Cisco Aironet 1260 Series Access Point

Performance and Flexibility for Challenging RF Environments
- Nine times faster than 802.11a/g networks
- ClientLink improves reliability and coverage for legacy clients
- BandSelect improves 5-GHz client connections in mixed client environments
- VideoStream uses multicast to improve rich-media applications

Rugged Metal Housing and Extended Operating Temperature
- Ideal for factories, warehouses, and other industrial environments
- Supports external antennas for a variety of RF environments and deployment scenarios
- UL 2043 plenum-rated for above ceiling installation options or suspended from drop ceilings

Easy Installation and Power Efficient
- 802.11n performance with existing PoE switches
- Sleek design blends into a variety of indoor environments

Easy-to-Install, Multipurpose Mounting Bracket
- Designed for easy replacement of existing access points
- Locks for theft protection

Simplified Network Management
- Controller-based or standalone deployment options

Secure Connections
- Supports rogue access point detection and denial-of-service attacks
- Management frame protection detects malicious users and alerts network administrators

Greater Network Capacity
- Dynamic frequency selection 2 (DFS-2) compliant

Cisco® Aironet® 1260 Series wireless access points provide reliable and predictable 802.11n wireless coverage for indoor environments. These enterprise-class access points deliver up to nine times the throughput of 802.11a/g networks for rich-media applications. Designed specifically for challenging environments, the 1260 Series supports external antennas and a broad operating-temperature range.

RF Excellence

Building on the Cisco Aironet heritage of RF excellence, the 1260 Series delivers industry-leading performance for secure and reliable wireless connections. Enterprise-class silicon and optimized radios deliver a robust mobility experience using Cisco M-Drive technology, which includes:

- ClientLink improves reliability and coverage for legacy clients
- BandSelect improves 5-GHz client connections in mixed client environments
- VideoStream uses multicast to improve rich-media applications

All of these features ensure the best possible end-user experience on the wireless network.

Cisco also offers the industry's broadest selection of 802.11n antennas, delivering optimal coverage for a variety of deployment scenarios.

The Cisco Aironet 1260 Series is a component of the Cisco Unified Wireless Network, which can scale up to 18,000 access points with full Layer 3 mobility across central or remote locations on the enterprise campus, in branch offices, and at remote sites. The Cisco Unified Wireless Network is the industry's most flexible, resilient, and scalable architecture, delivering secure access to mobility services and applications and offering the lowest total cost of ownership and investment protection by integrating seamlessly with the existing wired network.

Product Specifications

Table 1 lists the product specifications for Cisco Aironet 1260 Series Access Points.

Table 1.   Product Specifications for Cisco Aironet 1260 Series Access Points

Item	Specification				
Part Numbers	**Cisco Aironet 1260 Series Access Point**				
	Controller-based access point				
	Indoor, challenging environments, with external antennas				
	• AIR-LAP1262N-x-K9 - Dual-band Controller-based 802.11 a/g/n				
	• AIR-LAP1261N-x-K9 - Single-band Controller-based 802.11 g/n				
	• AIR-AP1262N-x-K9 - Dual-band Standalone 802.11 a/g/n				
	• AIR-AP1261N-x-K9 - Single-band Standalone 802.11 g/n				
	• AIR-LAP1262N-xK910 - Eco-pack (dual-band 802.11a/g/n) 10 quantity Controller-based access points				
	• AIR-AP1262N-xK9-5 - Eco-pack (dual-band 802.11a/g/n) 5 quantity Standalone access points				
	SMARTnet Services				
	• CON-SNT-LAP1262x - SMARTnet 8x5xNBD 1260 Series access point (dual-band 802.11 a/g/n)				
	• CON-SNT-LAP1261x - SMARTnet 8x5xNBD 1260 Series access point (single-band 802.11 g/n)				
	• CON-SNT-LAP1262x - SMARTnet 8x5xNBD 10 quantity eco-pack 1260 Series access point (dual-band 802.11a/g/n)				
	Cisco Wireless LAN Services				
	• AS-WLAN-CNSLT - Cisco Wireless LAN Network Planning and Design Service				
	• AS-WLAN-CNSLT - Cisco Wireless LAN 802.11n Migration Service				
	• AS-WLAN-CNSLT - Cisco Wireless LAN Performance and Security Assessment Service				
	Regulatory domains: (x = regulatory domain)				
	Customers are responsible for verifying approval for use in their individual countries. To verify approval and to identify the regulatory domain that corresponds to a particular country, please visit: http://www.cisco.com/go/aironet/compliance				
	Not all regulatory domains have been approved. As they are approved, the part numbers will be available on the Global Price List.				
Software	• Cisco Unified Wireless Network Software Release 7.0 or later				
	• Cisco IOS® Software Release 12.4(25d)JA				
802.11n Version 2.0 (and Related) Capabilities	• 2x3 multiple-input multiple-output (MIMO) with two spatial streams				
	• Maximal ratio combining (MRC)				
	• Legacy beamforming				
	• 20- and 40-MHz channels				
	• PHY data rates up to 300 Mbps				
	• Packet aggregation: A-MPDU (Tx/Rx), A-MSDU (Tx/Rx)				
	• 802.11 dynamic frequency selection (DFS)				
	• Cyclic shift diversity (CSD) support				
Data Rates Supported	**802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps**				
	802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps				
	802.11n data rates (2.4 GHz and 5 GHz):				
	MCS Index[1]	GI[2] = 800 ns		GI = 400 ns	
		20-MHz Rate (Mbps)	40-MHz Rate (Mbps)	20-MHz Rate (Mbps)	40-MHz Rate (Mbps)
	0	6.5	13.5	7.2	15
	1	13	27	14.4	30
	2	19.5	40.5	21.7	45
	3	26	54	28.9	60
	4	39	81	43.3	90

[1] MCS Index: The Modulation and Coding Scheme (MCS) index determines the number of spatial streams, the modulation, the coding rate, and data rate values.
[2] GI: A guard interval (GI) between symbols helps receivers overcome the effects of multipath delays.

Item	Specification				
	5	52	108	57.8	120
	6	58.5	121.5	65	135
	7	65	135	72.2	150
	8	13	27	14.4	30
	9	26	54	28.9	60
	10	39	81	43.3	90
	11	52	108	57.8	120
	12	78	162	86.7	180
	13	104	216	115.6	240
	14	117	243	130	270
	15	130	270	144.4	300

Item	Specification
Frequency Band and 20-MHz Operating Channels	**A (A Regulatory Domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz, 8 channels (excludes 5.600 to 5.640 GHz) • 5.745 to 5.825 GHz; 5 channels **C (C Regulatory Domain):** • 2.412 to 2.472 GHz; 13 channels • 5.745 to 5.825 GHz; 5 channels **E (E Reg Domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz, 8 channels (excludes 5.600 to 5.640 GHz) **I (I Regulatory Domain):** • 2.412 to 2.472 GHz, 13 channels • 5.180 to 5.320 GHz; 8 channels **K (K Regulatory Domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.620 GHz, 7 channels • 5.745 to 5.805 GHz, 4 channels **N (N Regulatory Domain):** • 2.412 to 2.462 GHz; 11 channels • 5.180 to 5.320 GHz; 8 channels • 5.745 to 5.825 GHz; 5 channels **Q (Q Regulatory Domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.500 to 5.700 GHz; 11 channels **S (S Regulatory Domain):** • 2.412 to 2.472 GHz; 13 channels • 5.180 to 5.320 GHz; 8 channels • 5.745 to 5.825 GHz; 5 channels **T (T Regulatory Domain):** • 2.412 to 2.462 GHz; 11 channels • 5.280 to 5.320 GHz; 3 channels • 5.500 to 5.700 GHz, 11 channels • 5.745 to 5.825 GHz; 5 channels

Note: Customers are responsible for verifying approval for use in their individual countries. To verify approval and to identify the regulatory domain that corresponds to a particular country, please visit: http://www.cisco.com/go/aironet/compliance.

Item	Specification	
Maximum Number of Nonoverlapping Channels	**2.4 GHz** • 802.11b/g: ◦ 20 MHz: 3 • 802.11n: ◦ 20 MHz: 3	**5 GHz** • 802.11a: ◦ 20 MHz: 21 • 802.11n: ◦ 20 MHz: 21 ◦ 40 MHz: 9

Note: This varies by regulatory domain. Refer to the product documentation for specific details for each regulatory domain.

Item	Specification			
Receive Sensitivity	**802.11b (Complementary Code Keying [CCK])** -101 dBm @ 1 Mb/s -98 dBm @ 2 Mb/s -92 dBm @ 5.5 Mb/s -89 dBm @ 11 Mb/s	**802.11g (non HT20)** -92 dBm @ 6 Mb/s -92 dBm @ 9 Mb/s -92 dBm @ 12 Mb/s -90 dBm @ 18 Mb/s -86 dBm @ 24 Mb/s -84 dBm @ 36 Mb/s -79 dBm @ 48 Mb/s -78 dBm @ 54 Mb/s	**802.11a (non HT20)** -93 dBm @ 6 Mb/s -93 dBm @ 9 Mb/s -92 dBm @ 12 Mb/s -90 dBm @ 18 Mb/s -87 dBm @ 24 Mb/s -84 dBm @ 36 Mb/s -79 dBm @ 48 Mb/s -79 dBm @ 54 Mb/s	
	2.4-GHz **802.11n (HT20)** -92 dBm @ MCS0 -90 dBm @ MCS1 -88 dBm @ MCS2 -85 dBm @ MCS3 -82 dBm @ MCS4 -77 dBm @ MCS5 -76 dBm @ MCS6 -74 dBm @ MCS7 -92 dBm @ MCS8 -90 dBm @ MCS9 -87 dBm @ MCS10 -85 dBm @ MCS11 -82 dBm @ MCS12 -77 dBm @ MCS13 -75 dBm @ MCS14 -74 dBm @ MCS15		**5-GHz** **802.11n (HT20)** -93 dBm @ MCS0 -91 dBm @ MCS1 -89 dBm @ MCS2 -86 dBm @ MCS3 -83 dBm @ MCS4 -78 dBm @ MCS5 -77 dBm @ MCS6 -75 dBm @ MCS7 -87 dBm @ MCS8 -87 dBm @ MCS9 -85 dBm @ MCS10 -83 dBm @ MCS11 -79 dBm @ MCS12 -75 dBm @ MCS13 -73 dBm @ MCS14 -72 dBm @ MCS15	**5-GHz** **802.11n (HT40)** -91 dBm @ MCS0 -89 dBm @ MCS1 -87 dBm @ MCS2 -83 dBm @ MCS3 -80 dBm @ MCS4 -75 dBm @ MCS5 -74 dBm @ MCS6 -72 dBm @ MCS7 -86 dBm @ MCS8 -85 dBm @ MCS9 -84 dBm @ MCS10 -80 dBm @ MCS11 -77 dBm @ MCS12 -72 dBm @ MCS13 -71 dBm @ MCS14 -70 dBm @ MCS15

Maximum Transmit Power	**2.4 GHz**
	• 802.11b
	  ◦ 23 dBm with 2 antennas
	• 802.11g
	  ◦ 20 dBm with 2 antennas
	• 802.11n (non-HT duplicate mode)
	  ◦ 20 dBm with 2 antennas
	• 802.11n (HT20)
	  ◦ 20 dBm with 2 antennas
			5 GHz
			• 802.11a
			  ◦ 20 dBm with 2 antennas
			• 802.11n non-HT duplicate mode
			  ◦ 20 dBm with 2 antennas
			• 802.11n (HT20)
			  ◦ 20 dBm with 2 antennas
			• 802.11n (HT40)
			  ◦ 20 dBm with 2 antennas	

Note: The maximum power setting will vary by channel and according to individual country regulations. Refer to the product documentation for specific details.				
Available Transmit Power Settings	**2.4 GHz** 23 dBm (200 mW) CCK Only 20 dBm (100 mW) 17 dBm (50 mW) 14 dBm (25 mW) 11 dBm (12.5 mW) 8 dBm (6.25 mW) 5 dBm (3.13 mW) 2 dBm (1.56 mW) -1 dBm (0.78 mW)		**5 GHz** 20 dBm (100 mW) 17 dBm (50 mW) 14 dBm (25 mW) 11 dBm (12.5 mW) 8 dBm (6.25 mW) 5 dBm (3.13 mW) 2 dBm (1.56 mW) -1 dBm (0.78 mW)	
Note: The maximum power setting will vary by channel and according to individual country regulations. Refer to the product documentation for specific details.				

Item	Specification
External Antenna (sold separately)	Cisco offers the industry's broadest selection of [802.11n antennas](#) delivering optimal coverage for a variety of deployment scenarios.
Interfaces	• 10/100/1000BASE-T autosensing (RJ-45) • Management console port (RJ-45)
Indicators	• Status LED indicates boot loader status, association status, operating status, boot loader warnings, and boot loader errors
Dimensions (W x L x H)	• Access point (without mounting bracket): 8.7 x 8.7 x 1.84 in. (22.1 x 22.1 x 4.7 cm)
Weight	• 2.3 lbs (1.04 kg)
Environmental	• Nonoperating (storage) temperature: -40 to 185°F (-40 to 85°C) • Operating temperature: -4 to +131°F (-20 to +55°C) • Operating humidity: 10 to 90 percent (noncondensing)
System Memory	• 128 MB DRAM • 32 MB flash
Input Power Requirements	• AP1260: 44 to 57 VDC • Power Supply and Power Injector: 100 to 240 VAC; 50 to 60 Hz
Powering Options	• 802.3af Ethernet Switch • Cisco AP1260 Power Injectors (AIR-PWRINJ4=) • Cisco AP1260 Local Power Supply (AIR-PWR-B=)
Power Draw	• AP1260: 12.95 W **Note:** When deployed using Power over Ethernet (PoE), the power drawn from the power sourcing equipment will be higher by some amount dependent on the length of the interconnecting cable. This additional power may be as high as 2.45W, bringing the total system power draw (access point + cabling) to 15.4W.
Warranty	• Limited Lifetime Hardware Warranty

Compliance Standards	• Safety:
	  ◦ UL 60950-1
	  ◦ CAN/CSA-C22.2 No. 60950-1
	  ◦ UL 2043
	  ◦ IEC 60950-1
	  ◦ EN 60950-1
	• Radio approvals:
	  ◦ FCC Part 15.247, 15.407
	  ◦ RSS-210 (Canada)
	  ◦ EN 300.328, EN 301.893 (Europe)
	  ◦ ARIB-STD 33 (Japan)
	  ◦ ARIB-STD 66 (Japan)
	  ◦ ARIB-STD T71 (Japan)
	  ◦ AS/NZS 4268.2003 (Australia and New Zealand)
	  ◦ EMI and susceptibility (Class B)
	  ◦ FCC Part 15.107 and 15.109
	  ◦ ICES-003 (Canada)
	  ◦ VCCI (Japan)
	  ◦ EN 301.489-1 and -17 (Europe)
	  ◦ EN 60601-1-2 EMC requirements for the Medical Directive 93/42/EEC
	• IEEE Standard:
	  ◦ IEEE 802.11a/b/g, IEEE 802.11n 2.0, IEEE 802.11h, IEEE 802.11d
	• Security:
	  ◦ 802.11i, Wi-Fi Protected Access 2 (WPA2), WPA
	  ◦ 802.1X
	  ◦ Advanced Encryption Standards (AES), Temporal Key Integrity Protocol (TKIP)
	• EAP Type(s):
	  ◦ Extensible Authentication Protocol-Transport Layer Security (EAP-TLS)
	  ◦ EAP-Tunneled TLS (TTLS) or Microsoft Challenge Handshake Authentication Protocol Version 2 (MSCHAPv2)
	  ◦ Protected EAP (PEAP) v0 or EAP-MSCHAPv2

Item	Specification
	○ Extensible Authentication Protocol-Flexible Authentication via Secure Tunneling (EAP-FAST)
	○ PEAPv1 or EAP-Generic Token Card (GTC)
	○ EAP-Subscriber Identity Module (SIM)
	● Multimedia:
	○ Wi-Fi Multimedia (WMM™)
	● Other:
	○ FCC Bulletin OET-65C
	○ RSS-102

Limited Lifetime Hardware Warranty

This Cisco Aironet 1260 Series Access Point comes with a Limited Lifetime Warranty that provides full warranty coverage of the hardware for as long as the original end user continues to own or use the product. The warranty includes 10-day advance hardware replacement and ensures that software media is defect-free for 90 days. For more details, visit: http://www.cisco.com/go/warranty.

Service and Support

Cisco and Cisco Wireless LAN Specialized Partners offer a broad portfolio of end-to-end services based on proven methodologies for planning, designing, implementing, operating, and optimizing the performance of a variety of secure voice and data wireless network solutions, technologies, and strategies. Cisco Wireless LAN Specialized Partners bring application expertise to help deliver a secure enterprise mobility solution with a low total cost of ownership. For more information about Cisco 802.11n planning and deployment services, visit: http://www.cisco.com/go/wirelesslanservices.

For More Information

For more information about the Cisco Aironet 1260 Series, visit http://www.cisco.com/go/wireless or contact your local account representative.

Cisco 5500 Series Wireless Controllers

Maximum Performance and Scalability

- Support for up to 500 access points and 7000 clients.
- 802.11n optimized for up to nine times the performance of 802.11a/g networks.
- Enhanced uptime with the ability to simultaneously configure and manage 500 access points per controller

Improved Mobility and Services

- Larger mobility domain for more simultaneous client associations.
- Faster RRM updates for uninterrupted network access when roaming.
- Intelligent RF control plane for self-configuration, self-healing, and self-optimization.
- Efficient roaming improves application performance such as toll quality, voice, and consistent streaming video and data backup.

Licensing Flexibility and Investment Protection

- Additional access point capacity licenses may be added over time.

OfficeExtend Solution

- Secure, simple, cost-effective mobile teleworker solution.
- Up to 500 remote access points per controller.
- Supports Unified Communications wireless phones for reduced cell phone charges.

Comprehensive Wired/Wireless Security

- Full CAPWAP access point to controller encryption.
- Supports rogue access point detection and denial-of-service attacks.
- Management frame protection detects malicious users and alerts network administrators.

Enterprise Wireless Mesh

- Dynamic wireless mesh networks support indoor and outdoor connectivity for areas that are difficult to wire.

Environmentally Responsible

- Support for adaptive power management to turn off access point radios during off-peak hours to reduce power consumption.
- OfficeExtend solution reduces costs and supports green best practices by reducing commuting time and saving on gas, vehicle mileage, and insurance costs.

The Cisco® 5500 Series Wireless Controller is a highly scalable and flexible platform that enables system wide services for mission-critical wireless in medium to large-sized enterprises and campus environments. Designed for 802.11n performance and maximum scalability, the 5500 Series offers enhanced uptime with RF visibility and protection, the ability to simultaneously manage up to 500 access points; superior performance for reliable streaming video and toll quality voice; and improved fault recovery for a consistent mobility experience in the most demanding environments.

Features

Optimized for high performance wireless networking, the 5500 Series offers improved mobility and prepares the business for the next wave of mobile devices and applications. The 5500 Series supports a higher density of clients and delivers more efficient roaming, with at least nine times the throughput of existing 802.11a/g networks.

The 5500 Series automates wireless configuration and management functions and allows network managers to have the visibility and control needed to cost-effectively manage, secure and optimize the performance of their wireless networks. With integrated CleanAir technology the 5500 Series protects 802.11n performance by providing cross-network access to real-time and historic RF interference information for quick, troubleshooting and resolution. As a component of the Cisco Unified Wireless Network, this controller provides realtime communication between Cisco Aironet® access points, the Cisco Wireless Control System (WCS), and the Cisco Mobility Services Engine to deliver centralized security policies, wireless intrusion prevention system (IPS) capabilities, award-winning RF management, and quality of service (QoS).

Software Licensing Flexibility

Base access point licensing offers flexibility to add up to 500 additional access points as business needs grow. The licensing structure supports a variety of business mobility needs as part of the basic feature set, including the OfficeExtend solution for secure, mobile teleworking and Enterprise Wireless Mesh, which allows access points to dynamically establish wireless connections in locations where it may be difficult or impossible to physically connect to the wired network.

Table 1 lists the features of the Cisco 5500 Series Wireless LAN Controllers.

Table 1.   Cisco 5500 Series Wireless LAN Controller Features

Feature	Benefits
Scalability	• Supports 12, 25, 50,100, 250 or 500 access points for business-critical wireless services at locations of all sizes.
High Performance	• Wire speed, non-blocking performance for 802.11n networks.
RF Management	• Provides both real-time and historical information about RF interference impacting network performance across controllers, via system wide CleanAir integration.
OfficeExtend	• Supports corporate wireless service for mobile and remote workers with secure wired tunnels to the Cisco Aironet® 1130 or 1140 Series Access Points. • Extends the corporate network to remote locations with minimal set up and maintenance requirements (zerotouch deployment). • Improves productivity and collaboration at remote site locations. • Separate SSID tunnels allow both corporate and personal Internet access. • Reduced CO2 emissions from decrease in commuting. • Higher employee job satisfaction from ability to work at home. • Improves business resiliency by providing continuous, secure connectivity in the event of disasters, pandemics, or inclement weather.
Comprehensive End-to-End Security	• Offers Control and Provisioning of Wireless Access Points (CAPWAP) compliant DTLS encryption to ensure full-line-rate encryption between access points and controllers across remote WAN/LAN links.
Enterprise Wireless Mesh	• Allows access points to dynamically establish wireless connections without the need for a physical connection to the wired network. • Available on select Cisco Aironet access points, Enterprise Wireless Mesh is ideal for warehouses, manufacturing floors, shopping centers and any other location where extending a wired connection may prove difficult or aesthetically unappealing.
High Performance Video	• Integrates VideoStream technology as part of the Cisco Medianet freamework to optimize the delivery of video applications across the WLAN.
End-to-end Voice	• Supports Unified Communications for improved collaboration through messaging, presence, and conferencing. • Supports all Cisco Unified Communications Wireless IP Phones for cost-effective, real-time voice services.
High Availability	• An optional redundant power supply helps to ensure maximum availability.
Environmentally Responsible	• Organizations may choose to turn off access point radios to reduce power consumption during off peak hours.

Table 2 lists the product specifications for Cisco 5500 Series Wireless Controllers.

Table 2.   Product Specifications for Cisco 5500 Series Wireless Controllers

Item	Specifications
Wireless	IEEE 802.11a, 802.11b, 802.11g, 802.11d, WMM/802.11e, 802.11h, 802.11n
Wired/Switching/Routing	IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX specification, 1000BASE-T. 1000BASE-SX, 1000-BASE-LH, IEEE 802.1Q Vtagging, and IEEE 802.1AX Link Aggregation.

Item	Specifications
Data Request For Comments (RFC)	• RFC 768 UDP • RFC 791 IP • RFC 2460 IPv6 (pass through Bridging mode only) • RFC 792 ICMP • RFC 793 TCP • RFC 826 ARP • RFC 1122 Requirements for Internet Hosts • RFC 1519 CIDR • RFC 1542 BOOTP • RFC 2131 DHCP • RFC 5415 CAPWAP Protocol Specification • RFC 5416 CAPWAP Binding for 802.11
Security Standards	• WPA • IEEE 802.11i (WPA2, RSN) • RFC 1321 MD5 Message-Digest Algorithm • RFC 1851 The ESP Triple DES Transform • RFC 2104 HMAC: Keyed Hashing for Message Authentication • RFC 2246 TLS Protocol Version 1.0 • RFC 2401 Security Architecture for the Internet Protocol • RFC 2403 HMAC-MD5-96 within ESP and AH • RFC 2404 HMAC-SHA-1-96 within ESP and AH • RFC 2405 ESP DES-CBC Cipher Algorithm with Explicit IV • RFC 2406 IPsec • RFC 2407 Interpretation for ISAKMP • RFC 2408 ISAKMP • RFC 2409 IKE • RFC 2451 ESP CBC-Mode Cipher Algorithms • RFC 3280 Internet X.509 PKI Certificate and CRL Profile • RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPsec • RFC 3686 Using AES Counter Mode with IPsec ESP • RFC 4347 Datagram Transport Layer Security • RFC 4346 TLS Protocol Version 1.1
Encryption	• WEP and TKIP-MIC: RC4 40, 104 and 128 bits (both static and shared keys) • AES: CBC, CCM, CCMP • DES: DES-CBC, 3DES • SSL and TLS: RC4 128-bit and RSA 1024- and 2048-bit • DTLS: AES-CBC • IPSec: DES-CBC, 3DES, AES-CBC
Authentication, Authorization, and Accounting (AAA)	• IEEE 802.1X • RFC 2548 Microsoft Vendor-Specific RADIUS Attributes • RFC 2716 PPP EAP-TLS • RFC 2865 RADIUS Authentication • RFC 2866 RADIUS Accounting • RFC 2867 RADIUS Tunnel Accounting • RFC 2869 RADIUS Extensions • RFC 3576 Dynamic Authorization Extensions to RADIUS • RFC 3579 RADIUS Support for EAP • RFC 3580 IEEE 802.1X RADIUS Guidelines • RFC 3748 Extensible Authentication Protocol • Web-based authentication • TACACS support for management users

Item	Specifications
Management	• SNMP v1, v2c, v3 • RFC 854 Telnet • RFC 1155 Management Information for TCP/IP-Based Internets • RFC 1156 MIB • RFC 1157 SNMP • RFC 1213 SNMP MIB II • RFC 1350 TFTP • RFC 1643 Ethernet MIB • RFC 2030 SNTP • RFC 2616 HTTP • RFC 2665 Ethernet-Like Interface types MIB • RFC 2674 Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering, and Virtual Extensions • RFC 2819 RMON MIB • RFC 2863 Interfaces Group MIB • RFC 3164 Syslog • RFC 3414 User-Based Security Model (USM) for SNMPv3 • RFC 3418 MIB for SNMP • RFC 3636 Definitions of Managed Objects for IEEE 802.3 MAUs • Cisco private MIBs
Management Interfaces	• Web-based: HTTP/HTTPS • Command-line interface: Telnet, Secure Shell (SSH) Protocol, serial port • Cisco Wireless Control System (WCS)
Interfaces and Indicators	• Uplink: 8 (5508) 1000BaseT, 1000Base-SX and 1000Base-LH transceiver slots • Small Form-Factor Pluggable (SFP) options (only Cisco SFPs supported): GLC-T, GLC-SX-MM, GLC-LH-SM • LED indicators: link • Service Port: 10/100/1000 Mbps Ethernet (RJ45). • Service Port: 10/100/1000 Mbps Ethernet (RJ45) For High Availability for future use • LED indicators: link, • Utility Port: 10/100/1000 Mbps Ethernet (RJ45) • LED indicators: link • Expansion Slots: 1 (5508) • Console Port: RS232 (DB-9 male/RJ-45 connector included), mini-USB • Other Indicators: Sys, ACT, Power Supply 1, Power Supply 2
Physical and Environmental	• Dimensions (WxDxH): 17.30 x 21.20 x 1.75 in. (440 x 539 x 44.5 mm) • Weight: 20 lbs (9.1 kg) with 2 power supplies • Temperature: Operating temperature: 32 to 104°F (0 to 40°C); Storage temperature: -13 to 158°F (-25 to 70°C) • Humidity: Operating humidity: 10 95%, noncondensing; Storage humidity: up to 95% • Input power: 100 to 240 VAC; 50/60 Hz; 1.05 A at 110 VAC, 115 W Maximum; 0.523 A at 220 VAC, 115 W Maximum; Test Conditions: Redundant Power Supplies, 40C, Full Traffic. • Heat Dissipation: 392 BTU/hour at 110/220 VAC Maximum
Regulatory Compliance	CE Mark Safety: • UL 60950-1:2003 • EN 60950:2000 • EMI and susceptibility (Class A): • U.S.: FCC Part 15.107 and 15.109 • Canada: ICES-003 • Japan: VCCI • Europe: EN 55022, EN 55024

Table 3 and Table 4 list the ordering and accessories information for Cisco 5500 Series Wireless Controllers.

Table 3.   Ordering Information for Cisco 5500 Series Wireless Controllers

Part Number	Product Name	SMARTnet 8x5xNBD
AIR-CT5508-12-K9	5500 Series Wireless Controller for up to 12 Cisco access points	CON-SNT-CT0812
AIR-CT5508-25-K9	5500 Series Wireless Controller for up to 25 Cisco access points	CON-SNT-CT0825
AIR-CT5508-50-K9	5500 Series Wireless Controller for up to 50 Cisco access points	CON-SNT-CT0850
AIR-CT5508-100-K9	5500 Series Wireless Controller for up to 100 Cisco access points	CON-SNT-CT08100
AIR-CT5508-250-K9	5500 Series Wireless Controller for up to 250 Cisco access points	CON-SNT-CT08250
AIR-CT5508-500-K9	5500 Series Wireless Controller for up to 500 Cisco access points	CON-SNT-CT08500

Table 4.   Accessories for Cisco 5500 Series Wireless Controllers

Part Number	Product Name
AIR-PWR-5500-AC=	5500 Series Wireless Controller Redundant AC Power Supply
AIR-FAN-5500=	5500 Series Wireless Controller Fan Tray
AIR-CT5500-RK-MNT	5500 Series Wireless Controller Spare mounting kit

Additive Capacity Upgrade Licenses

The following additive capacity upgrade licenses are available for the Cisco 5500 Series:

Table 5.   Ordering Information for Cisco 5500 Series Wireless Controllers Additive Capacity Licenses (e-delivery PAK's)

	Part Number	Product Description	SMARTnet 8x5xNBD
e-License	L-LIC-CT5508-UPG	Primary upgrade SKU: Pick any number or combination of the following options under this SKU to upgrade one or many controllers under one product authorization key	CON-SNT-LCTUPG
	L-LIC-CT5508-25A	25 AP Adder License for the 5508 Controller (eDelivery)	CON-SNT-LCT25A
	L-LIC-CT5508-50A	50 AP Adder License for the 5508 Controller (eDelivery)	CON-SNT-LCT50A
	L-LIC-CT5508-100A	100 AP Adder License for the 5508 Controller (eDelivery)	CON-SNT-LCT100A
	L-LIC-CT5508-250A	250 AP Adder License for the 5508 Controller (eDelivery)	CON-SNT-LCT250A

Table 6.   Ordering Information for Cisco 5500 Series Wireless Controllers Additive Capacity Licenses (Paper PAK's)

	Part Number	Product Description	SMARTnet 8x5xNBD
Paper License	LIC-CT5508-UPG	Primary upgrade SKU: Pick any number or combination of the following options under this SKU, to upgrade one or many controllers under one product authorization key.	CON-SNT-LCTUPG
	LIC-CT5508-25A	25 AP Adder License for the 5508 Controller	CON-SNT-LCT25A
	LIC-CT5508-50A	50 AP Adder License for the 5508 Controller	CON-SNT-LCT50A
	LIC-CT5508-100A	100 AP Adder License for the 5508 Controller	CON-SNT-LCT100A
	LIC-CT5508-250A	250 AP Adder License for the 5508 Controller	CON-SNT-LCT250A

The additive capacity licenses allow for the increase in access point capacity supported by the controller upto a maximum of 500 Access points. As an example, if a controller was initially ordered with the 250 access point support, that capacity could be later increased to upto 500 access points by purchasing a 250 access point additive capacity license (1x-LIC-CT5508-250A).

A certificate with a PAK is required to add additional access point capacity on the Cisco 5500 Series Wireless Controller.

The certificate may be expedited via email. If a paper certificate is required for customs, it should be ordered to ship via U.S. mail. Each additive capacity license and PAK must be registered prior to installation.

Ordering and installing the Cisco 5500 Series Wireless Controller additive capacity licenses is a three-step process:

1. Select the correct SKU for email or paper delivery.
2. Register the PAK certificate. (See Registering PAK Certificate).
3. Install the license on the Cisco 5508 Series Wireless Controller. (See Installing License).

Please review the Cisco Wireless LAN Controller Configuration Guide, Release 6.0, for detailed ordering, registration and installation information for the 5500 Series additive capacity licenses.

Electronic delivery of the same PAK's is available by ordering the e-License SKUs as listed in Table 4. If a paper certificate is required, please use the SKUs listed in Table 5.

PAK Certificate Registration

Customers are required to register a PAK certificate for all upgrade licenses for the Cisco 5500 Series Wireless Controllers. Customer email address and host name are required to register the PAK certificate at http://www.cisco.com/go/license.

Installing License on Cisco WCS Server
Follow these steps to install a license file. If you need additional help, contact Cisco Technical Assistance Center (TAC) at 800 553-2447 or tac@cisco.com.

1. Install Cisco WCS software if not already completed.
2. Save the license file (.lic) to a temporary directory on your hard drive. (You will receive an email from Cisco with an attached license file).
3. Open a supported version of the Internet Explorer browser.
4. In the location or address field, enter the following URL, replacing IP address with the IP address or host name of the Cisco WCS server: **https: // <IP address>**.
5. Log in to the Cisco WCS server as system administrator. (Be aware that usernames and passwords are casesensitive.).
6. From the Help menu select **Licensing**.
7. On the Licensing page, from the command menu select **Add License**
8. On the Add License page, click **Browse** to navigate to the location where you saved the .lic file.
9. Click **Download**. The Cisco WCS server imports the license.

Table 7 shows the optional paper PAK license for Cisco 5500 Series Wireless Controllers. DTLS license is designated for customers who purchase a controller with DTLS disabled due to import restrictions but get permission to add DTLS support after initial purchase. This optional DTLS license is required for OfficeExtend deployment.

Table 7.   Optional Licensing for Cisco 5500 Series Wireless Controllers (Paper PAKs)

Part Number	Description
LIC-CT5508-LPE-K9	Cisco 5508 Controller DTLS License (Paper Certificate - US Mail)

Service and Support

Cisco Wireless LAN Services

Cisco and our specialized partners offer a broad portfolio of end-to-end services to help you improve your organization's productivity and collaboration by assisting with the readiness, deployment and optimization of your wireless network and mobility services. Our services help you successfully deploy the 5500 Series Wireless Controller and integrate mobility solutions effectively to lower the total cost of ownership and secure your wireless network. To learn more about Cisco Wireless LAN Service offers, please visit http://www.cisco.com/go/wirelesslanservices.

Cisco WLAN Advanced Services Consulting is available for the planning and deployment stages to help ensure the successful integration of the Cisco 5500 Series Wireless Controller in your network. Cisco WLAN Advanced Services Consulting can be ordered with the SKU listed in Table 6.

Please contact your Cisco Sales representative with the information required for a pricing quote:

- Number of sites
- Desired coverage area (square feet or square miles)
- Estimated number of access points per site
- Advanced Mobility Services and required applications

Table 8.   Ordering Information for planning and deployment consulting services for the Cisco 5500 Series Wireless Controllers

Part Number	Service Name
AS-WLAN-CNSLT	Cisco WLAN Advanced Services Consulting

Summary

The Cisco 5500 Series Wireless Controller is designed for 802.11n performance and offers maximum scalability for enterprise and service provider wireless deployments. It simplifies deployment and operation of wireless networks, helping to ensure smooth performance, enhance security, and maximize network availability. The Cisco 5500 Series Wireless Controller manages all of the Cisco access points within campus environments and branch locations, eliminating complexity and providing network administrators with visibility and control of their wireless LANs.

For More Information

For more information about Cisco wireless controllers, contact your local account representative or visit http://www.cisco.com/en/US/products/ps6366/index.html.

For more information about the Cisco Unified Wireless Network framework, visit http://www.cisco.com/go/unifiedwireless.

HP 5400 zl Switch Series

Data sheet

Product overview

The HP 5400 zl Switch Series consists of advanced intelligent switches in the HP modular chassis product line which 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+ and non-PoE, integrated Layer 3 features, and HP AllianceONE solutions, the 5400 zl switches offer excellent investment protection, flexibility, and scalability, as well as ease of deployment, operation, and maintenance.

Key features

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

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 an 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 8200, 6200, 5400, or 3500 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 bidirectional link into a unidirectional one; this prevents network problems such as loops

- **Management simplicity:** includes common software features and CLI implementation across all ProVision-based switches (including the zl and yl 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

- **IEEE 802.3az Energy Efficient Ethernet:** Lowers power consumption in periods of low link usage (supported on v2 zl 10/100/1000 and 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 96 10-GbE ports per system

- **Jumbo frames:** on Gigabit Ethernet and 10-Gigabit ports, they 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

- **NEW IPv6:**
  - **IPv6 host:** enables switches to be managed in IPv6 network
  - **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
  - **IPv6 routing:** supports static and OSPFv3 routing protocols
  - **6in4 tunneling:** supports encapsulation of IPv6 traffic in IPv4 packets

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:** allow you to 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
- **IEEE 802.3ad Link Aggregation Control Protocol (LACP) and HP port trunking:** support up to 60 trunks, each with up to eight links (ports) per trunk
- **Distributed trunking:** enables loop-free and redundant network topology without using Spanning Tree Protocol; allows a server or switch to connect to two switches using one logical trunk for redundancy and load sharing
- **Optional redundant power supply (HP 5400 series):** provides uninterrupted power and allows hot-swapping of the redundant power supplies when installed

- **Hot-swappable modules (5400 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 and power supplies)
- **NEW Uplink failure detect:** provides active-standby network path redundancy for servers that are configured for active-standby NIC teaming

Layer 2 switching

- **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
- **IEEE 802.1ad Q-in-Q:** increases the scalability of an Ethernet network by providing a hierarchical structure; connects multiple LANs on a high-speed campus or metro network
- **MAC-based VLAN:** provides granular control and security; uses RADIUS to map a MAC address/user to specific VLANs (requires v2 modules)
- **HP's switch meshing:** dynamically load balances across multiple active redundant links to increase available aggregate bandwidth

Layer 3 services

- **User Datagram Protocol helper function:** allows User Datagram Protocol (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
- **Route maps:** provide more control during route redistribution; allow filtering and altering of route metrics

Layer 3 routing

- **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

- **NEW Policy-based routing:** uses classifier to select traffic that can be forwarded based on policy set by network administrator (requires v2 modules)

- **NEW BGP:** provides IPv4 Border Gateway routing protocol that is scalable, robust, and flexible

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
  - **Web-based authentication:** authenticates from Web browser for clients that do not support IEEE 802.1X supplicant
  - **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 accepts 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 a 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 the 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:** encrypts all transmitted data for secure remote 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 a switch configuration file

- **Management Interface Wizard:** helps ensure that management interfaces such as SNMP, telnet, SSH, SSL, Web, and USB are secured at 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 a standard RADIUS attribute and LLDP-MED to automatically configure a 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

- **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 5406 zl Switch with Premium Software (J9642A)	HP 5412 zl Switch with Premium Software (J9643A)	HP 5406-44G-PoE+-2XG v2 zl Switch with Premium Software (J9533A)
Included accessories	1 HP 5400 zl Premium License (J8994A)	1 HP 5400 zl Premium License (J8994A)	1 HP 20-port Gig-T PoE+ / 2-port 10GbE SFP+ v2 zl Module (J9536A) 1 HP 1500W PoE+ zl Power Supply (J9306A) 1 HP 24-port Gig-T PoE+ v2 zl Module (J9534A) 1 HP 5400 zl 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 slot includes: 1 x J9306A (HP 1500W 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	10000 entries	10000 entries	10000 entries
MAC address table size	64000 entries	64000 entries	64000 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 is 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 5406 zl Switch with Premium Software (J9642A)	HP 5412 zl Switch with Premium Software (J9643A)	HP 5406-44G-PoE+-2XG 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	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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 (UY909E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UY914E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UY909E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UY910E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UY915E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UY910E)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY911E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY916E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY911E)
	3-year, 24x7 SW phone support, software updates (UY912E)	3-year, 24x7 SW phone support, software updates (UW440E)	3-year, 24x7 SW phone support, software updates (UY912E)
	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)
	Installation with HP-provided configuration, system-based pricing (U4832E)	Installation with HP-provided configuration, system-based pricing (U4832E)	Installation with HP-provided configuration, system-based pricing (U4832E)
	4-year, 4-hour onsite, 13x5 coverage for hardware (UW452E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW457E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW452E)
	4-year, 4-hour onsite, 24x7 coverage for hardware (UW453E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW458E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW453E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW454E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW459E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW454E)
	4-year, 24x7 SW phone support, software updates (UW455E)	4-year, 24x7 SW phone support, software updates (UW460E)	4-year, 24x7 SW phone support, software updates (UW455E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UW473E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UY940E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UW473E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UW474E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UY917E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UW474E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW475E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UY918E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW475E)
	5-year, 24x7 SW phone support, software updates (UY938E)	5-year, 24x7 SW phone support, software updates (UY919E)	5-year, 24x7 SW phone support, software updates (UY938E)
	3 Yr 6 hr Call-to-Repair Onsite (UY913E)	3 Yr 6 hr Call-to-Repair Onsite (UW441E)	3 Yr 6 hr Call-to-Repair Onsite (UY913E)
	4 Yr 6 hr Call-to-Repair Onsite (UW456E)	4 Yr 6 hr Call-to-Repair Onsite (UW461E)	4 Yr 6 hr Call-to-Repair Onsite (UW456E)
	5 Yr 6 hr Call-to-Repair Onsite (UY939E)	5 Yr 6 hr Call-to-Repair Onsite (UY920E)	5 Yr 6 hr Call-to-Repair Onsite (UY939E)
	1-year, 4-hour onsite, 13x5 coverage for hardware (HR599E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR604E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR599E)

Specifications (continued)

	HP 5406 zl Switch with Premium Software (J9642A)	HP 5412 zl Switch with Premium Software (J9643A)	HP 5406-44G-PoE+-2XG v2 zl Switch with Premium Software (J9533A)
	1-year, 4-hour onsite, 24x7 coverage for hardware (HR600E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR605E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR600E)
	1-year, 6 hour Call-To-Repair Onsite for hardware (HR603E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR608E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR603E)
	1-year, 24x7 software phone support, software updates (HR602E)	1-year, 24x7 software phone support, software updates (HR607E)	1-year, 24x7 software phone support, software updates (HR602E)
	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR601E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR606E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR601E)
	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS738E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS746E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS738E)
	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS739E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS747E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS739E)
	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS740E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS740E)
	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS741E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS741E)
	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS742E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS749E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS742E)
	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS743E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS750E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS743E)
	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS744E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS751E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS744E)
	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS745E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS752E)	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS745E)
	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.	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS753E)	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.
		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 5406 zl Switch with Premium Software (J9642A)	HP 5412 zl Switch with Premium Software (J9643A)	HP 5406-44G-PoE+-2XG v2 zl Switch with Premium Software (J9533A)
Standards and protocols (applies to all products in series)	**BGP** RFC 1997 BGP Communities Attribute RFC 2918 Route Refresh Capability RFC 4271 A Border Gateway Protocol 4 (BGP-4) RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) RFC 5492 Capabilities Advertisement with BGP-4 **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 for IPv6 RFC 4022 MIB for TCP RFC 4087 IP Tunnel MIB RFC 4113 MIB for UDP RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers 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 5519 Multicast Group Membership Discovery MIB (MLDv2 only) 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 RFC 2933 IGMP 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 RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP) Secure Sockets Layer (SSL) SSHv2 Secure Shell

Specifications (continued)

	HP 5412-92G-PoE+-2XG v2 zl Switch with Premium Software (J9532A)	**HP 5406-44G-PoE+-4G-SFP v2 zl Switch with Premium Software (J9539A)**	**HP 5412-92G-PoE+-4G 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 10GbE SFP+ v2 zl Module (J9536A) 2 HP 1500W PoE+ zl Power Supply (J9306A) 1 HP 5400 zl 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 1500W PoE+ zl Power Supply (J9306A) 1 HP 5400 zl 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 1500W PoE+ zl Power Supply (J9306A) 1 HP 5400 zl 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	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	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	4 open mini-GBIC slots	4 open mini-GBIC slots
	8 open module slots	4 open module 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	Supports a maximum of 16 10-GbE ports or 140 autosensing 10/100/1000 ports or 100 mini-GBICs, or a combination	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 J9306A (HP 1500W PoE+ zl Power Supply)	1 power supply slot includes: 1 x J9306A (HP 1500W PoE+ zl Power Supply)	2 power supply slots includes: 2 x J9306A (HP 1500W 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	10000 entries	10000 entries	10000 entries
MAC address table size	64000 entries	64000 entries	64000 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 are installed. Two open power supply slots are available; three different power supplies are available. See power supply products for additional specifications.	One J9306A is installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J9306A are 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 5412-92G-PoE+-2XG v2 zl Switch with Premium Software (J9532A)	HP 5406-44G-PoE+-4G-SFP v2 zl Switch with Premium Software (J9539A)	HP 5412-92G-PoE+-4G 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	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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 (UY914E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UY909E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UY914E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UY915E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UY910E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UY915E)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY916E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY911E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UY916E)
	3-year, 24x7 SW phone support, software updates (UW440E)	3-year, 24x7 SW phone support, software updates (UY912E)	3-year, 24x7 SW phone support, software updates (UW440E)
	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)
	Installation with HP-provided configuration, system-based pricing (U4832E)	Installation with HP-provided configuration, system-based pricing (U4832E)	Installation with HP-provided configuration, system-based pricing (U4832E)
	4-year, 4-hour onsite, 13x5 coverage for hardware (UW457E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW452E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW457E)
	4-year, 4-hour onsite, 24x7 coverage for hardware (UW458E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW453E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW458E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW459E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW454E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW459E)
	4-year, 24x7 SW phone support, software updates (UW460E)	4-year, 24x7 SW phone support, software updates (UW455E)	4-year, 24x7 SW phone support, software updates (UW460E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UY940E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UW473E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UY940E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UY917E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UW474E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UY917E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UY918E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW475E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UY918E)
	5-year, 24x7 SW phone support, software updates (UY919E)	5-year, 24x7 SW phone support, software updates (UY938E)	5-year, 24x7 SW phone support, software updates (UY919E)
	3 Yr 6 hr Call-to-Repair Onsite (UW441E)	3 Yr 6 hr Call-to-Repair Onsite (UY913E)	3 Yr 6 hr Call-to-Repair Onsite (UW441E)
	4 Yr 6 hr Call-to-Repair Onsite (UW461E)	4 Yr 6 hr Call-to-Repair Onsite (UW456E)	4 Yr 6 hr Call-to-Repair Onsite (UW461E)
	5 Yr 6 hr Call-to-Repair Onsite (UY920E)	5 Yr 6 hr Call-to-Repair Onsite (UY939E)	5 Yr 6 hr Call-to-Repair Onsite (UY920E)
	1-year, 4-hour onsite, 13x5 coverage for hardware (HR604E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR599E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR604E)

Specifications (continued)

HP 5412-92G-PoE+-2XG v2 zl Switch with Premium Software (J9532A)	HP 5406-44G-PoE+-4G-SFP v2 zl Switch with Premium Software (J9539A)	HP 5412-92G-PoE+-4G v2 zl Switch with Premium Software (J9540A)
1-year, 4-hour onsite, 24x7 coverage for hardware (HR605E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR600E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR605E)
1-year, 6 hour Call-To-Repair Onsite for hardware (HR608E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR603E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR608E)
1-year, 24x7 software phone support, software updates (HR607E)	1-year, 24x7 software phone support, software updates (HR602E)	1-year, 24x7 software phone support, software updates (HR607E)
1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR606E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR601E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR606E)
1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS746E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS738E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS746E)
1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS747E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS739E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS747E)
3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS740E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)
3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS741E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS748E)
3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS749E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS742E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS749E)
4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS750E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS743E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS750E)
4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS751E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS744E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS751E)
5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS752E)	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS745E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS752E)
5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS753E)	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.	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS753E)
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.		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 5412-92G-PoE+-2XG v2 zl Switch with Premium Software (J9532A)	HP 5406-44G-PoE+-4G-SFP v2 zl Switch with Premium Software (J9539A)	HP 5412-92G-PoE+-4G v2 zl Switch with Premium Software (J9540A)
Standards and protocols (applies to all products in series)	**BGP** RFC 1997 BGP Communities Attribute RFC 2918 Route Refresh Capability RFC 4271 A Border Gateway Protocol 4 (BGP-4) RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) RFC 5492 Capabilities Advertisement with BGP-4 **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 for IPv6 RFC 4022 MIB for TCP RFC 4087 IP Tunnel MIB RFC 4113 MIB for UDP RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers 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 5519 Multicast Group Membership Discovery MIB (MLDv2 only) 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 RFC 2933 IGMP 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 RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP) Secure Sockets Layer (SSL) SSHv2 Secure Shell

Specifications (continued)

	HP 5406-44G-PoE+-4SFP zl Switch (J9447A)	HP 5412-92G-PoE+-4SFP zl Switch (J9448A)
Included accessories	1 HP 24-port 10/100/1000 PoE+ zl Module (J9307A) 1 HP 20-port 10/100/1000 PoE+ / 4-port Mini-GBIC zl Module (J9308A) 1 HP 1500W PoE+ zl Power Supply (J9306A)	3 HP 24-port 10/100/1000 PoE+ zl Module (J9307A) 1 HP 20-port 10/100/1000 PoE+ / 4-port Mini-GBIC zl Module (J9308A) 2 HP 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 slot includes: 1 x J9306A (HP 1500W PoE+ zl Power Supply)	2 power supply slots includes: 2 x J9306A (HP 1500W 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	10000 entries	10000 entries
MAC address table size	64000 entries	64000 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 is installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J9306A are 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)
Surge	IEC 61000-4-5; 1 kV/2 kV AC	IEC 61000-4-5; 1 kV/2 kV AC

Specifications (continued)

	HP 5406-44G-PoE+-4SFP zl Switch (J9447A)	HP 5412-92G-PoE+-4SFP zl Switch (J9448A)
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	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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, 13x5 coverage for hardware (UE253E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UE252E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UE255E)
	3-year, 24x7 SW phone support, software updates (UF786E)	3-year, 24x7 SW phone support, software updates (UF788E)
	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)
	Installation with HP-provided configuration, system-based pricing (U4832E)	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 (UR901E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UR917E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR902E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR918E)
	4-year, 24x7 SW phone support, software updates (UR903E)	4-year, 24x7 SW phone support, software updates (UR919E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UR904E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UR920E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UR905E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UR921E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR906E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR922E)
	5-year, 24x7 SW phone support, software updates (UR907E)	5-year, 24x7 SW phone support, software updates (UR923E)
	3 Yr 6 hr Call-to-Repair Onsite (UW377E)	3 Yr 6 hr Call-to-Repair Onsite (UW380E)
	4 Yr 6 hr Call-to-Repair Onsite (UW378E)	4 Yr 6 hr Call-to-Repair Onsite (UW381E)
	5 Yr 6 hr Call-to-Repair Onsite (UW379E)	5 Yr 6 hr Call-to-Repair Onsite (UW382E)
	1-year, 4-hour onsite, 13x5 coverage for hardware (HR989E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR984E)
	1-year, 4-hour onsite, 24x7 coverage for hardware (HR990E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR985E)
	1-year, 6 hour Call-To-Repair Onsite for hardware (HR993E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR988E)
	1-year, 24x7 software phone support, software updates (HR992E)	1-year, 24x7 software phone support, software updates (HR987E)
	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR991E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR986E)
	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS578E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS626E)
	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS579E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS627E)
	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS580E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS628E)
	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS581E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS629E)
	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS582E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS630E)
	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS583E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS631E)
	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS584E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS632E)
	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS585E)	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS633E)
	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.	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 5406-44G-PoE+-4SFP zl Switch (J9447A)		HP 5412-92G-PoE+-4SFP zl Switch (J9448A)	

Standards and protocols
(applies to all products in series)

BGP
RFC 1997 BGP Communities Attribute
RFC 2918 Route Refresh Capability
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 5492 Capabilities Advertisement with BGP-4

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 for IPv6
RFC 4022 MIB for TCP
RFC 4087 IP Tunnel MIB
RFC 4113 MIB for UDP
RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
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 5519 Multicast Group Membership Discovery MIB (MLDv2 only)
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
RFC 2933 IGMP 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
RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP)
Secure Sockets Layer (SSL)
SSHv2 Secure Shell

Specifications (continued)

	HP 5406-48G zl Switch (J8699A)	HP 5412-96G zl Switch (J8700A)
Included accessories	2 HP 24-port 10/100/1000 PoE zl Module (J8702A) 1 HP 875W zl Power Supply (J8712A)	4 HP 24-port 10/100/1000 PoE zl Module (J8702A) 2 HP 875W zl 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 slot includes: 1 x J8712A (HP 875W zl Power Supply)	2 power supply slots includes: 2 x J8712A (HP 875W 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	10000 entries	10000 entries
MAC address table size	64000 entries	64000 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 is installed. One open power supply slot is available; three different power supplies are available. See power supply products for additional specifications.	Two J8712A are 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 5406-48G zl Switch (J8699A)	HP 5412-96G 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	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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.	J8177B Gigabit 1000Base-T mini-GBIC is not supported on the 3500 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, 13x5 coverage for hardware (UE253E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UE251E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UE254E)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UE252E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UE255E)
	3-year, 24x7 SW phone support, software updates (UF786E)	3-year, 24x7 SW phone support, software updates (UF788E)
	Installation with minimum configuration, system-based pricing (U4828E)	Installation with minimum configuration, system-based pricing (U4828E)
	Installation with HP-provided configuration, system-based pricing (U4832E)	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 (UR901E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UR917E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR902E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR918E)
	4-year, 24x7 SW phone support, software updates (UR903E)	4-year, 24x7 SW phone support, software updates (UR919E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UR904E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UR920E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UR905E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UR921E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR906E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UR922E)
	5-year, 24x7 SW phone support, software updates (UR907E)	5-year, 24x7 SW phone support, software updates (UR923E)
	3 Yr 6 hr Call-to-Repair Onsite (UW377E)	3 Yr 6 hr Call-to-Repair Onsite (UW380E)
	4 Yr 6 hr Call-to-Repair Onsite (UW378E)	4 Yr 6 hr Call-to-Repair Onsite (UW381E)
	5 Yr 6 hr Call-to-Repair Onsite (UW379E)	5 Yr 6 hr Call-to-Repair Onsite (UW382E)
	1-year, 4-hour onsite, 13x5 coverage for hardware (HR989E)	1-year, 4-hour onsite, 13x5 coverage for hardware (HR984E)
	1-year, 4-hour onsite, 24x7 coverage for hardware (HR990E)	1-year, 4-hour onsite, 24x7 coverage for hardware (HR985E)
	1-year, 6 hour Call-To-Repair Onsite for hardware (HR993E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR988E)
	1-year, 24x7 software phone support, software updates (HR992E)	1-year, 24x7 software phone support, software updates (HR987E)
	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR991E)	1-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support and software updates (HR986E)
	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS578E)	1-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS626E)
	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS579E)	1-year, 24x7 software phone support, software updates + 4 hour hardware exchange (HS627E)
	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS580E)	3-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS628E)
	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS581E)	3-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS629E)
	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS582E)	4-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS630E)
	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS583E)	4-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS631E)
	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS584E)	5-year, 24x7 software phone support, software updates + Next Business Day Hardware Exchange (HS632E)
	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS585E)	5-year, 24x7 software phone support, software updates + 4 hour Hardware Exchange (HS633E)
	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.	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 5406-48G zl Switch (J8699A)		HP 5412-96G zl Switch (J8700A)

Standards and protocols
(applies to all products in series)

BGP
RFC 1997 BGP Communities Attribute
RFC 2918 Route Refresh Capability
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 5492 Capabilities Advertisement with BGP-4

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 for IPv6
RFC 4022 MIB for TCP
RFC 4087 IP Tunnel MIB
RFC 4113 MIB for UDP
RFC 4213 Basic Transition Mechanisms for IPv6 Hosts and Routers
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 5519 Multicast Group Membership Discovery MIB (MLDv2 only)
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
RFC 2933 IGMP 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
RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP)
Secure Sockets Layer (SSL)
SSHv2 Secure Shell

HP 5400 zl Switch Series accessories

Modules

NEW HP 8-port 10GBASE-T v2 zl Module (J9546A)

HP 4-port 10GbE CX4 zl Module (J8708A)

HP 4-port 10GbE X2 zl Module (J8707A)

HP 4-port 10GbE SFP+ zl Module (J9309A)

HP 8-port 10GbE SFP+ v2 zl Module (J9538A)

HP 20-port Gig-T PoE+ / 2-port 10GbE SFP+ v2 zl Module (J9536A)

HP 20-port Gig-T PoE+ / 4-port SFP v2 zl Module (J9535A)

HP 24-port SFP v2 zl Module (J9537A)

HP 12-port Gig-T PoE+ / 12-port SFP v2 zl Module (J9637A)

HP 24-port 10/100/1000 PoE zl Module (J8702A)

HP 20-port 10/100/1000 PoE+ / 4-port Mini-GBIC zl Module (J9308A)

HP 20-port Gig-T / 4-port Mini-GBIC zl Module (J8705A)

HP 24-port Mini-GBIC zl Module (J8706A)

HP 24-port 10/100/1000 PoE+ zl Module (J9307A)

HP 24-port Gig-T PoE+ v2 zl Module (J9534A)

HP 24-port 10/100 PoE+ zl Module (J9478A)

HP 24-port 10/100 PoE+ v2 zl Module (J9547A)

HP 24-port Gig-T v2 zl Module (J9550A)

HP 20-port Gig-T / 4-port SFP v2 zl Module (J9549A)

HP 20-port Gig-T / 2-port 10GbE SFP+ v2 zl Module (J9548A)

HP Extended Services zl Module with Riverbed Steelhead RiOS™ Application (J9517A)

HP Survivable Branch Communication zl Module powered by Microsoft® Lync (J9485A)

HP Services zl Module for Avaya Aura Session Border Controller powered by Acme Packet (J9486A)

HP Threat Management Services zl Module with 1-year IPS Subscription Service (J9156A)

HP Threat Management Services zl Module (J9155A)

HP Services zl Module (J9289A)

HP Advanced Services zl Module (J9483A)

HP Advanced Services zl Module with Microsoft® Windows® Server 2008 R2 Standard (J9666A)

NEW HP Advanced Services zl Module with Citrix XenServer platform (J9747A)

NEW HP Advanced Services zl Module with VMware vSphere Platform (J9748A)

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 (J9054C)

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 10G SFP+ to SFP+ 1m Direct Attach Copper Cable (J9281B)

HP X242 10G SFP+ to SFP+ 3m Direct Attach Copper Cable (J9283B)

HP X242 10G SFP+ to SFP+ 7m Direct Attach Copper Cable (J9285B)

HP X244 10G XFP to SFP+ 1m Direct Attach Copper Cable (J9300A)

HP X244 10G XFP to SFP+ 3m Direct Attach Copper Cable (J9301A)

HP X244 10G XFP to SFP+ 5m Direct Attach Copper Cable (J9302A)

HP 0.5 m Multimode OM3 LC/LC Optical Cable (AJ833A)

HP 1 m Multimode OM3 LC/LC Optical Cable (AJ834A)

HP 2 m Multimode OM3 LC/LC Optical Cable (AJ835A)

HP 5 m Multimode OM3 LC/LC Optical Cable (AJ836A)

HP 15 m Multimode OM3 LC/LC Optical Cable (AJ837A)

HP 30 m Multimode OM3 LC/LC Optical Cable (AJ838A)

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 1500W PoE+ zl Power Supply (J9306A)

HP 1500W zl Power Supply (J8713A)

HP 875W zl Power Supply (J8712A)

EPS/RPS

HP zl Power Supply Shelf (J8714A)

License

HP MSM760/765 Additional 40 Access Point License
(J9371A)

HP 5400 zl Premium License (J8994A)

WLAN

HP MSM765 zl Mobility Controller (J9370A)

Appliance

HP PCM+ Agent with ONE Services zl Module (J9496A)

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.

To learn more, visit www.hp.com/networking

Avaya Communication Server 1000

A foundation for unified communications

Provide all your employees – whether they're working from home, on the road, in a branch office or at headquarters – with access to communication and productivity enhancing capabilities. Communication Server 1000 is a tightly integrated access element of the Avaya Aura™ communications platform, that provides contextual based collaborative communications that can increase customer interaction and service – through improved employee contact, extended reach, and always-on communications.

Communication Server 1000

The Avaya Communication Server 1000 is an enterprise communications platform and integrated access element of the Avaya Aura™ solution that enables a simple evolutionary path to unified communications. Communications Server 1000 offers a comprehensive suite of reliability and survivability mechanisms to help ensure the integrity of your network, while enabling communications security through a full suite of security features and capabilities. The Communication Server 1000 supports the delivery of business-critical telephony features and Avaya Aura™ features and applications to any user — anywhere on the network.

Resilient to ensure business continuity

Ensuring the integrity of your telephony infrastructure is critical to business success, which is why the Avaya Communication Server 1000 was specially designed with no single point of failure. The platform can also be deployed with an array of reliability and redundancy mechanism to help ensure business continues as usual even in adverse conditions.

Campus redundancy
Communication Server 1000's fault tolerance and operational resilience enable active and inactive call servers to be physically separated on different floors or in different buildings across a campus environment. The separate redundant call servers connect over a high-speed, reliable data link. If a disaster such as a fire or flood causes one call server to fail, the redundant call server will automatically take over.

Geographic redundancy
Since system failures are not always localized, enterprises must have broad-reaching failover mechanisms that provide continuity of service in the event of disasters or network failures. Implementing geographic redundancy enables networks to 'self-heal' in the event that the main call server is isolated from the rest of the network — allowing users to stay connected and business operations to continue.

Branch survivability
Connectivity between remote sites and their network can be impacted without warning. To minimize exposure in the event of these unforeseen circumstances, it's critical that offices be able to support their telephony infrastructure in isolation. A full suite of survivable branch office solutions are available to address the needs and requirements of branch offices from small to large.

Communication Server 1000 Portfolio	
Communication Server 1000E	Communications Server 1000E (CS 1000E) is ideal for existing customer environments that are IP-centric and want a flexible, reliable and secure IP Telephony solution. CS 1000E integrates with Avaya Aura™ and supports a broad portfolio of productivity-enhancing applications and services.
Communication Server 1000M	Communication Server 1000M (CS 1000M) is well suited for Meridian 1 customers that are TDM-centric and want to maintain investment in their existing infrastructure - while evolving to enjoy the benefits of IP applications and services.

Avaya Communication Server 1000 Highlights

- Fully integrated access element of Avaya Aura™ with Session Manager delivering SIP Trunk consolidation across CS 1000 networks as well as mixed CS 1000 and Avaya Communication Manager networks

- Centralized application deployment and management across the entire network including next generation Avaya Aura™ Conferencing, and Avaya Aura™ Messaging solutions

- SIP Peering extending application sequencing and foundation services to CS 1000 users across the network

- IP PBX functionality delivered over IP LAN and WAN infrastructures delivers a comprehensive suite of rich telephony features and applications

- Support for TDM, IP, and Session Initiation Protocol (SIP) clients on a single platform provides a smooth migration path for a cost of ownership advantage

- Scalability to meet growing enterprise requirements: 40,000 IP clients or 20,000 SIP clients per call server. A high scalability centrally managed solution supports up to 150,000 IP users

- Inherent reliability and multiple resiliency mechanisms to maintain business continuity during a network or system failure

- Supports IM (Instant Messaging) and presence capability

- Integration with best-in-class unified communications solutions from market-leading desktop application providers such as Microsoft and IBM

- Extensive client portfolio, including IP phones, soft clients, wireless handsets as well as digital and analog phones to meet a diverse set of customer needs

Unified Communications Management

With Avaya Aura™ System Manager integrating the Avaya Unified Communications Management solution, network administrators have a common, comprehensive web-based management solution to manage voice, data and multimedia applications, utilizing a set of common services that serve as building blocks for unifying management applications. Key system and network management applications for Communication Server 1000, such as Element Manager, Network Routing Services Manager, and Subscriber Manager, are all deployed and accessed from a single secure domain within a consolidated navigation

environment. Avaya Aura™ System Manager supports all Communication Server 1000 deployment scenarios including high scalability centrally managed architecture.

Voice quality management

Equipment reliability doesn't mean a thing if the network can't provide high-quality service. Communication Server 1000 supports real-time monitoring and reporting of network conditions during calls — enabling quicker resolution to network problems to continue high-quality service.

Proactive Voice Quality Management (PVQM) enables network managers to deliver the overall quality of their IP Telephony deployments. PVQM continuously

and passively measures the user quality of experience (QoE) for IP Telephony communications, conducts system health checks for IP Telephony servers, and provides troubleshooting and resolution for any performance degradation or fault conditions to help maintain the quality of VoIP communications.

Security

Increased user mobility combined with growing threats from legitimate and illegitimate users and devices represent a daunting challenge for companies who are trying to secure their networks. Fundamental to our architecture is a comprehensive layered defense approach that helps ensure the integrity and security of the network and its users. This offers numerous security capabilities that include firewall protection to secure against denial of service (DoS) attacks. Communication Server 1000 supports a number of capabilities for the security of its users, including the encryption of media and signaling traffic.

Location-based emergency services

Communication Server 1000 employs intelligent emergency services globally (e.g., 911, 999, 112) that track the location of IP clients and direct calls to the appropriate emergency contact, even if that client is halfway around the world. Location-based emergency services are a core built-in capability of the Communication Server 1000 designed for simple, effective and reliable service you can count on when you need it the most.

IP Phones and Clients

Avaya Communication Server 1000 supports one of the most extensive portfolios of IP clients and devices in the industry — allowing customers to choose the right mix of devices that best supports their business, user and mobility requirements:

- IP phones for desktops include the award-winning 1100 Series IP Deskphones and the value-oriented 1200 Series IP Deskphones. Each series includes models tailored to specific customer environments, budgets and/or requirements.

- Mobile handsets including the 6100 Series WLAN handsets and the 4000 Series DECT handsets for on-site mobility using enterprise-deployed wireless technologies. Handset choices range from modern sleek designs to specialized and rugged models designed to endure in harsh environments.

- Soft client options include the 2050 IP Softphone for Windows PCs and PDAs supporting Unified Communications, Avaya one-X® Mobile Lite and Avaya one-X® Communicator solutions.

- Any cell phone including the Apple iPhone can also be enhanced with the Communication Server 1000 features by using the Mobile Extension feature to pair it with the user's office phone.

Collectively the client portfolio provides ideal solutions for all types of users including office workers, contact center agents, remote workers, road warriors or campus mobile workers — delivering more effective employee communications and improved customer responsiveness. The tight integration of IP clients with the Communication Server 1000 system delivers streamlined management and provisioning for site administrators.

Business-enhancing telephony and unified communications

Communication Server 1000 leverages advances in technology, such as Session

Initiation Protocol (SIP), to provide users the flexibility to choose the type of media or device they need to communicate most effectively. SIP, a powerful protocol for IP Telephony and core architecture technology of Avaya Aura™, supports a wide range of media sessions allowing users to engage in real-time, integrated business communications regardless of location, media type or device.

Communication Server 1000 natively integrates unified communications capabilities for simple and cost-effective services, ideal for small to large organizations looking to take advantage of the latest productivity-enhancing applications.

Communication Server 1000 users also have equal access to feature-rich applications from Avaya including Avaya Aura™ Conferencing, Avaya Aura™ Messaging and Avaya CallPilot™, Avaya Hospitality

Figure 1. Example of network deployment

3
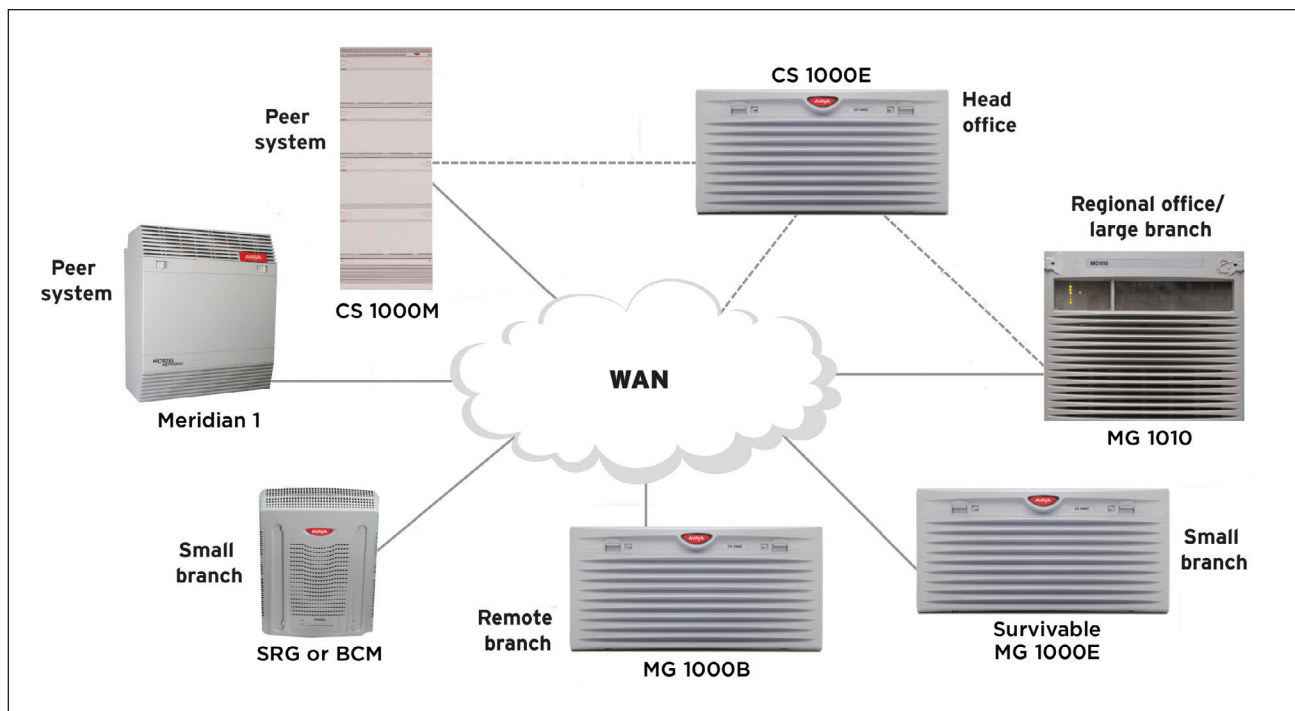
Messaging Server 400, Avaya NES Contact Center, Avaya Agile Communication Environment™ and more. These applications enable employees to improve their productivity, stay connected and actively engaged.

Investment protection and freedom to evolve

As enterprises face increasingly tighter capital and IT budgets, an evolutionary approach can provide significant savings. Our investment protection philosophy and migration program helps ensure that when an enterprise is ready to implement the latest technology that Avaya Aura™ unified communications delivers, they can upgrade with minimal to no disruption — enabling users to remain productive and engaged with customers and colleagues regardless of time or distance.

Partnering to deliver unified communications

To deliver on the promise of open unified communications, we work with leading desktop vendors such as Microsoft and IBM to deliver integrated telephony across the entire enterprise.

Enterprises can take advantage of Communication Server 1000 telephony features and capabilities integrated into Microsoft applications. These applications include Microsoft Office Communications Server 2007 (OCS) and Microsoft Exchange Server 2007 Unified Messaging. And with IBM, our rich telephony capabilities are extended to Lotus Notes and Sametime users. Additionally, through our DevConnect Partner Program, innovation continues with eco-system partners to accelerate the deployment of enhanced next-generation solutions.

Conclusion

Avaya is delivering unified communications solutions that allow users to experience enhanced communications while leveraging their existing investments in telephony. The Avaya Communication Server 1000, with its tight integration with Avaya Aura™, is helping enterprises maximize each interaction, reinforce each relationship and deliver innovative new services.

Learn More

To learn more about Avaya Communication Server 1000, Avaya Aura, or our other award-winning solutions and Avaya Global Services, contact your Avaya Account Manager or Authorized Partner. Or visit us at **www.avaya.com**.

About Avaya

Avaya is a global provider of business collaboration and communications solutions, providing unified communications, contact centers, data solutions and related services to companies of all sizes around the world. For more information please visit **www.avaya.com**.

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HP 5830 Switch Series

Data sheet

Product overview

The HP 5830AF Switch Series is a family of high-density 1 GbE top-of-rack data center and campus switches that are a part of the HP FlexFabric solution module of the HP FlexNetwork architecture. The two models, the 5830AF-48G and 5830AF-96G switches, are ideally suited for deployments at the server access layer in medium-sized and large enterprise data centers and campus networks. The HP 5830AF-48G Switch delivers 48 1-GbE ports and up to four 10-GbE ports in a space-saving 1RU package, while the HP 5830AF-96G Switch provides an industry-leading 96 1-GbE ports and up to 10 10-GbE uplink ports in a 2RU form factor.

Key features

• Stackable, high port density for high scalability
• HP IRF technology for simpler two-tier networks
• Ultradeep (1 Gb and 3 GB) packet buffers
• Full L2/L3 features, IPv4 and IPv6 dual stack
• Lower OpEx and greener data centers

Features and benefits

Quality of Service (QoS)

- **Traffic policing:** supports Committed Access Rate (CAR) and line rate

- **Powerful QoS feature:** creates traffic classes based on access control lists (ACLs), IEEE 802.1p precedence, IP, DSCP, or Type of Service (ToS) precedence; supports filter, redirect, mirror, or remark; supports the following congestion actions: strict priority (SP) queuing, weighted round robin (WRR), weighted fair queuing (WFQ), weighted random early discard (WRED), SP+WRR, and SP+WFQ

Management

- **sFlow (RFC 3176):** provides scalable ASIC-based wire-speed network monitoring and accounting with no impact on network performance; this allows network operators to gather a variety of sophisticated network statistics and information for capacity planning and real-time network monitoring purposes

- **Remote configuration and management:** is available through a secure Web browser or a command-line interface (CLI)

- **Manager and operator privilege levels:** enable read-only (operator) and read-write (manager) access on CLI and Web browser management interfaces

- **Management VLAN:** segments traffic to and from management interfaces, including CLI/telnet, a Web browser interface, and SNMP

- **Remote intelligent mirroring:** mirrors ingress/egress ACL-selected traffic from a switch port or VLAN to a local or remote 8200 zl, 6600, 6200 yl, 5400 zl, or 3500 switch port anywhere on the network

- **Multiple configuration files:** can be stored to the flash image

- **Secure Web GUI:** provides a secure, easy-to-use graphical interface for configuring the module via HTTPS

- **SNMPv1, v2c, and v3:** facilitate centralized discovery, monitoring, and secure management of networking devices

- **Remote monitoring (RMON):** uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group

- **Network Time Protocol (NTP):** synchronizes timekeeping among distributed time servers and clients; keeps consistent timekeeping among all clock-dependent devices within the network so that the devices can provide diverse applications based on the consistent time

- **Out-of band-interface:** isolates management traffic from user data plane traffic for complete isolation and total reachability, no matter what happens in the data plane

Connectivity

- **Auto-MDIX:** automatically adjusts for straight-through or crossover cables on all 10/100 ports

- **Jumbo Frames:** on Gigabit Ethernet and 10-Gigabit ports, they allow high-performance remote backup and disaster recovery services

- **IPv6 native support:**
  - **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
  - **Multicast Listener Discovery (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 IPv6 static routes and IPv6 versions of RIP and OSPF routing protocols

Performance

- **Extraordinarily high port density:** is a single box-type switch that can provide 96 GbE ports and 10 10-GbE ports simultaneously with full line-rate switching and forwarding

- **Ultradeep packet buffering:** provides up to a 3G packet buffer to eliminate network congestion at the I/O associated with heavy use of server virtualization, as well as bursty multimedia, storage applications, and other critical services.

- **Hardware-based wire-speed access control lists (ACLs):** feature-rich ACL implementation (TCAM based) helps ensure high levels of security and ease of administration without impacting network performance

- **Local Address Resolution Protocol (ARP):** ARP fast reply feature provides an outstanding utilization of air-interface resources by first issuing an ARP request locally before the AP broadcasts over the radio interface

Resiliency and high availability

- **Device Link Detection Protocol (DLDP):** monitors link connectivity and shuts down ports at both ends if unidirectional traffic is detected, preventing loops in STP-based networks

- **Virtual Router Redundancy Protocol (VRRP):** allows groups of two routers to dynamically back each other up to create highly available routed environments

- **Intelligent Resilient Framework (IRF):** creates virtual resilient switching fabrics, where two or more switches perform as a single Layer 2 switch and Layer 3 router; switches do not have to be co-located and can be part of a disaster-recovery system; servers or switches can be attached using standard LACP for automatic load balancing and high availability; simplifies network operation by eliminating the complexity of Spanning Tree Protocol, Equal-Cost Multipath (ECMP), or VRRP

- **Rapid Ring Protection Protocol (RRPP):** connects multiple switches in a high-performance ring using standard Ethernet technology; traffic can be rerouted around the ring in less than 200 ms, reducing the impact on traffic and applications

- **Smart link:** allows 200 ms failover between links

- **Data center optimized design:** supports front-to-back/back-to-front airflow for hot/cold aisles, rear rack mounts, and redundant hot-swappable AC or DC power and fans

Manageability

- **Troubleshooting:** ingress and egress port monitoring enable network problem solving

Layer 2 switching

- **Spanning Tree/MSTP and RSTP:** prevent network loops

- **GARP VLAN Registration Protocol:** allows automatic learning and dynamic assignment of VLANs

- **Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) protocol snooping:** effectively control and manage the flooding of multicast packets in a Layer 2 network

- **32K MAC addresses:** provide access to many Layer 2 devices

- **IEEE 802.1ad QinQ and Selective QinQ:** increase the scalability of an Ethernet network by providing a hierarchical structure; connect multiple LANs on a high-speed campus or metro network

- **10 GbE port aggregation:** allows grouping of ports to increase overall data throughput to a remote device

- **Port isolation:** increases security by isolating ports within a VLAN while still allowing them to communicate with other VLANs

- **Per-VLAN Spanning Tree Plus (PVST+):** allows each virtual LAN (VLAN) to build a separate spanning tree to improve link bandwidth usage in network environments where multiple VLANs exist

Layer 3 services

- **Loopback interface address:** defines an address in Routing Information Protocol (RIP) and OSPF that can always be reachable, improving diagnostic capability

- **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

- **Route maps:** provide more control during route redistribution; allow filtering and altering of route metrics

- **Dynamic Host Configuration Protocol (DHCP):** simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation across subnets

Layer 3 routing

- **IPv6 tunneling:** is an important element for the transition from IPv4 to IPv6; allows IPv6 packets to traverse IPv4-only networks by encapsulating the IPv6 packet into a standard IPv4 packet; supports manually configured, 6to4, and Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) tunnels

- **Bidirectional Forwarding Detection (BFD):** enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, and IRF

- **Policy-based routing:** makes routing decisions based on policies set by the network administrator

- **IGMPv1, v2, and v3:** allow individual hosts to be registered on a particular VLAN

- **PIM-SSM, PIM-DM, and PIM-SM (for IPv4 and IPv6):** support IP Multicast address management and inhibition of DoS attacks

- **Layer 3 IPv4 routing:** provides routing of IPv4 at media speed; supports static routes, RIP and RIPv2, OSPF, IS-IS, and BGP

- **Equal-Cost Multipath (ECMP):** enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth
- **Layer 3 IPv6 routing:** provides routing of IPv6 at media speed; supports static routes, RIPng, OSPFv3, IS-ISv6, and MP-BGP

Security

- **Access control lists (ACLs):** provide IP Layer 3 filtering based on source/destination IP address/subnet and source/destination TCP/UDP port number
- **Secure Shell:** encrypts all transmitted data for secure remote CLI access over IP networks
- **Port security:** allows access only to specified MAC addresses, which can be learned or specified by the administrator
- **Secure FTP:** allows secure file transfer to and from the switch; protects against unwanted file downloads or unauthorized copying of a switch configuration file
- **Secure management access:** securely encrypts all access methods (CLI, GUI, or MIB) through SSHv2, SSL, and/or SNMPv3
- **Identity-driven security and access control:**
  - **Per-user ACLs:** permits or denies user access to specific network resources based on user identity, location, and time of day, allowing multiple types of users on the same network to access specific network services without risk to network security or unauthorized access to sensitive data
  - **Automatic VLAN assignment:** automatically assigns users to the appropriate VLAN based on their identity and location, and the time of day
- **STP BPDU port protection:** blocks Bridge Protocol Data Units (BPDUs) on ports that do not require BPDUs, preventing forged BPDU attacks
- **DHCP protection:** blocks DHCP packets from unauthorized DHCP servers, preventing denial-of-service attacks
- **Dynamic ARP protection:** blocks ARP broadcasts from unauthorized hosts, preventing eavesdropping or theft of network data
- **STP Root Guard:** protects the root bridge from malicious attacks or configuration mistakes
- **Guest VLAN:** similar to IEEE 802.1X, it provides a browser-based environment to authenticated clients
- **MAC-based authentication:** allows or denies access to the switch based on client MAC address
- **IP Source Guard:** helps prevent IP spoofing attacks

- **Endpoint Admission Defense (EAD):** provides security policies to users accessing a network
- **RADIUS/HWTACACS:** eases switch management security administration by using a password authentication server

Convergence

- **IP multicast snooping (data-driven IGMP):** automatically prevents flooding of IP multicast traffic
- **IEEE 802.1AB Link Layer Discovery Protocol (LLDP):** is an automated device discovery protocol that provides easy mapping of network management applications
- **Internet Group Management Protocol (IGMP):** is used by IP hosts to establish and maintain multicast groups; supports v1, v2, and v3; utilizes Any-Source Multicast (ASM) or Source-Specific Multicast (SSM) to manage IPv4 multicast networks
- **Protocol Independent Multicast (PIM):** is used for IPv4 and IPv6 multicast applications; supports PIM Dense Mode (PIM-DM), Sparse Mode (PIM-SM), and Source-Specific Mode (PIM-SSM)
- **Multicast Source Discovery Protocol (MSDP):** is used for inter-domain multicast applications, allowing multiple PIM-SM domains to interoperate
- **Multicast Border Gateway Protocol (MBGP):** allows multicast traffic to be forwarded across BGP networks and kept separate from unicast traffic
- **Multicast VLAN:** allows multiple VLANs to receive the same IPv4 or IPv6 multicast traffic, reducing network bandwidth demand by eliminating multiple streams to each VLAN
- **LLDP-MED:** is a standard extension that automatically configures network devices, including LLDP-capable IP phones
- **LLDP-CDP compatibility:** receives and recognizes CDP packets from Cisco's IP phones for seamless interoperation

Monitor and diagnostics

- **Port mirroring:** enables traffic on a port to be simultaneously sent to a network analyzer for monitoring
- **OAM (802.3ah):** detects data link layer problems that occurred in the "last mile"; monitors the status of the link between the two devices

- **CFD (802.1ag):** connectivity fault detection (CFD) provides a Layer 2 link OAM (operations, administration, and maintenance) mechanism used for link connectivity detection and fault locating

Additional information

- **Green initiative support:** provides support for RoHS and WEEE regulations

- **Green IT and power:** use the latest advances in silicon development, shut off unused ports, and use variable-speed fans to improve energy efficiency

Warranty and support

- **1-year warranty:** 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

- **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)

HP 5830 Switch Series

Specifications

	HP 5830AF-48G Switch with 1 Interface Slot (JC691A)	**HP 5830AF-96G Switch (JC694A)**
Ports	48 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); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only	96 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); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only
	2 dual-personality ports; auto-sensing 10/100/1000Base-T or SFP	10 fixed 1000/10000 SFP+ ports
	2 fixed 1000/10000 SFP+ ports	1 RJ-45 serial console port
	1 RJ-45 serial console port	1 RJ-45 out-of-band management port
	1 RJ-45 out-of-band management port	
	1 extended module slot	
Power supplies	2 power supply slots 1 minimum power supply required (ordered separately)	2 power supply slots 1 minimum power supply required (ordered separately)
Fan tray	1 fan tray slot Base product does not include fan tray	1 fan tray slot Base product does not include fan tray
Physical characteristics		
Dimensions	18.11(d) x 17.32(w) x 1.72(h) in. (46 x 44 x 4.36 cm) (1U height)	25.98(d) x 17.32(w) x 3.39(h) in. (66 x 44 x 8.6 cm)
Weight	14.53 lb. (6.59 kg)	31.75 lb. (14.4 kg)
Memory and processor		
	64 MB flash, 1 GB SDRAM; packet buffer size: 1 GB	64 MB flash, 1 GB SDRAM; packet buffer size: 3 GB
Performance		
Throughput	119 million pps (64-byte packets)	291.6 million pps (64-byte packets)
Switching capacity	160 Gbps	392 Gbps
Routing table size	12000 entries	12000 entries
MAC address table size	32000 entries	32000 entries
Environment		
Operating temperature	32°F to 113°F (0°C to 45°C)	32°F to 113°F (0°C to 45°C)
Operating relative humidity	5% to 95%	5% to 95%
Acoustic	Low-speed fan: 58 dB, High-speed fan: 65 dB	Low-speed fan: 58 dB, High-speed fan: 65 dB
Electrical characteristics		
Maximum heat dissipation	440 BTU/hr (464.2 kJ/hr)	1209 BTU/hr (1275.49 kJ/hr)
Voltage	100-240 VAC	100-240 VAC
DC voltage	-40 to -60 VDC	-40 to -60 VDC
Frequency	50/60 Hz	50/60 Hz
Safety	UL 60950-1; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1; Anatel; ULAR; GOST; EN 60950-1/A11; FDA 21 CFR Subchapter J; NOM; ROHS Compliance	UL 60950-1; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1; Anatel; ULAR; GOST; EN 60950-1/A11; FDA 21 CFR Subchapter J; NOM; ROHS Compliance
Emissions	VCCI Class A; EN 55022 Class A; ICES-003 Class A; ETSI EN 300 386 V1.3.3; AS/NZS CISPR22 Class A; EMC Directive 2004/108/EC; EN 55024:1998+ A1:2001 + A2:2003; FCC (CFR 47, Part 15) Subpart B Class A	VCCI Class A; EN 55022 Class A; ICES-003 Class A; ETSI EN 300 386 V1.3.3; AS/NZS CISPR22 Class A; EMC Directive 2004/108/EC; EN 55024:1998+ A1:2001 + A2:2003; FCC (CFR 47, Part 15) Subpart B Class A
Immunity		
Generic	ETSI EN 300 386 V1.3.3	ETSI EN 300 386 V1.3.3
EN	EN 55024:1998+ A1:2001 + A2:2003	EN 55024:1998+ A1:2001 + A2:2003
ESD	EN 61000-4-2; IEC 61000-4-2	EN 61000-4-2; IEC 61000-4-2
Radiated	EN 61000-4-3; IEC 61000-4-3	EN 61000-4-3; IEC 61000-4-3
EFT/Burst	EN 61000-4-4; IEC 61000-4-4	EN 61000-4-4; IEC 61000-4-4
Surge	EN 61000-4-5; IEC 61000-4-5	EN 61000-4-5; IEC 61000-4-5
Conducted	EN 61000-4-6; IEC 61000-4-6	EN 61000-4-6; IEC 61000-4-6
Power frequency magnetic field	IEC 61000-4-8; IEC 61000-4-8	IEC 61000-4-8; IEC 61000-4-8
Voltage dips and interruptions	EN 61000-4-11; IEC 61000-4-11	EN 61000-4-11; IEC 61000-4-11
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	IMC - Intelligent Management Center; command-line interface; Web browser; out-of-band management; SNMP Manager; Telnet; RMON1; FTP; IEEE 802.3 Ethernet MIB	IMC - Intelligent Management Center; command-line interface; Web browser; out-of-band management; SNMP Manager; Telnet; RMON1; FTP; IEEE 802.3 Ethernet MIB

Specifications (continued)

	HP 5830AF-48G Switch with 1 Interface Slot (JC691A)	HP 5830AF-96G Switch (JC694A)
Notes	Additional specifications • Static MAC table: 5120 • Max VLAN interface: 1,000 • Multicast L2 entries for IPv4: 2,000 • Multicast L2 entries for IPv6: 1,000 • Multicast L3 entries for IPv4: 2,000 • Multicast L3 entries for IPv6: 1,000 • VLAN table: 4,000 • QoS forward queue number: 8 • Static ARP number: 1,000 • Dynamic ARP number: 8,000 • MAX number in one link group: 8 • Link group number: 128 • ACL number: 4,000 (ingress); 512 (egress)	Additional specifications • Static MAC table: 5120 • Max VLAN interface: 1,000 • Multicast L2 entries for IPv4: 2,000 • Multicast L2 entries for IPv6: 1,000 • Multicast L3 entries for IPv4: 2,000 • Multicast L3 entries for IPv6: 1,000 • VLAN table: 4,000 • QoS forward queue number: 8 • Static ARP number: 1,000 • Dynamic ARP number: 8,000 • MAX number in one link group: 8 • Link group number: 128 • ACL number (GbE ports): 8,000 (ingress); 1,000 (egress) • ACL number(10 GbE ports): 2,000 (ingress); 512 (egress)
Services	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.	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 5830AF-48G Switch with 1 Interface Slot (JC691A)	HP 5830AF-96G Switch (JC694A)

Standards and protocols
(applies to all products in series)

BGP
RFC 1771 BGPv4
RFC 1772 Application of the BGP
RFC 1965 BGP4 confederations
RFC 1997 BGP Communities Attribute
RFC 1998 PPP Gandalf FZA Compression Protocol
RFC 2385 BGP Session Protection via TCP MD5
RFC 2439 BGP Route Flap Damping
RFC 2796 BGP Route Reflection
RFC 2858 BGP-4 Multi-Protocol Extensions
RFC 2918 Route Refresh Capability
RFC 3065 Autonomous System Confederations for BGP
RFC 3392 Capabilities Advertisement with BGP-4
RFC 4271 A Border Gateway Protocol 4 (BGP-4)
RFC 4272 BGP Security Vulnerabilities Analysis
RFC 4273 Definitions of Managed Objects for BGP-4
RFC 4274 BGP-4 Protocol Analysis
RFC 4275 BGP-4 MIB Implementation Survey
RFC 4276 BGP-4 Implementation Report
RFC 4277 Experience with the BGP-4 Protocol
RFC 4360 BGP Extended Communities Attribute
RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP)
RFC 5291 Outbound Route Filtering Capability for BGP-4
RFC 5292 Address-Prefix-Based Outbound Route Filter for BGP-4

Denial of service protection
RFC 2267 Network Ingress Filtering
Automatic filtering of well-known denial-of-service packets
CPU DoS Protection
Rate Limiting by ACLs

Device management
RFC 1157 SNMPv1/v2c
RFC 1305 NTPv3
RFC 1902 (SNMPv2)
RFC 2271 FrameWork
RFC 2579 (SMIv2 Text Conventions)
RFC 2580 (SMIv2 Conformance)
RFC 2819 (RMON groups Alarm, Event, History and Statistics only)
HTTP, SSHv1, and Telnet
Multiple Configuration Files
Multiple Software Images
SSHv1/SSHv2 Secure Shell
TACACS/TACACS+
Web UI

General protocols
IEEE 802.1ad Q-in-Q
IEEE 802.1ag Service Layer OAM
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
IEEE 802.1X PAE
IEEE 802.3ab 1000BASE-T
IEEE 802.3ac (VLAN Tagging Extension)
IEEE 802.3ad Link Aggregation Control Protocol (LACP)
IEEE 802.3ae 10-Gigabit Ethernet
IEEE 802.3at
IEEE 802.3u 100BASE-X
IEEE 802.3x Flow Control
IEEE 802.3z 1000BASE-X
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP

RFC 854 TELNET
RFC 894 IP over Ethernet
RFC 903 RARP
RFC 906 TFTP Bootstrap
RFC 925 Multi-LAN Address Resolution
RFC 950 Internet Standard Subnetting Procedure
RFC 951 BOOTP
RFC 959 File Transfer Protocol (FTP)
RFC 1027 Proxy ARP
RFC 1035 Domain Implementation and Specification
RFC 1042 IP Datagrams
RFC 1058 RIPv1
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1256 ICMP Router Discovery Protocol (IRDP)
RFC 1293 Inverse Address Resolution Protocol
RFC 1305 NTPv3
RFC 1350 TFTP Protocol (revision 2)
RFC 1393 Traceroute Using an IP Option
RFC 1519 CIDR
RFC 1531 Dynamic Host Configuration Protocol
RFC 1533 DHCP Options and BOOTP Vendor Extensions
RFC 1591 DNS (client only)
RFC 1624 Incremental Internet Checksum
RFC 1701 Generic Routing Encapsulation
RFC 1721 RIP-2 Analysis
RFC 1723 RIP v2
RFC 1812 IPv4 Routing
RFC 2091 Trigger RIP
RFC 2131 DHCP
RFC 2138 Remote Authentication Dial In User Service (RADIUS)
RFC 2453 RIPv2
RFC 2644 Directed Broadcast Control
RFC 2763 Dynamic Name-to-System ID mapping
RFC 2784 Generic Routing Encapsulation (GRE)
RFC 2865 Remote Authentication Dial In User Service (RADIUS)
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 3277 IS-IS Transient Blackhole Avoidance
RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3784 ISIS TE support
RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit
RFC 3787 Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS)
RFC 3847 Restart signaling for IS-IS
RFC 4251 The Secure Shell (SSH) Protocol Architecture
RFC 5130 A Policy Control Mechanism in IS-IS Using Administrative Tags

IP multicast
RFC 2236 IGMPv2
RFC 2283 Multiprotocol Extensions for BGP-4
RFC 2362 PIM Sparse Mode (Premium Edge License)
RFC 3376 IGMPv3
RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 3618 Multicast Source Discovery Protocol (MSDP)
RFC 3973 PIM Dense Mode
RFC 4541 Considerations for Internet Group

Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches
RFC 4601 Draft 10 PIM Sparse Mode
RFC 4604 Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
RFC 4605 IGMP/MLD Proxying
RFC 4607 Source-Specific Multicast for IP
RFC 4610 Anycast-RP Using Protocol Independent Multicast (PIM)
RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)

IPv6
RFC 1886 DNS Extension for IPv6
RFC 1887 IPv6 Unicast Address Allocation Architecture
RFC 1981 IPv6 Path MTU Discovery
RFC 2080 RIPng for IPv6
RFC 2081 RIPng Protocol Applicability Statement
RFC 2292 Advanced Sockets API for IPv6
RFC 2373 IPv6 Addressing Architecture
RFC 2375 IPv6 Multicast Address Assignments
RFC 2460 IPv6 Specification
RFC 2461 IPv6 Neighbor Discovery
RFC 2462 IPv6 Stateless Address Auto-configuration
RFC 2463 ICMPv6
RFC 2464 Transmission of IPv6 over Ethernet Networks
RFC 2473 Generic Packet Tunneling in IPv6
RFC 2526 Reserved IPv6 Subnet Anycast Addresses
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2740 OSPFv3 for IPv6
RFC 2767 Dual stacks IPv46 & IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3307 IPv6 Multicast Address Allocation
RFC 3315 DHCPv6 (client and relay)
RFC 3484 Default Address Selection for IPv6
RFC 3513 IPv6 Addressing Architecture
RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 3810 MLDv2 for IPv6
RFC 4214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)

MIBs
RFC 1156 (TCP/IP MIB)
RFC 1157 A Simple Network Management Protocol (SNMP)
RFC 1213 MIB II
RFC 1215 A Convention for Defining Traps for use with the SNMP
RFC 1229 Interface MIB Extensions
RFC 1493 Bridge MIB
RFC 1573 SNMP MIB II
RFC 1643 Ethernet MIB
RFC 1657 BGP-4 MIB
RFC 1724 RIPv2 MIB
RFC 1757 Remote Network Monitoring MIB
RFC 1850 OSPFv2 MIB
RFC 1907 SNMPv2 MIB
RFC 2011 SNMPv2 MIB for IP
RFC 2012 SNMPv2 MIB for TCP
RFC 2013 SNMPv2 MIB for UDP
RFC 2096 IP Forwarding Table MIB
RFC 2233 Interface MIB
RFC 2452 IPV6-TCP-MIB
RFC 2454 IPV6-UDP-MIB

Specifications (continued)

HP 5830AF-48G Switch with 1 Interface Slot (JC691A)		HP 5830AF-96G Switch (JC694A)

Standards and protocols
(applies to all products in series)

RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Target MIB
RFC 2578 Structure of Management Information Version 2 (SMIv2)
RFC 2580 Conformance Statements for SMIv2
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 2787 VRRP MIB
RFC 2819 RMON MIB
RFC 2925 Ping MIB
RFC 2932IP (Multicast Routing MIB)
RFC 2933 IGMP MIB
RFC 2934 Protocol Independent Multicast MIB for IPv4
RFC 3414 SNMP-User based-SM MIB
RFC 3415 SNMP-View based-ACM MIB
RFC 3417 Simple Network Management Protocol (SNMP) over IEEE 802 Networks
RFC 3418 MIB for SNMPv3
RFC 3595 Textual Conventions for IPv6 Flow Label
RFC 3826 AES for SNMP's USM MIB
RFC 4133 Entity MIB (Version 3)
RFC 4444 Management Information Base for Intermediate System to Intermediate System (IS-IS)

Network management
IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 1155 Structure of Management Information
RFC 1157 SNMPv1
RFC 1448 Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)
RFC 2211 Controlled-Load Network
RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 3176 sFlow
RFC 3411 SNMP Management Frameworks

RFC 3412 SNMPv3 Message Processing
RFC 3414 SNMPv3 User-based Security Model (USM)
RFC 3415 SNMPv3 View-based Access Control Model VACM
ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)

OSPF
RFC 1245 OSPF protocol analysis
RFC 1246 Experience with OSPF
RFC 1765 OSPF Database Overflow
RFC 1850 OSPFv2 Management Information Base (MIB), traps
RFC 2154 OSPF w/ Digital Signatures (Password, MD-5)
RFC 2328 OSPFv2
RFC 2370 OSPF Opaque LSA Option
RFC 3101 OSPF NSSA
RFC 3137 OSPF Stub Router Advertisement
RFC 3630 Traffic Engineering Extensions to OSPF Version 2
RFC 4061 Benchmarking Basic OSPF Single Router Control Plane Convergence
RFC 4062 OSPF Benchmarking Terminology and Concepts
RFC 4063 Considerations When Using Basic OSPF Convergence Benchmarks
RFC 4222 Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance
RFC 4811 OSPF Out-of-Band LSDB Resynchronization
RFC 4812 OSPF Restart Signaling
RFC 4813 OSPF Link-Local Signaling
RFC 4940 IANA Considerations for OSPF

QoS/CoS
IEEE 802.1P (CoS)

RFC 1349 Type of Service in the Internet Protocol Suite
RFC 2211 Specification of the Controlled-Load Network Element Service
RFC 2212 Guaranteed Quality of Service
RFC 2474 DSCP DiffServ
RFC 2475 DiffServ Architecture
RFC 2597 DiffServ Assured Forwarding (AF)
RFC 2598 DiffServ Expedited Forwarding (EF)

Security
IEEE 802.1X Port Based Network Access Control
RFC 1321 The MD5 Message-Digest Algorithm
RFC 1334 PPP Authentication Protocols (PAP)
RFC 1492 An Access Control Protocol, Sometimes Called TACACS
RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 Keyed-Hashing for Message Authentication
RFC 2408 Internet Security Association and Key Management Protocol (ISAKMP)
RFC 2409 The Internet Key Exchange (IKE)
RFC 2716 PPP EAP TLS Authentication Protocol
RFC 2865 RADIUS Authentication
RFC 2866 RADIUS Accounting
RFC 2867 RADIUS Accounting Modifications for Tunnel Protocol Support
RFC 2868 RADIUS Attributes for Tunnel Protocol Support
RFC 2869 RADIUS Extensions
Access Control Lists (ACLs)
Guest VLAN for 802.1x
MAC Authentication
Port Security
SSHv1/SSHv2 Secure Shell

HP 5830 Switch Series accessories

Transceivers

HP X110 100M SFP LC LH40 Transceiver (JD090A)
HP X110 100M SFP LC LH80 Transceiver (JD091A)
HP X110 100M SFP LC FX Transceiver (JD102B)
HP X110 100M SFP LC LX Transceiver (JD120B)
HP X125 1G SFP LC LH40 1310nm Transceiver (JD061A)
HP X120 1G SFP LC LH40 1550nm Transceiver (JD062A)
HP X125 1G SFP LC LH70 Transceiver (JD063B)
HP X120 1G SFP LC SX Transceiver (JD118B)
HP X120 1G SFP LC LX Transceiver (JD119B)
HP X120 1G SFP RJ45 T Transceiver (JD089B)
HP X170 1G SFP LC LH70 1550 Transceiver (JD109A)
HP X170 1G SFP LC LH70 1570 Transceiver (JD110A)
HP X170 1G SFP LC LH70 1590 Transceiver (JD111A)
HP X170 1G SFP LC LH70 1610 Transceiver (JD112A)
HP X170 1G SFP LC LH70 1470 Transceiver (JD113A)
HP X170 1G SFP LC LH70 1490 Transceiver (JD114A)
HP X170 1G SFP LC LH70 1510 Transceiver (JD115A)
HP X170 1G SFP LC LH70 1530 Transceiver (JD116A)
HP X130 10G SFP+ LC SR Transceiver (JD092B)
HP X130 10G SFP+ LC LRM Transceiver (JD093B)
HP X130 10G SFP+ LC LR Transceiver (JD094B)
HP X130 10G SFP+ LC ER 40km Transceiver (JG234A)
HP X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable (JD095B)
HP X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable (JD096B)
HP X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable (JD097B)
HP X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable (JG081B)

Power Supply

HP 58x0AF 650W AC Power Supply (JC680A)
HP 58x0AF 650W DC Power Supply (JC681A)

HP 5830AF-48G Switch with 1 Interface Slot (JC691A)

HP 5500/5120 2-port 10GbE SFP+ Module (JD368B)
HP 5830AF-48G Back (power side) to Front (port side) Airflow Fan Tray (JC692A)
HP 5830AF-48G Front (port side) to Back (power side) Airflow Fan Tray (JC693A)

HP 5830AF-96G Switch (JC694A)

HP 5830AF-96G back (power side) to front (port side) airflow Fan Tray (JC695A)
HP 5830AF-96G front (port side) to back (power side) airflow Fan Tray (JC696A)

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