to-Repair Onsite (UW378E) 5 Yr 6 hr Call-to-Repair Onsite (UW379E) Refer to the HP website at www.hp.com/networking/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.	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) 3 Yr 6 hr Call-to-Repair Onsite (UW380E) 4 Yr 6 hr Call-to-Repair Onsite (UW381E) 5 Yr 6 hr Call-to-Repair Onsite (UW382E) Refer to the HP website at www.hp.com/networking/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.

Specifications (continued)

	HP E5406-48G zl Switch (J8699A)	HP E5412-96G zl Switch (J8700A)

Standards and protocols
(applies to all products in series)

Device management
RFC 1591 DNS (client)
HTML and telnet management

General protocols
IEEE 802.1ad Q-in-Q
IEEE 802.1AX-2008 Link Aggregation
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
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
RFC 4675 RADIUS VLAN & Priority
UDLD (Uni-directional Link Detection)

IP multicast
RFC 3376 IGMPv3 (host joins only)
RFC 3973 Draft 2 PIM Dense Mode
RFC 4601 Draft 10 PIM Sparse Mode

IPv6
RFC 1981 IPv6 Path MTU Discovery
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 IPv6 Specification
RFC 2464 Transmission of IPv6 over Ethernet Networks
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations (Ping only)
RFC 3019 MLDv1 MIB
RFC 3315 DHCPv6 (client and relay)
RFC 3484 Default Address Selection for IPv6
RFC 3587 IPv6 Global Unicast Address Format
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 4291 IP Version 6 Addressing Architecture
RFC 4293 MIB for IP
RFC 4294 IPv6 Node Requirements
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
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
RFC 5340 OSPFv3 for IPv6
RFC 5453 Reserved IPv6 Interface Identifiers
RFC 5722 Handling of Overlapping IPv6 Fragments

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
RFC 3101 OSPF NSSA
RFC 5340 OSPFv3 for IPv6

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+
RFC 2865 RADIUS (client only)
RFC 2866 RADIUS Accounting
Secure Sockets Layer (SSL)
SSHv1/SSHv2 Secure Shell

HP E5400 zl Switch Series accessories

Modules

NEW HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module (J9535A)
NEW HP 20-port Gig-T PoE+ / 2-port 10-GbE SFP+ v2 zl Module (J9536A)
NEW HP 24-port SFP v2 zl Module (J9537A)
NEW HP 8-port 10 GbE SFP+ v2 zl Module (J9538A)
NEW HP 24-port 10/100 PoE+ v2 zl Module (J9547A)
NEW HP 12-port Gig-T PoE+ / 12-port SFP v2 zl Module (J9637A)
HP 24-Port 10/100/1000 PoE zl Module (J8702A)
HP 4-Port 10 GbE CX4 zl Module (J8708A)
HP 24-Port 10/100 PoE+ zl Module (J9478A)
HP 20-Port 10/100/1000 PoE+/4-Port Mini-GBIC zl Module (J9308A)
HP 4-Port 10 GbE SFP+ zl Module (J9309A)
HP 20-Port Gig-T/4-Port Mini-GBIC zl Module (J8705A)
HP 24-Port Mini-GBIC zl Module (J8706A)
HP 4-Port 10 GbE X2 zl Module (J8707A)
HP 24-Port 10/100/1000 PoE+ zl Module (J9307A)
NEW HP AllianceONE Extended Services zl Module with Riverbed Steelhead RiOS Application (J9517A)
NEW HP AllianceONE Services zl Module for Avaya Aura Session Border Controller powered by Acme Packet (J9486A)
NEW HP 24-port Gig-T PoE+ v2 zl Module (J9534A)
NEW HP 24-port Gig-T v2 zl Module (J9550A)
NEW HP 20-port Gig-T / 4-port SFP v2 zl Module (J9549A)
NEW HP 20-port Gig-T / 2-port 10-GbE SFP+ v2 zl Module (J9548A)

Transceivers

HP X131 10G X2 SC ER Transceiver (J8438A)
HP X130 CX4 Optical Media Converter (J8439A)
HP X131 10G X2 SC SR Transceiver (J8436A)
HP X131 10G X2 CX4 Transceiver (J8440C)
HP X111 100M SFP LC FX Transceiver (J9054B)
HP X131 10G X2 SC LR Transceiver (J8437A)
HP X131 10G X2 SC LRM Transceiver (J9144A)
HP X112 100M SFP LC BX-D Transceiver (J9099B)
HP X112 100M SFP LC BX-U Transceiver (J9100B)
HP X132 10G SFP+ LC SR Transceiver (J9150A)
HP X132 10G SFP+ LC LR Transceiver (J9151A)
HP X132 10G SFP+ LC LRM Transceiver (J9152A)
HP X121 1G SFP LC LH Transceiver (J4860C)
HP X121 1G SFP LC SX Transceiver (J4858C)
HP X121 1G SFP LC LX Transceiver (J4859C)
HP X121 1G SFP RJ45 T Transceiver (J8177C)
HP X122 1G SFP LC BX-D Transceiver (J9142B)
HP X122 1G SFP LC BX-U Transceiver (J9143B)
HP X132 10G SFP+ LC ER Transceiver (J9153A)

Cables

HP X242 SFP+ SFP+ 1 m Direct Attach Cable (J9281B)
HP X242 SFP+ SFP+ 3 m Direct Attach Cable (J9283B)
HP X242 SFP+ SFP+ 7 m Direct Attach Cable (J9285B)
HP X244 XFP SFP+ 1 m Direct Attach Cable (J9300A)
HP X244 XFP SFP+ 3 m Direct Attach Cable (J9301A)
HP X244 XFP SFP+ 5 m Direct Attach Cable (J9302A)
NEW HP 0.5 m Multimode OM3 LC/LC Optical Cable (AJ833A)
NEW HP 1 m Multimode OM3 LC/LC Optical Cable (AJ834A)
NEW HP 2 m Multimode OM3 LC/LC Optical Cable (AJ835A)
NEW HP 5 m Multimode OM3 LC/LC Optical Cable (AJ836A)
NEW HP 15 m Multimode OM3 LC/LC Optical Cable (AJ837A)
NEW HP 30 m Multimode OM3 LC/LC Optical Cable (AJ838A)
NEW HP 50 m Multimode OM3 LC/LC Optical Cable (AJ839A)
NEW HP 0.5 m PremierFlex OM3+ LC/LC Optical Cable (BK837A)
NEW HP 1 m PremierFlex OM3+ LC/LC Optical Cable (BK838A)
NEW HP 2 m PremierFlex OM3+ LC/LC Optical Cable (BK839A)
NEW HP 5 m PremierFlex OM3+ LC/LC Optical Cable (BK840A)
NEW HP 15 m PremierFlex OM3+ LC/LC Optical Cable (BK841A)
NEW HP 30 m PremierFlex OM3+ LC/LC Optical Cable (BK842A)
NEW HP 50 m PremierFlex OM3+ LC/LC Optical Cable (BK843A)

Power Supply

HP 875 W zl Power Supply (J8712A)
HP 1500 W zl Power Supply (J8713A)
HP 1500 W PoE+ zl Power Supply (J9306A)

EPS/RPS

HP zl Power Supply Shelf (J8714A)

License

HP E-MSM760/765 40-access point license (J9371A)
HP E5400 zl Switch Premium License (J8994A)

WLAN

HP ProCurve Wireless Edge Services zl Module (J9051A)
HP ProCurve Redundant Wireless Services zl Module (J9052A)
HP E-MSM765zl Mobility Controller (J9370A)

HP E5400 zl Switch Series accessories (continued)

Appliance

HP AllianceONE Services zl Module (J9289A)
HP Threat Management Services zl Module with 1-year IDS/IPS subscription (J9156A)
HP PCM+ Agent with ONE Services zl Module (J9496A)
NEW HP AllianceONE Advanced Services zl Module (J9483A)

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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.

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