Hewlett Packard Enterprise

Aruba 2540 Switch Series

Key features

- Aruba Layer 2 switch series with static and RIP routing, ACLs, and robust QoS

- Advanced security and network management tools like Aruba ClearPass Policy Manager and Aruba Airwave

- Simple deployment with Zero Touch Provisioning and cloud-based Aruba Central support

- Convenient built-in 10GbE uplinks and up to 370 W PoE+

- Limited Lifetime Warranty

Product overview

Designed for the digital workplace, the Aruba 2540 Switch Series is optimized for mobile users. With advanced security and network management tools—Aruba ClearPass Policy Manager and Aruba AirWave—this layer-2 access switch is easy to deploy and manage. With support from Aruba Central, you can quickly set up remote branch sites with little or no IT support. A powerful Aruba ProVision ASIC delivers performance, robust feature support, and value with flexible programmability for future applications.

The Aruba 2540 Switch Series provides a convenient and cost-effective wired access solution that can be quickly set up with Zero Touch Provisioning. PoE+ models deliver power across all access ports for wireless APs, security cameras, and IoT devices.

The 2540 has wire-speed backhaul bandwidth capacity with built-in 10GbE uplinks, robust QoS, static and RIP routing, IPv6 and includes a limited lifetime warranty with no software licensing required.

Features and benefits

Unified wired and wireless

- **ClearPass Policy Manager support** Unified wired and wireless policies using Aruba ClearPass Policy Manager.

- **Switch auto-configuration** Automatically configures switches for different settings such as VLAN, CoS, PoE max power, and PoE priority when an Aruba access point is detected.

- **User role** Defines a set of switch-based policies in areas such as security, authentication, and QoS. A user role can be assigned to a group of users or devices, using switch configuration or ClearPass.

- **HTTP redirect function** Supports HPE Intelligent Management Center (IMC) bring your own device (BYOD) solution.

- **Static IP Visibility** Allows ClearPass to do accounting for clients with static IP address.

Quality of service (QoS)

- **Traffic prioritization (IEEE 802.1p)** Allows real-time traffic classification into eight priority levels mapped to eight queues.

- **Layer 4 prioritization** Enables prioritization based on TCP/UDP port numbers.

- **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.

- **Rate limiting** Sets per-port ingress enforced maximums and per-port, per-queue minimums.

- **Large buffers** Provide graceful congestion management.

Connectivity

- **Flexible 10 Gbps Ethernet connectivity** Four fixed 10 Gigabit ports (SFP+) available.

- **Auto-MDIX** Provides automatic adjustments for straight-through or crossover cables on all 10/100 and 10/100/1000 ports.

- **IEEE 802.3at Power over Ethernet (PoE+)** Provides up to 30 W per port that allows support of the latest PoE+-capable devices such as IP phones, wireless access points, and security cameras, as well as any IEEE 802.3af-compliant end device; eliminates the cost of additional electrical cabling and circuits that would otherwise be necessary in IP phone and WLAN deployments.

- **Pre-standard PoE support** Detects and provides power to pre-standard PoE devices.

- **IPv6**

  - **IPv6 host** Enables switches to be managed in an 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 RIPng protocols.

  - **Security** Provides RA guard, DHCPv6 protection, dynamic IPv6 lockdown, and ND snooping.

Performance
- **Energy-efficient design**

  – **80 PLUS Silver Certified power** supply increases power efficiency and savings.

  – **Energy-efficient Ethernet (EEE) support** Reduces power consumption in accordance with IEEE 802.3az.

- **Aruba ProVision ASIC architecture** Is designed with the latest Aruba ProVision ASIC, providing very low latency, increased packet buffering, and adaptive power consumption.

- **Selectable queue configurations** Allow for increased performance by selecting the number of queues and associated memory buffering that best meet the requirements of the network applications.

Convergence
- **IP multicast snooping and data-driven IGMP** Automatically prevent flooding of IP multicast traffic.

- **IEEE 802.1AB Link Layer Discovery Protocol (LLDP)** Facilitates easy mapping using network management applications with LLDP automated device discovery protocol.

- **LLDP-MED (Media Endpoint Discovery)** Defines a standard extension of LLDP that stores values for parameters such as QoS and VLAN to configure automatically network devices such as IP phones.

- **PoE and PoE+ allocations** Support multiple methods (automatic, IEEE 802.3at dynamic, LLDP-MED fine grain, IEEE 802.3af device class, or user-specified) to allocate and manage PoE and PoE+ power for more efficient energy savings.

- **Local MAC Authentication** Assigns attributes such as VLAN and QoS using locally configured profile that can be a list of MAC prefixes.

Resiliency and high availability
- **IEEE 802.1s Multiple Spanning Tree** Provides high link availability in multiple VLAN environments by allowing multiple spanning trees; provides legacy support for IEEE 802.1d and IEEE 802.1w.

- **IEEE 802.3ad link-aggregation-control protocol (LACP) and port trunking** Support up to 26 static, dynamic, or distributed trunks with each trunk having up to eight links (ports) per static trunk.

- **SmartLink** Provides easy-to-configure link redundancy of active and standby links.

Management
- **SNMPv1, v2, and v3** Provide complete support of SNMP; provide full support of industry-standard Management Information Base (MIB) plus private extensions; SNMPv3 supports increased security using encryption.

- **Zero-Touch Provisioning (ZTP)** Simplifies installation of the switch infrastructure using the Aruba Activate-based or a DHCP-based process with AirWave Network Management.

- **Aruba Central support** Cloud-based management platform offers a simple, secure, and cost-effective way to manage switches.

Manageability
- **Dual flash images** Provides independent primary and secondary operating system files for backup while upgrading.

- **Friendly port names** Allow assignment of descriptive names to ports.

- **Find-Fix-Inform** Finds and fixes common network problems automatically, then informs administrator.

- **Multiple configuration files** Allow multiple configuration files to be stored to a flash image.

- **Software updates** Free downloads from the Web.

- **RMON, XRMON, and sFlow®** Provide advanced monitoring and reporting capabilities for statistics, history, alarms, and events.

- **Troubleshooting** Ingress and egress port monitoring enable network problem solving.

- **Unidirectional link detection (UDLD)** Monitors the link between two switches and blocks the ports on both ends of the link if the link goes down at any point between the two devices.

Layer 2 switching
- **VLAN support and tagging** Supports IEEE 802.1Q (4094 VLAN IDs) and 512 VLANs simultaneously.

- **Jumbo packet support** Improves the performance of large data transfers; supports frame size of up to 9220 bytes.

- **IEEE 802.1v protocol VLANs** Isolate select non-IPv4 protocols automatically into their own VLANs.

- **Rapid per-VLAN spanning tree (RPVST+)** Allows each VLAN to build a separate spanning tree to improve link bandwidth usage; is compatible with PVST+.

- **GVRP and MVRP** Allow automatic learning and dynamic assignment of VLANs.

Layer 3 services
- **DHCP server** Centralizes and reduces the cost of IPv4 address management.

Layer 3 routing
- **Static IP routing** Provides manually configured routing; includes ECMP capability.

- **256 static and 2,000 RIP routes** Facilitate segregation of user data, without adding external hardware.

- **Routing Information Protocol (RIP) Provides** RIPv1, RIPv2, and RIPng routing.

Security
- **Multiple user authentication methods**

  - **IEEE 802.1X** Uses an IEEE 802.1X supplicant on the client in conjunction with a RADIUS server to authenticate in accordance with industry standards.

  - **Web-based authentication** Provides a browser-based environment, similar to IEEE 802.1X, to authenticate clients that do not support the IEEE 802.1X supplicant.

  - **MAC-based authentication** Authenticates the client with the RADIUS server based on the client's MAC address.

Authentication flexibility
  - Multiple IEEE 802.1X users per port Provides authentication of multiple IEEE 802.1X users per port; prevents a user from piggybacking on another user's IEEE 802.1X authentication.

  - Concurrent IEEE 802.1X, Web, and MAC authentication schemes per port Switch port will accept up to 32 sessions of IEEE 802.1X, Web, and MAC authentications.

- **Access control lists (ACLs)** Provide IP Layer 3 filtering based on source and destination IP address or subnet and source and destination TCP/UDP port number.

- **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.

- **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.

- **Secure FTP** Allows secure file transfer to and from the switch; protects against unwanted file downloads or unauthorized copying of a switch configuration file.

- **Switch management logon security** Helps secure switch CLI logon by optionally requiring either RADIUS or TACACS+ authentication.

- **Custom banner** Displays security policy when users log in to the switch.

- **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.

- **Dynamic IP lockdown** Works with DHCP protection to block traffic from unauthorized hosts, preventing IP source address spoofing.

- **STP root guard** Protects the root bridge from malicious attacks or configuration mistakes.

- **Identity-driven ACL** Enables implementation of a highly granular and flexible access security policy and VLAN assignment specific to each authenticated network user.

- **Per-port broadcast throttling** Configures broadcast control selectively on heavy traffic port uplinks.

Monitor and diagnostics
- Digital optical monitoring of SFP+ and 1000BASE-T transceivers allow detailed monitoring of the transceiver settings and parameters.

Warranty and support
- **Limited Lifetime Warranty** See **hpe.com/networking/warrantysummary** for warranty and support information included with your product purchase.

- **Software releases** To find software for your product, refer to **hpe.com/networking/support**; for details on the software releases available with your product purchase, refer to **hpe.com/networking/warrantysummary**.

Aruba 2540 Switch Series
Specifications

	Aruba 2540 24 G 4SFP+ Switch (JL354A)	**Aruba 2540 48 G 4SFP+ Switch (JL355A)**
I/O ports and slots	24 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; 4 SFP+ 1/10GbE ports; PHY-less	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 4 SFP+ 1/10GbE ports; PHY-less
Additional ports and slots	1 dual-personality (RJ-45 or USB micro-B) serial console port	1 dual-personality (RJ-45 or USB micro-B) serial console port

Physical characteristics

Dimensions **Weight**	17.42(w) x 7.88(d) x 1.73(h) in. (44.25 x 20.02 x 4.39 cm) (1U height) 5.31 lb (2.41 kg)	17.42(w) x 9.7(d) x 1.73(h) in. (44.25 x 24.63 x 4.39 cm) (1U height) 6.83 lb (3.10 kg)
Memory and processor	Dual Core ARM® Coretex A9 @ 1016 MHz, 1 GB DDR3 SDRAM; Packet buffer size: 12.38 MB 4.5 MB Ingress/7.875 MB Egress, 4 GB eMMC	Dual Core ARM Coretex A9 @ 1016 MHz, 1 GB DDR3 SDRAM; Packet buffer size: 12.38 GB 4.5 MB Ingress/7.875 MB Egress, 4 GB eMMC

Performance

1000 Mb Latency **10 Gbps Latency** **Throughput** **Switching capacity** **Routing table size** **MAC address table size**	< 3.8 µs (64-byte packets) < 1.6 µs (64-byte packets) up to 95.2 Mpps 128 Gbps 2000 entries (IPv4), 1000 entries (IPv6) 16384 entries	< 3.8 µs (64-byte packets) < 1.6 µs (64-byte packets) up to 112.0 Mpps 176 Gbps 2000 entries (IPv4), 1000 entries (IPv6) 16384 entries

Environment

Operating temperature	32°F to 113°F (0°C to 45°C); up to 5000 Feet, -0°C to 40°C (32°F to 104°F) up to 10000 Feet	32°F to 113°F (0°C to 45°C); up to 5000 Feet, -0°C to 40°C (32°F to 104°F) up to 10000 Feet
Operating relative humidity	15% to 95% @ 104°F (40°C), noncondensing	15% to 95% @ 104°F (40°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C); up to 15000 Feet	-40°F to 158°F (-40°C to 70°C); up to 15000 Feet
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C), noncondensing	15% to 95% @ 149°F (65°C), noncondensing
Acoustic	Power: 49.7 dB, Pressure: 37.1 dB	Power: 54.1 dB, Pressure: 40.2 dB
Airflow direction	Side-to-side	Side-to-side

Electrical characteristics

Frequency **Maximum heat dissipation** **Voltage** **Current** **Maximum power rating** **Idle power** **Notes**	50/60 Hz 100 BTU/hr (105.5 kJ/hr) 100–127/200–240 VAC, rated 0.6/0.4 A 29.3 W 19.5 W Idle power is the actual power consumption of the device with no ports connected. Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.	50/60 Hz 159 BTU/hr (167.74 kJ/hr) 100–127/200–240 VAC, rated 0.9/0.6 A 46.6 W 32.7 W Idle power is the actual power consumption of the device with no ports connected. Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.

Specifications (continued)

	Aruba 2540 24 G 4SFP+ Switch (JL354A)	Aruba 2540 48 G 4SFP+ Switch (JL355A)
Safety	UL 60950-1, 2nd Edition; EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013; IEC 60950-1:2005 +A1:2009 +A2:2013; CSA 22.2 No. 60950-1-07 2nd; EN 60825-1:2007/IEC 60825-1:2007 Class 1	UL 60950-1, 2nd Edition; EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013; IEC 60950-1:2005 +A1:2009 +A2:2013; CSA 22.2 No. 60950-1-07 2nd; EN 60825-1:2007/IEC 60825-1:2007 Class 1
Emissions	VCCI Class A; CNS 13438; ICES-003 Class A; FCC CFR 47 Part 15, Class A; EN 55022: 2010/CISPR-22, Class A	VCCI Class A; CNS 13438; ICES-003 Class A; FCC CFR 47 Part 15, Class A; EN 55022: 2010/CISPR-22, Class A
Immunity		
Generic	EN 55024:2010/CISPR 24	EN 55024:2010/CISPR 24
ESD	IEC 61000-4-2	IEC 61000-4-2
Radiated	IEC 61000-4-3	IEC 61000-4-3
EFT/Burst	IEC 61000-4-4	IEC 61000-4-4
Surge	IEC 61000-4-5	IEC 61000-4-5
Conducted	IEC 61000-4-6	IEC 61000-4-6
Power frequency magnetic field	IEC 61000-4-8	IEC 61000-4-8
Voltage dips and interruptions	IEC 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	Aruba AirWave Network Management; IMC—Intelligent Management Center; Command-line interface; Web browser; Configuration menu; SNMP manager; Telnet; RMON1; FTP; Out-of-band management (serial RS-232C or micro USB)	Aruba AirWave Network Management; IMC—Intelligent Management Center; Command-line interface; Web browser; Configuration menu; SNMP manager; Telnet; RMON1; FTP; Out-of-band management (serial RS-232C or micro USB)
Services	Refer to the HPE website at **hpe.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 HPE sales office.	Refer to the HPE website at **hpe.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 HPE sales office.

Specifications (continued)

	Aruba 2540 24 G PoE+ 4SFP+ Switch (JL356A)	Aruba 2540 48 G PoE+ 4SFP+ Switch (JL357A)
I/O ports and slots	24 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+); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only 4 SFP+ 1/10GbE ports; PHY-less	48 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+); Duplex: 10BASE-T/100BASE-TX: half or full; 1000BASE-T: full only 4 SFP+ 1/10GbE ports; PHY-less
Additional ports and slots	1 dual-personality (RJ-45 or USB micro-B) serial console port	1 dual-personality (RJ-45 or USB micro-B) serial console port
Physical characteristics		
Dimensions **Weight**	17.42(w) x 11.98(d) x 1.73(h) in. (44.25 x 30.42 x 4.39 cm) (1U height) 8.6 lb (3.9 kg)	17.42(w) x 11.98(d) x 1.73(h) in. (44.25 x 30.42 x 4.39 cm) (1U height) 9.83 lb (4.46 kg)
Memory and processor	Dual Core ARM Coretex A9 @ 1016 MHz, 1 GB DDR3 SDRAM; Packet buffer size: 12.38 MB 4.5 MB Ingress/7.785 MB Egress, 4 GB eMMC	Dual Core ARM Coretex A9 @ 1016 MHz, 1 GB DDR3 SDRAM; Packet buffer size: 12.38 MB 4.5 MB Ingress/7.875 MB Egress, 4 GB eMMC
Performance		
1000 Mb Latency	< 3.8 µs (64-byte packets)	< 3.8 µs (64-byte packets)
10 Gbps Latency	< 1.6 µs (64-byte packets)	< 1.6 µs (64-byte packets)
Throughput	up to 95.2 Mpps	up to 112.0 Mpps
Switching capacity	128 Gbps	176 Gbps
Routing table size	2000 entries (IPv4), 1000 entries (IPv6)	2000 entries (IPv4), 1000 entries (IPv6)
MAC address table size	16384 entries	16384 entries
Environment		
Operating temperature	32°F to 113°F (0°C to 45°C); up to 5000 Feet, -0°C to 40°C (32°F to 104°F) up to 10000 Feet	32°F to 113°F (0°C to 45°C); up to 5000 Feet, -0°C to 40°C (32°F to 104°F) up to 10000 Feet
Operating relative humidity	15% to 95% @ 104°F (40°C), noncondensing	15% to 95% @ 104°F (40°C), noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C); up to 15000 Feet	-40°F to 158°F (-40°C to 70°C); up to 15000 Feet
Nonoperating/Storage relative humidity	15% to 95% @ 149°F (65°C)	15% to 95% @ 149°F (65°C)
Acoustic	Power: 54.1 dB, Pressure: 40.6 dB	Power: 55.7 dB, Pressure: 41.7 dB
Airflow direction	Side-to-side	Side-to-side
Electrical characteristics		
Frequency	50/60 Hz	50/60 Hz
80plus.org Certification	Silver	Silver
Maximum heat dissipation	1518 BTU/hr (1601.49 kJ/hr)	1566 BTU/hr (1652.13 kJ/hr)
Voltage	100–127/200–240 VAC, rated	100–127/200–240 VAC, rated
Current	4.9/2.4 A	5.1/2.5 A
Maximum power rating	445 W	459 W
Idle power	36.8 W	48.6 W
PoE power	370 W PoE+	370 W PoE+
Notes	Idle power is the actual power consumption of the device with no ports connected. Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.	Idle power is the actual power consumption of the device with no ports connected. Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.

Specifications (continued)

	Aruba 2540 24 G PoE+ 4SFP+ Switch (JL356A)	Aruba 2540 48 G PoE+ 4SFP+ Switch (JL357A)
Safety	UL 60950-1 2nd Edition; EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013; IEC 60950-1:2005 +A1:2009 +A2:2013; CSA 22.2 No. 60950-1-07 2nd; EN 60825-1:2007/IEC 60825-1:2007 Class 1	UL 60950-1 2nd Edition; EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011+A2:2013; IEC 60950-1:2005 +A1:2009 +A2:2013; CSA 22.2 No. 60950-1-07 2nd; EN 60825-1:2007/IEC 60825-1:2007 Class 1
Emissions	VCCI Class A; CNS 13438; ICES-003 Class A; FCC CFR 47 Part 15, Class A; EN 55022: 2010/CISPR-22, Class A	VCCI Class A; CNS 13438; ICES-003 Class A; FCC CFR 47 Part 15, Class A; EN 55022: 2010/CISPR-22, Class A
Immunity		
Generic	EN 55024:2010/CISPR 24	EN 55024:2010/CISPR 24
ESD	IEC 61000-4-2	IEC 61000-4-2
Radiated	IEC 61000-4-3	IEC 61000-4-3
EFT/Burst	IEC 61000-4-4	IEC 61000-4-4
Surge	IEC 61000-4-5	IEC 61000-4-5
Conducted	IEC 61000-4-6	IEC 61000-4-6
Power frequency magnetic field	IEC 61000-4-8	IEC 61000-4-8
Voltage dips and interruptions	IEC 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	Aruba AirWave Network Management; IMC—Intelligent Management Center; Command-line interface; Web browser; Configuration menu; SNMP manager; Telnet; RMON1; FTP; Out-of-band management (serial RS-232C or micro USB)	Aruba AirWave Network Management; IMC—Intelligent Management Center; Command-line interface; Web browser; Configuration menu; SNMP manager; Telnet; RMON1; FTP; Out-of-band management (serial RS-232C or micro USB)
Services	Refer to the HPE website at **hpe.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 HPE sales office.	Refer to the HPE website at **hpe.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 HPE sales office.

Standards and Protocols
(Applies to all products in series)

Denial of service protection		CPU DoS Protection	
Device management	• RFC 1155 Structure and Mgmt Information (SMIv1) • RFC 1157 SNMPv1/v2c • RFC 1591 DNS (client) • RFC 1901 (Community based SNMPv2) • RFC 1901-1907 SNMPv2c, SMIv2 and Revised MIB-II • RFC 1908 (SNMP v1/2 Coexistence) • RFC 2576 (Coexistence between SNMP V1, V2, V3)	• RFC 2578-2580 SMIv2 • RFC 2579 (SMIv2 Text Conventions) • RFC 2580 (SMIv2 Conformance) • RFC 2819 (RMON groups Alarm, Event, History and Statistics only) • RFC 3416 (SNMP Protocol Operations v2) • RFC 3417 (SNMP Transport Mappings) • HTML and telnet management	• HTTP, SSHv1, and Telnet • Multiple Configuration Files • Multiple Software Images • SNMP v3 and RMON RFC support • SSHv1/SSHv2 Secure Shell • TACACS/TACACS+ • Web UI
General protocols	• 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 • VLAN classification by Protocol and Port of Spanning Tree • 1000BASE-T • IEEE 802.3ad Link Aggregation Control Protocol (LACP) • IEEE 802.3af Power over Ethernet • IEEE 802.3at PoE+ • IEEE 802.3az Energy Efficient 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 1256 ICMP Router Discovery Protocol (IRDP) • RFC 1350 TFTP Protocol (revision 2) IEEE 802.1v • RFC 1519 CIDR IEEE 802.1w Rapid Reconfiguration • RFC 1542 BOOTP Extensions IEEE 802.3ab • RFC 1918 Address Allocation for Private Internet • RFC 2030 Simple Network Time Protocol (SNTP) v4 • RFC 2131 DHCP • RFC 2236 IGMP Snooping • RFC 2453 RIPv2 • RFC 2865 Remote Authentication Dial In User Service (RADIUS) • RFC 2866 RADIUS Accounting • RFC 3046 DHCP Relay Agent Information Option • RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks • RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	• RFC 3413 Simple Network Management Protocol (SNMP) Applications • RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) • RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP) • RFC 3416 Protocol Operations for SNMP • RFC 3417 Transport Mappings for the Simple Network Management Protocol (SNMP) • RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP) • RFC 3575 IANA Considerations for RADIUS • RFC 3576 Ext to RADIUS (CoA only) • RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) • Snooping Switches • RFC 4675 RADIUS VLAN & Priority • RFC 4861 Neighbor Discovery for IP version 6 (IPv6) • RFC 4862 IPv6 Stateless Address Auto configuration • RFC 5905 Network Time Protocol Version 4: Protocol and Algorithms Specification • UDLD (Uni-directional Link Detection)
IP multicast	• RFC 1112 IGMP • RFC 2236 IGMPv2	• RFC 2710 Multicast Listener Discovery (MLD) for IPv6 • RFC 3376 IGMPv3	• RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) • Snooping Switches
IPv6	• RFC 1981 IPv6 Path MTU Discovery • RFC 2080 RIPng for IPv6 • RFC 2081 RIPng Protocol Applicability Statement • RFC 2082 RIP-2 MD5 • 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 2925 Remote Operations MIB (Ping only) • RFC 3019 MLDv1 MIB	• RFC 3315 DHCPv6 (client and relay) • RFC 3484 Default Address Selection for IPv6 • RFC 3513 IPv6 Addressing Architecture • RFC 3596 DNS Extension for IPv6 • RFC 3810 MLDv2 for IPv6 • RFC 4022 MIB for TCP • RFC 4113 MIB for UDP • RFC 4251 SSHv6 Architecture • RFC 4252 SSHv6 Authentication • RFC 4253 SSHv6 Transport Layer draft-ietf-savi-mix • RFC 4254 SSHv6 Connection	• RFC 4291 IP Version 6 Addressing Architecture • RFC 4293 MIB for IP • RFC 4419 Key Exchange for SSH • RFC 4443 ICMPv6 • RFC 4541 IGMP & MLD Snooping Switch • RFC 4861 IPv6 Neighbor Discovery • RFC 4862 IPv6 Stateless Address Auto-configuration • RFC 5095 Deprecation of Type 0 Routing Headers in IPv6 • RFC 6620 FCFS SAVI

Standards and Protocols (continued)
(Applies to all products in series)

MIBs	• IEEE 802.1ap (MSTP and STP MIB's only) • IEEE 8021-Bridge-MIB (2008) • IEEE 8021-Q-Bridge-MIB (2008) • RFC 1155 Structure & ID of Mgmt Info for TCP/IP Internets • RFC 1156 (TCP/IP MIB) • RFC 1157 A Simple Network Management Protocol (SNMP) • RFC 1213 MIB II • RFC 1493 Bridge MIB • RFC 1724 RIPv2 MIB • RFC 2021 RMONv2 MIB	• RFC 2578 Structure of Management Information Version 2 • RFC 2579 Textual Conventions for SMIv2 • RFC 2580 Conformance Statements for SMIv2 • 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 2819 RMON MIB • RFC 2863 The Interfaces Group MIB • RFC 2925 Ping MIB • RFC 2932 IP (Multicast Routing MIB) • RFC 2933 IGMP MIB • 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 4836 Managed Objects for 802.3 Medium Attachment Units (MAU)
Network management	• IEEE 802.1AB Link Layer Discovery Protocol (LLDP) • RFC 1155 Structure of Management Information • RFC 1157 SNMPv1 • RFC 2021 Remote Network Monitoring Management Information Base Version 2 using SMIv2 • RFC 2576 Coexistence between SNMP versions • RFC 2578 Structure of Management Information Version 2 (SMIv2) • RFC 2579 Textual Conventions for SMIv2 • RFC 2580 Conformance Statements for SMIv2 • RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)	• RFC 2819 Remote Network Monitoring Management Information Base • RFC 2856 Textual Conventions for Additional High Capacity Data Types • RFC 2925 Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations • RFC 3164 BSD syslog Protocol • RFC 3176 sFlow • RFC 3411 SNMP Management Frameworks • RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)	• RFC 3413 Simple Network Management Protocol (SNMP) Applications • RFC 3414 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) • RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP) • RFC 3418 Management Information Base (MIB) for the Simple Network Management Protocol (SNMP) • RFC 5424 Syslog Protocol • ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) • SNMPv1/v2c/v3 XRMON
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