Data sheet

HP 6600 TAA-compliant router series

Key features

- High-performance WAN routing
- Multicore distributed or centralized processing
- Comprehensive routing, switching, and security
- Embedded hardware encryption
- Robust high availability and resiliency

Product overview

The HP 6600 TAA-Compliant Router Series is a family of high-performance WAN routers that is ideal for campus and data center WAN edge and aggregation deployments.

These routers are built with a multicore architecture offering distributed or centralized processing to help balance performance and cost. The 6600 Router Series delivers robust routing, security, full Layer 2 switching, and modular high-density WAN and LAN interface options, all integrated in a single high-performance routing platform.

In addition, the routers features robust carrier-class reliability capabilities to help reduce disruption from network or system failures.

Features and benefits

Quality of Service (QoS)

- **Traffic policing** supports Committed Access Rate (CAR) and line rate
- **Congestion management** supports FIFO, PQ, CQ, WFQ, CBQ, and RTPQ
- **Other QoS technologies** support traffic shaping, FR QoS, MPLS QoS, and MP QoS/LFI
- **Congestion avoidance** weighted random early detection (WRED)/random early detection (RED)

Management

- **Management interface control** provides management access through modem port and terminal interface, as well as in-band and out-of-band Ethernet ports
- **Management security** includes multiple administration levels, with password protection and restricted access to critical configuration commands; access control lists (ACLs) provide telnet and SNMP access; local and remote syslog capability allows logging of all access
- **SNMP v1, v2, and v3** provides complete support of SNMP, as well as full support of industry-standard MIBs and private MIB extensions
- **Industry-standard CLI with a hierarchical structure** reduces training needs and increases productivity in multivendor installations
- **Remote monitoring (RMON)** uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group
- **Debug and sampler utility** supports ping and traceroute for both IPv4 and IPv6
- **Network Quality Analyzer (NQA)** analyzes network performance and service quality by sending test packets, and provides network performance and service quality parameters such as jitter, TCP, or FTP connection delays and file transfer rates; allows a network manager to determine overall network performance and to diagnose and locate network congestion points or failures
- **Network Time Protocol (NTP)** synchronizes timekeeping among distributed time servers and clients; keeps timekeeping consistent among all clock-dependent devices within the network so that the devices can provide diverse applications based on the consistent time
- **Information center** provides a central repository for system and network information; aggregates all logs, traps, and debugging information generated by the system and maintains them in order of severity; outputs the network information to multiple channels based on user-defined rules
- **FTP and TFTP support** File Transfer Protocol allows bidirectional transfers over a TCP/IP network and is used for configuration updates; Trivial FTP is a simpler method using User Datagram Protocol (UDP)
- **Loopback** supports internal loopback testing for maintenance purposes and high availability; loopback detection protects the system from incorrect cabling or network configurations and can be enabled on a port or VLAN
- **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

Connectivity

- **High port density** provides up to 16 interface module slots, and high-density Ethernet interface cards; a single card can provide up to 48 GbE interfaces, which enables the routers to fully satisfy the demands of high-density Ethernet (MSTP) link distribution
- **Multiple WAN interfaces** support Fast Ethernet/Gigabit Ethernet/10GbE ports, OC3~OC48 POS/CPOS, and ATM ports
- **Flexible port selection** provides a combination of fiber and copper interface modules, 100/1000BASE-X auto speed selection, and 10/100/1000BASE-T auto speed detection plus auto duplex and MDI/MDI-X; speed is adaptable between 155 M POS and 622 M POS

Performance

- **Industry-leading performance** provides up to 252 Mpps forwarding performance
- **Flexible chassis selection** consists of 4 models: 16 HIM-slot chassis, 8 HIM-slot chassis, 4 HIM-slot chassis, and 2 HIM-slot chassis
- **Scalable system design** backplane is designed for smooth bandwidth upgrade

Resiliency and high availability

- **Separate data and control planes** provide greater flexibility and enable continual services
- **Hitless software upgrades** allow patches to be installed without restarting the device, increasing network uptime and simplifying maintenance
- **Redundant design of main processing unit and power supply** increases the overall system availability
- **Virtual Router Redundancy Protocol (VRRP)** enables fast convergence of routes and packet forwarding when links fail, ensuring high network availability
- **IP Fast Reroute Framework (FRR)** nodes are configured with backup ports and routes; local implementation requires no cooperation of adjacent devices, simplifying the deployment; solves the traditional convergence faults in IP forwarding; provides restoration within 50 ms, with the restoration time independent of the number of routes and fast link switchovers without route convergence
- **Graceful restart** features are fully supported, including graceful restart for OSPF, IS-IS, Border Gateway Protocol (BGP), LDP, and RSVP; network remains stable during the active-standby switchover; after the switchover, the device quickly learns the network routes by communicating with adjacent routers; forwarding remains uninterrupted during the switchover to realize nonstop forwarding (NSF)
- **Hot-swappable modules** facilitates the replacement of hardware interface modules without impacting the traffic flow through the system

Layer 3 services

- **Address Resolution Protocol (ARP)** determines the MAC address of another IP host in the same subnet; supports static ARPs; gratuitous ARP allows detection of duplicate IP addresses; proxy ARP allows normal ARP operation between subnets or when subnets are separated by a Layer 2 network
- **User Datagram Protocol (UDP) helper** redirects UDP broadcasts to specific IP subnets to prevent server spoofing
- **Dynamic Host Configuration Protocol (DHCP)** simplifies the management of large IP networks and supports client and server; DHCP Relay enables DHCP operation across subnets
- **Domain Name System (DNS)** provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server

Layer 3 routing

- **Static IPv4 routing** provides simple manually configured IPv4 routing
- **Open shortest path first (OSPF)** delivers faster convergence; uses this link-state routing Interior Gateway Protocol (IGP), which supports ECMP, NSSA, and MD5 authentication for increased security and graceful restart for faster failure recovery
- **Routing Information Protocol (RIP)** uses a distance vector algorithm with UDP packets for route determination; supports RIPv1 and RIPv2 routing; includes loop protection
- **Intermediate system to intermediate system (IS-IS)** uses a path vector Interior Gateway Protocol (IGP), which is defined by the ISO organization for IS-IS routing and extended by IETF RFC 1195 to operate in both TCP/IP and the OSI reference model (Integrated IS-IS)
- **Static IPv6 routing** provides simple manually configured IPv6 routing
- **Dual IP stack** maintains separate stacks for IPv4 and IPv6 to ease the transition from an IPv4-only network to an IPv6-only network design
- **Routing Information Protocol next generation (RIPng)** extends RIPv2 to support IPv6 addressing

- **OSPFv3** provides OSPF support for IPv6
- **BGP+** extends BGP-4 to support Multiprotocol BGP (MBGP), including support for IPv6 addressing
- **IS-IS for IPv6** extends IS-IS to support IPv6 addressing
- **IPv6 tunneling** 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; is an important element for the transition from IPv4 to IPv6
- **Multiprotocol Label Switching (MPLS)** uses BGP to advertise routes across Label Switched Paths (LSPs), but uses simple labels to forward packets from any Layer 2 or Layer 3 protocol, which reduces complexity and increases performance; supports graceful restart for reduced failure impact; supports LSP tunneling and multilevel stacks
- **Multiprotocol Label Switching (MPLS) Layer 3 VPN** allows Layer 3 VPNs across a provider network; uses MP-BGP to establish private routes for increased security; supports RFC 2547bis multiple autonomous system VPNs for added flexibility
- **Multiprotocol Label Switching (MPLS) Layer 2 VPN** establishes simple Layer 2 point-to-point VPNs across a provider network using only MPLS Label Distribution Protocol (LDP); requires no routing and therefore decreases complexity, increases performance, and allows VPNs of non-routable protocols; uses no routing information for increased security; supports Circuit Cross Connect (CCC), Static Virtual Circuits (SVCs), Martini draft, and Kompella-draft technologies
- **Policy routing** allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies
- **Multicast VPN** supports Multicast Domain (MD) multicast VPN, which can be distributed on separate service cards, providing high performance and flexible configuration
- **Border Gateway Protocol 4** Exterior Gateway Protocol (EGP) with path vector protocol uses TCP for enhanced reliability for the route discovery process, reduces bandwidth consumption by advertising only incremental updates, and supports extensive policies to increase flexibility and scale to large networks
- **OSPFv3 MCE** Multi-VPN-Instance CE (MCE) binds different VPNs to different interfaces on one single CE; the OSPFv3 MCE feature creates and maintains separate OSPFv3 routing tables for each IPv6 VPN to isolate VPN services in the device

Security

- **Access control list** supports powerful ACLs for both IPv4 and IPv6; ACLs are used for filtering traffic to prevent illegal users from accessing the network or for controlling network traffic flow; rules can either deny or permit traffic to be forwarded; rules can be based on a Layer 2 header or a Layer 3 protocol header; rules can also be set to operate on specific dates or times
- **Remote Authentication Dial-In User Service (RADIUS)** eases switch security access administration by using a password authentication server
- **Terminal Access Controller Access-Control System (TACACS+)** delivers an authentication tool using TCP with encryption of the full authentication request, providing additional security
- **Network address translation (NAT)** supports repeated multiplexing of a port and automatic 5-tuple collision detection, enabling NAPT to support unlimited connections; supports blacklist in NAT/NAPT/internal server, a limit on the number of connections, session log, and multi-instance
- **Secure shell (SSHv2)** uses external servers to securely log in to a remote device; with authentication and encryption, it protects against IP spoofing and plain-text password interception; increases the security of Secure FTP (SFTP) transfers
- **Unicast Reverse Path Forwarding (URPF)** allows normal packets to be forwarded correctly, but discards the attaching packet due to lack of reverse path route or incorrect inbound interface; prevents source spoofing and distributed attacks; supports distributed URPF

- **Dynamic Virtual Private Network (DVPN)** collects, maintains, and distributes dynamic public addresses through the VPN Address Management (VAM) protocol, making VPN establishment available between enterprise branches that use dynamic addresses to access the public network; compared to traditional VPN technologies, DVPN technology is more flexible and has richer features, such as NAT traversal of DVPN packets, AAA identity authentication, IPSec protection of data packets, and multiple VPN domains

Multicast support

- **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 interdomain multicast applications, allowing multiple PIM-SM domains to interoperate
- **Multicast Border Gateway Protocol (MBGP)** allows multicast traffic to be forwarded across BGP networks separately from unicast traffic

Integration

- **Embedded VPN firewall** provides enhanced stateful packet inspection and filtering; provides advanced VPN services with 3DES and AES encryption at high performance and low latency
- **Open Application Architecture (OOA)** provides both software and hardware platforms based on open standards so that third-party applications can be integrated seamlessly into routers

Additional information

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

Product architecture

- **Multicore CPU** delivers multi-threaded processing, with eight cores and 32 hardware threads
- **Distributed processing** the main processing engine and service engine have separate hardware for high performance and parallel processing; the main processing engine is used for route calculation and system management, while the service engine is used for service processing
- **Separate FIP card and interface card** interface cards are separated from the FIP card to support flexible service configurations

Warranty and support

- **1-year Warranty 2.0** advance hardware replacement with 10-calendar-day delivery (available in most countries)
- **Electronic and telephone support (for Warranty 2.0)** limited electronic and 24x7 telephone support is available from HP for the entire warranty period; to reach our support centers, refer to hp.com/networking/contact-support; for details on the duration of support provided with your product purchase, refer to hp.com/networking/warrantysummary
- **Software releases** to find software for your product, refer to hp.com/networking/support; for details on the software releases available with your product purchase, refer to hp.com/networking/warrantysummary

HP 6600 TAA-compliant Router Series

Specifications

	 HP 6604 Router Chassis (JC178B)	 HP 6608 Router Chassis (JC177B)	 HP 6616 Router Chassis (JC496A)
I/O ports and slots	4 HIM slots, 2 SAP slots, or a combination 2 MPU (for management modules) slots	8 HIM slots, 4 SAP slots, or a combination 2 MPU (for management modules) slots	16 HIM slots, 8 SAP slots, or a combination 2 MPU (for management modules) slots
Physical characteristics	17.17(w) x 18.9(d) x 8.66(h) in (43.61 x 48.01 x 22 cm) (5U height)	17.17(w) x 18.74(d) x 12.13(h) in (43.61 x 47.6 x 30.81 cm) (7U height)	17.17(w) x 18.74(d) x 34.88(h) in (43.61 x 47.6 x 88.6 cm) (20U height)
Weight	83.77 lb (38 kg)	110.23 lb (50 kg)	
Full configuration weight	83.77 lb (38 kg)	110.23 lb (50 kg)	220.46 lb (100 kg)
Mounting and enclosure	EIA-standard 19-inch rack	EIA-standard 19-inch rack	EIA-standard 19-inch rack
Performance			
Throughput	Up to 36 million pps	Up to 108 mpps	Up to 252 mpps
Routing table size	2000000 entries (IPv4), 500000 entries (IPv6)	2000000 entries (IPv4), 500000 entries (IPv6)	2000000 entries (IPv4), 500000 entries (IPv6)
Forwarding table size	1000000 entries (IPv4), 300000 entries (IPv6)	1000000 entries (IPv4), 300000 entries (IPv6)	1000000 entries (IPv4), 300000 entries (IPv6)
Backplane bandwidth	100 Gb/s	300 Gb/s	700 Gb/s
Environment			
Operating temperature	32°F to 113°F (0°C to 45°C)	32°F to 113°F (0°C to 45°C)	32°F to 113°F (0°C to 45°C)
Operating relative humidity	10% to 95%, noncondensing	10% to 95%, noncondensing	10% to 95%, noncondensing
Nonoperating/Storage temperature	14°F to 131°F (-10°C to 55°C)	14°F to 131°F (-10°C to 55°C)	14°F to 131°F (-10°C to 55°C)
Nonoperating/Storage relative humidity	5% to 95%, noncondensing	5% to 95%, noncondensing	5% to 95%, noncondensing
Electrical characteristic			
Frequency	50/60 +/- 2 Hz	50/60 +/- 2 Hz	50/60 +/- 2 Hz
Maximum heat dissipation	1126 BTU/hr (1187.93 kJ/hr)	1910 BTU/hr (2015.05 kJ/hr)	4265 BTU/hr (4499.58 kJ/hr)
AC voltage	100-240 VAC	100-240 VAC	100-240 VAC
DC voltage	-48 to -60 VDC	-48 to -60 VDC	-48 to -60 VDC
Maximum power rating	650 W	650 W	1950 W
Notes	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.	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.	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.
Reliability			
MTBF (years)	31.19	26.80	24.50
MTTR (hours)	1.0	1.0	1.0
Safety	CSA 22.2 No. 60950; cUL (CSA 22.2 No. 60950); CSA 22.2 No. 60950 3rd edition; CSA 22.2 No. 950; CSA 950; cUL (CSA 950); EN 60950/IEC 60950; UL 1950 3rd edition; UL 1950; UL 60950; UL 60950-1; CAN/CSA 22.2 No. 60950; CAN/CSA 22.2 No. 60950-1; EN 60825; AS/NZS 60950; KN 60950; GOST R MEK60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; EN 609500 Safety Information Technology Equipment; UL 60950; CSA 22.2 No. 60950/cUL; IEC 60950; IEC 60950-1; EN 60950; EN 60950-1; IEC 60825; CSA 22.2 No. 950-95; IEC 60950-1:2001 (with CB Report); CAN/CSA-C22.2 No. 60950-1-03; CAN/CSA-C22.2 No. 60950-1; CSA 60950-1; CSA C22.2 60950-1; EU RoHS Compliant; EN 60950-1/A11; CSA 22.2 60950-1; EN 60950: 2000, ZB and ZC Deviations; IEC 60950: 1999, Corr Feb 2000, all national deviations; As/NZS 60950:2000, Australia; UL 60950-1:2003; UL 60950-1:2001; CSA 22.2 60950-1:2003; IEC 60950-1:2001; EN 60950-1:2001; CSA 22.2-60950; AS/NZS 60950: 2000 Australia, Russian GOST Safety Approval; CSA 22.2 No. 950 3rd Edition 1995; UL 60950 3rd Edition; CAN/CSA 22.2 No. 60950-00/UL 60950 3rd Edition, Safety Information for Technology Equipment; EN 60950/IEC 60950 3rd Edition; UL 60950 Standard for the Safety of Information Technology Equipment; EN 60825: Safety of Laser Products	CSA 22.2 No. 60950; cUL (CSA 22.2 No. 60950); CSA 22.2 No. 60950 3rd edition; CSA 22.2 No. 950; CSA 950; cUL (CSA 950); EN 60950/IEC 60950; UL 1950 3rd edition; UL 1950; UL 60950; UL 60950-1; CAN/CSA 22.2 No. 60950; CAN/CSA 22.2 No. 60950-1; EN 60825; AS/NZS 60950; KN 60950; GOST R MEK60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; EN 609500 Safety Information Technology Equipment; UL 60950; CSA 22.2 No. 60950/cUL; IEC 60950; IEC 60950-1; EN 60950; EN 60950-1; IEC 60825; CSA 22.2 No. 950-95; IEC 60950-1:2001 (with CB Report); CAN/CSA-C22.2 No. 60950-1-03; CAN/CSA-C22.2 No. 60950-1; CSA 60950-1; CSA C22.2 60950-1; EU RoHS Compliant; EN 60950-1/A11; CSA 22.2 60950-1; EN 60950: 2000, ZB and ZC Deviations; IEC 60950: 1999, Corr Feb 2000 all national deviations; As/NZS 60950:2000, Australia; UL 60950-1:2003; UL 60950-1:2001; CSA 22.2 60950-1:2003; IEC 60950-1:2001; EN 60950-1:2001; CSA 22.2-60950; AS/NZS 60950: 2000 Australia, Russian GOST Safety Approval; CSA 22.2 No. 950 3rd Edition 1995; UL 60950 3rd Edition; CAN/CSA 22.2 No. 60950-00/UL 60950 3rd Edition, Safety Information for Technology Equipment; EN 60950/IEC 60950 3rd Edition; UL 60950 Standard for the Safety of Information Technology Equipment; EN 60825: Safety of Laser Products	CSA 22.2 No. 60950; cUL (CSA 22.2 No. 60950); CSA 22.2 No. 60950 3rd edition; CSA 22.2 No. 950; CSA 950; cUL (CSA 950); EN 60950/IEC 60950; UL 1950 3rd edition; UL 1950; UL 60950; UL 60950-1; CAN/CSA 22.2 No. 60950; CAN/CSA 22.2 No. 60950-1; EN 60825; AS/NZS 60950; KN 60950; GOST R MEK60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; EN 609500 Safety Information Technology Equipment; UL 60950; CSA 22.2 No. 60950/cUL; IEC 60950; IEC 60950-1; EN 60950; EN 60950-1; IEC 60825; CSA 22.2 No. 950-95; IEC 60950-1:2001 (with CB Report); CAN/CSA-C22.2 No. 60950-1-03; CAN/CSA-C22.2 No. 60950-1; CSA 60950-1; CSA C22.2 60950-1; EU RoHS Compliant; EN 60950-1/A11; CSA 22.2 60950-1; EN 60950: 2000, ZB and ZC Deviations; IEC 60950: 1999, Corr Feb 2000, all national deviations; As/NZS 60950:2000, Australia; UL 60950-1:2003; UL 60950-1:2001; CSA 22.2 60950-1:2003; IEC 60950-1:2001; EN 60950-1:2001; CSA 22.2-60950; AS/NZS 60950: 2000 Australia, Russian GOST Safety Approval; CSA 22.2 No. 950 3rd Edition 1995; UL 60950 3rd Edition; CAN/CSA 22.2 No. 60950-00/UL 60950 3rd Edition, Safety Information for Technology Equipment; EN 60950/IEC 60950 3rd Edition; UL 60950 Standard for the Safety of Information Technology Equipment; EN 60825: Safety of Laser Products

HP 6600 TAA-compliant Router Series

Specifications (continued)

	HP 6604 Router Chassis (JC178B)	HP 6608 Router Chassis (JC177B)	HP 6616 Router Chassis (JC496A)
Emissions	FCC part 15 Class A; FCC Rules Part 15, Subpart B Class A; EN 55022/CISPR-22 Class A; VCCI Class A; EN 55022/CISPR 22 Class A; EN 55022 Class A; CISPR 22 Class A; EN 55024; CISPR 22/A2; IEC/EN 61000-3-2; IEC/EN 61000-3-3; EN 55024/A1; IEC 61000:4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-11; BSMI CNS 13438; EMC Directive 89/336/EEC; ICES-003 Class A; ANSI C63.4 2003; CISPR 24; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-3-2; EN 61000-3-3; Korean EMI Class A; CNS 13438 Class A; EN 55024:1998; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-4-11	FCC part 15 Class A; FCC Rules Part 15, Subpart B Class A; EN 55022/CISPR-22 Class A; VCCI Class A; EN 55022/CISPR 22 Class A; EN 55022 Class A; CISPR 22 Class A; EN 55024; CISPR 22/A2; IEC/EN 61000-3-2; IEC/EN 61000-3-3; EN 55024/A1; IEC 61000:4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-11; BSMI CNS 13438; EMC Directive 89/336/EEC; ICES-003 Class A; ANSI C63.4 2003; CISPR 24; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-3-2; EN 61000-3-3; Korean EMI Class A; CNS 13438 Class A; EN 55024:1998; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-4-11	FCC part 15 Class A; FCC Rules Part 15, Subpart B Class A; EN 55022/CISPR-22 Class A; VCCI Class A; EN 55022/CISPR 22 Class A; EN 55022 Class A; CISPR 22 Class A; EN 55024; CISPR 22/A2; IEC/EN 61000-3-2; IEC/EN 61000-3-3; EN 55024/A1; IEC 61000:4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-11; BSMI CNS 13438; EMC Directive 89/336/EEC; ICES-003 Class A; ANSI C63.4 2003; CISPR 24; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-3-2; EN 61000-3-3; Korean EMI Class A; CNS 13438 Class A; EN 55024:1998; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-4-11
Management	IMC—Intelligent Management Center; command-line interface; limited command-line interface; out-of-band management (serial RS-232C); out-of-band management (DB-9 serial port console); out-of-band management; SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; terminal interface (serial RS-232C); modem interface; IEEE 802.3 Ethernet MIB; Ethernet Interface MIB	IMC—Intelligent Management Center; command-line interface; limited command-line interface; out-of-band management (serial RS-232C); out-of-band management (DB-9 serial port console); out-of-band management; SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; terminal interface (serial RS-232C); modem interface; IEEE 802.3 Ethernet MIB; Ethernet Interface MIB	IMC—Intelligent Management Center; command-line interface; limited command-line interface; out-of-band management (serial RS-232C); out-of-band management (DB-9 serial port console); out-of-band management; SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; terminal interface (serial RS-232C); modem interface; IEEE 802.3 Ethernet MIB; Ethernet Interface MIB
Notes	The chassis supports a maximum of four HIM or two SAP slots, or a combination thereof; it supports two HIM or one SAP slot with the redundant JC566A. The forwarding table size shown is with the use of JC566A. JC165A delivers forwarding of 500,000 IPv4 and 100,000 IPv6 addresses.	The chassis supports a maximum of eight HIM or four SAP slots, or a combination thereof; it supports six HIM or three SAP slots, or a combination thereof, with the redundant JC566A. The forwarding table size shown is with the use of JC566A. JC165A delivers forwarding of 500,000 IPv4 and 100,000 IPv6 addresses.	The chassis supports a maximum of 16 HIM or 8 SAP slots, or a combination thereof; it supports 14 HIM or 7 SAP slots, or a combination thereof, with the redundant JC566A. The forwarding table size shown is with the use of JC566A. JC165A delivers forwarding of 500,000 IPv4 and 100,000 IPv6 addresses.
Services	3-year, parts only, global next-day advance exchange (UW054E) 3-year, 4-hour onsite, 13x5 coverage for hardware (UW062E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UV930E) 3-year, 4-hour onsite, 24x7 coverage for hardware (HR530E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UV943E) 3-year, 24x7 SW phone support, software updates (UV955E) 1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR529E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR531E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UW063E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UV931E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV944E) 4-year, 24x7 SW phone support, software updates (UV956E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UW064E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UV932E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV945E) 5-year, 24x7 SW phone support, software updates (UV957E) 3 Yr 6 hr Call-to-Repair Onsite (UW055E) 4 Yr 6 hr Call-to-Repair Onsite (UW056E) 5 Yr 6 hr Call-to-Repair Onsite (UW057E) 1-year, 6 hour Call-To-Repair Onsite for hardware (HR533E) 1-year, 24x7 software phone support, software updates (HR532E) Refer to the HP website at hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	3-year, parts only, global next-day advance exchange (UW054E) 3-year, 4-hour onsite, 13x5 coverage for hardware (UW062E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UV930E) 3-year, 4-hour onsite, 24x7 coverage for hardware (HR530E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UV943E) 3-year, 24x7 SW phone support, software updates (UV955E) 1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR529E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR531E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UW063E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UV931E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV944E) 4-year, 24x7 SW phone support, software updates (UV956E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UW064E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UV932E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV945E) 5-year, 24x7 SW phone support, software updates (UV957E) 3 Yr 6 hr Call-to-Repair Onsite (UW055E) 4 Yr 6 hr Call-to-Repair Onsite (UW056E) 5 Yr 6 hr Call-to-Repair Onsite (UW057E) 1-year, 6 hour Call-To-Repair Onsite for hardware (HR533E) 1-year, 24x7 software phone support, software updates (HR532E) Refer to the HP website at hp.com/networking/services for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	3-year, parts only, global next-day advance exchange (UW054E) 3-year, 4-hour onsite, 13x5 coverage for hardware (UW062E) 3-year, 4-hour onsite, 24x7 coverage for hardware (UV930E) 3-year, 4-hour onsite, 24x7 coverage for hardware (HR530E) 3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UV943E) 3-year, 24x7 SW phone support, software updates (UV955E) 1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR529E) 1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR531E) 4-year, 4-hour onsite, 13x5 coverage for hardware (UW063E) 4-year, 4-hour onsite, 24x7 coverage for hardware (UV931E) 4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV944E) 4-year, 24x7 SW phone support, software updates (UV956E) 5-year, 4-hour onsite, 13x5 coverage for hardware (UW064E) 5-year, 4-hour onsite, 24x7 coverage for hardware (UV932E) 5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UV945E) 5-year, 24x7 SW phone support, software updates (UV957E) 3 Yr 6 hr Call-to-Repair Onsite (UW055E) 4 Yr 6 hr Call-to-Repair Onsite (UW056E) 5 Yr 6 hr Call-to-Repair Onsite (UW057E) 1-year, 6 hour Call-To-Repair Onsite for hardware (HR533E) 1-year, 24x7 software phone support, software updates (HR532E) Refer to the HP website at 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.

Standards and Protocols—(applies to all products in series)

BGP	RFC 1267 Border Gateway Protocol 3 (BGP-3) RFC 1657 Definitions of Managed Objects for BGPv4 RFC 1771 BGPv4 RFC 1772 Application of the BGP RFC 1773 Experience with the BGP-4 Protocol RFC 1774 BGP-4 Protocol Analysis 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 2842 Capability Advertisement with BGP-4 RFC 2858 BGP-4 Multi-Protocol Extensions RFC 2918 Route Refresh Capability RFC 4271 A Border Gateway Protocol 4 (BGP-4) RFC 4272 BGP Security Vulnerabilities Analysis 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 4451 BGP MULTI_EXIT_DISC (MED) Considerations	RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) RFC 4486 Subcodes for BGP Cease Notification Message RFC 4724 Graceful Restart Mechanism for BGP RFC 4760 Multiprotocol Extensions for BGP-4 RFC 4893 BGP Support for Four-octet AS Number Space RFC 5065 Autonomous System Confederations for BGP RFC 5291 Outbound Route Filtering Capability for BGP-4 RFC 5292 Address-Prefix-Based Outbound Route Filter for BGP-4 RFC 5398 Autonomous System (AS) Number Reservation for Documentation Use RFC 5883 BFD for Multihop Paths
Denial of service protection		CPU DoS Protection	Rate Limiting by ACLs
Device management	RFC 1155 Structure and Mgmt Information (SMIv1) RFC 1157 SNMPv1/v2c RFC 1305 NTPv3 RFC 1901 (Community based SNMPv2) RFC 1901-1907 SNMPv2c, SMIv2 and Revised MIB-II RFC 1902 (SNMPv2) RFC 1908 (SNMP v1/2 Coexistence) RFC 1945 Hypertext Transfer Protocol—HTTP/1.0	RFC 2068 Hypertext Transfer Protocol—HTTP/1.1 RFC 2452 MIB for TCP6 RFC 2454 MIB for UDP6 RFC 2573 (SNMPv3 Applications) 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 2819 RMON RFC 3410 (Management Framework) RFC 3416 (SNMP Protocol Operations v2) RFC 3417 (SNMP Transport Mappings) Multiple Configuration Files Multiple Software Images SNMP v3 and RMON RFC support SSHv1/SSHv2 Secure Shell
General protocols	IEEE 802.1ad Q-in-Q IEEE 802.1ad Q-in-Q IEEE 802.1ag Service Layer OAM IEEE 802.1ah Provider Backbone Bridges IEEE 802.1AX-2008 Link Aggregation IEEE 802.1D MAC Bridges IEEE 802.1p Priority IEEE 802.1Q (GVRP) IEEE 802.1Q VLANs IEEE 802.1s (MSTP) IEEE 802.1s Multiple Spanning Trees IEEE 802.1v VLAN classification by Protocol and Port IEEE 802.1w Rapid Reconfiguration of Spanning Tree IEEE 802.1X PAE IEEE 802.3 Type 10BASE-T IEEE 802.3ab 1000BASE-T IEEE 802.3ac (VLAN Tagging Extension) IEEE 802.3ad Link Aggregation (LAG) IEEE 802.3ad Link Aggregation Control Protocol (LACP) IEEE 802.3ae 10-Gigabit Ethernet IEEE 802.3ag Ethernet OAM IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber—EFMF IEEE 802.3i 10BASE-T 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 855 Telnet Option Specification RFC 856 TELNET RFC 857 Telnet Echo Option RFC 858 Telnet Suppress Go Ahead Option RFC 894 IP over Ethernet RFC 896 Congestion Control in IP/TCP Internetworks	RFC 1552 The PPP Internetworking Packet Exchange Control Protocol (IPXCP) RFC 1577 Classical IP and ARP over ATM RFC 1613 Cisco Systems X.25 over TCP (XOT) RFC 1624 Incremental Internet Checksum RFC 1631 NAT RFC 1638 PPP Bridging Control Protocol (BCP) RFC 1661 The Point-to-Point Protocol (PPP) RFC 1662 PPP in HDLC-like Framing RFC 1695 Definitions of Managed Objects for ATM Management Version 8.0 using SMIv2 RFC 1700 Assigned Numbers RFC 1701 Generic Routing Encapsulation RFC 1702 Generic Routing Encapsulation over IPv4 networks RFC 1721 RIP-2 Analysis RFC 1722 RIP-2 Applicability RFC 1723 RIP v2 RFC 1812 IPv4 Routing RFC 1829 The ESP DES-CBC Transform RFC 1853 IP in IP Tunneling RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses RFC 1944 Benchmarking Methodology for Network Interconnect Devices RFC 1945 Hypertext Transfer Protocol—HTTP/1.0 RFC 1973 PPP in Frame Relay RFC 1974 PPP Stac LZS Compression Protocol RFC 1981 Path MTU Discovery for IP version 6 RFC 1990 The PPP Multilink Protocol (MP) RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP) RFC 2003 IP Encapsulation within IP RFC 2082 RIP-2 MD5 Authentication RFC 2091 Trigger RIP RFC 2104 HMAC: Keyed-Hashing for Message Authentication RFC 2131 DHCP RFC 2132 DHCP Options and BOOTP Vendor Extensions RFC 2138 Remote Authentication Dial In User Service (RADIUS) RFC 2205 Resource ReSerVation Protocol (RSVP)—Version 1 Functional Specification	RFC 2787 Definitions of Managed Objects for VRRP RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals RFC 2856 Textual Conventions for Additional High Capacity Data Types RFC 2865 Remote Authentication Dial In User Service (RADIUS) RFC 2866 RADIUS Accounting RFC 2868 RADIUS Attributes for Tunnel Protocol Support RFC 2869 RADIUS Extensions RFC 2915 The Naming Authority Pointer (NAPTR) DNS Resource Record RFC 2916 E.164 number and DNS P. Faltstrom RFC 2961 RSVP Refresh Overhead Reduction Extensions RFC 2965 HTTP State Management Mechanism RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS RFC 2973 IS-IS Mesh Groups RFC 2993 Architectural Implications of NAT RFC 3022 Traditional IP Network Address Translator (Traditional NAT) RFC 3027 Protocol Complications with the IP Network Address Translator RFC 3031 Multiprotocol Label Switching Architecture RFC 3032 MPLS Label Stack Encoding RFC 3036 LDP Specification RFC 3046 DHCP Relay Agent Information Option RFC 3063 MPLS Loop Prevention Mechanism RFC 3065 Support AS confederation RFC 3137 OSPF Stub Router Advertisement RFC 3209 RSVP-TE Extensions to RSVP for LSP Tunnels RFC 3210 Applicability Statement for Extensions to RSVP for LSP-Tunnels RFC 3212 Constraint-Based LSP setup using LDP (CR-LDP) RFC 3214 LSP Modification Using CR-LDP RFC 3215 LDP State Machine RFC 3246 Expedited Forwarding PHB RFC 3268 Advanced Encryption Standard (AES Ciphersuites for Transport Layer Security (TLS) RFC 3272 Overview and Principles of Internet Traffic Engineering RFC 3277 IS-IS Transient Blackhole Avoidance RFC 3279 Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile

Standards and Protocols—(applies to all products in series) (continued)

General protocols (continued)

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 1006 ISO transport services on top of the TCP: Version 3
RFC 1027 Proxy ARP
RFC 1034 Domain Concepts and Facilities
RFC 1035 Domain Implementation and Specification
RFC 1042 IP Datagrams
RFC 1058 RIPv1
RFC 1071 Computing the Internet Checksum
RFC 1091 Telnet Terminal-Type Option
RFC 1093 NSFNET routing architecture
RFC 1122 Host Requirements
RFC 1141 Incremental updating of the Internet checksum
RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1144 Compressing TCP/IP headers for low-speed serial links
RFC 1171 Point-to-Point Protocol for the transmission of multi-protocol datagrams over Point-to-Point links
RFC 1191 Path MTU discovery
RFC 1195 OSI ISIS for IP and Dual Environments
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets
RFC 1253 (OSPF v2)
RFC 1256 ICMP Router Discovery Protocol (IRDP)
RFC 1293 Inverse Address Resolution Protocol
RFC 1305 NTPv3
RFC 1315 Management Information Base for Frame Relay DTEs
RFC 1321 The MD5 Message-Digest Algorithm
RFC 1332 The PPP Internet Protocol Control Protocol (IPCP)
RFC 1333 PPP Link Quality Monitoring
RFC 1334 PPP Authentication Protocols (PAP)
RFC 1334 PPP Authentication Protocols (PAP)
RFC 1349 Type of Service
RFC 1350 TFTP Protocol (revision 2)
RFC 1377 The PPP OSI Network Layer Control Protocol (OSINLCP)
RFC 1381 SNMP MIB Extension for X.25 LAPB
RFC 1389 RIPv2 MIB Extension
RFC 1471 The Definitions of Managed Objects for the Link Control Protocol of the Point-to-Point Protocol
RFC 1472 The Definitions of Managed Objects for the Security Protocols of the Point-to-Point Protocol
RFC 1473 The Definitions of Managed Objects for the IP Network Control Protocol of the Point-to-Point Protocol
RFC 1490 Multiprotocol Interconnect over Frame Relay
RFC 1519 CIDR
RFC 1531 Dynamic Host Configuration Protocol
RFC 1533 DHCP Options and BOOTP Vendor Extensions
RFC 1534 DHCP/BOOTP Interoperation
RFC 1541 DHCP
RFC 1542 BOOTP Extensions
RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
RFC 2209 Resource ReSerVation Protocol (RSVP)—Version 1 Message Processing Rules
RFC 2225 Classical IP and ARP over ATM
RFC 2236 IGMP Snooping
RFC 2246 The TLS Protocol Version 1.0
RFC 2251 Lightweight Directory Access Protocol (v3)
RFC 2252 Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions
RFC 2280 Routing Policy Specification Language (RPSL)
RFC 2283 MBGP
RFC 2284 EAP over LAN
RFC 2338 VRRP
RFC 2338 VRRP (Premium Edge License)
RFC 2364 PPP Over AAL5
RFC 2374 An Aggregatable Global Unicast Address Format
RFC 2390 Inverse Address Resolution Protocol
RFC 2427 Multiprotocol Interconnect over Frame Relay
RFC 2451 The ESP CBC-Mode Cipher Algorithms
RFC 2453 RIPv2
RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols
RFC 2511 Internet X.509 Certificate Request Message Format
RFC 2514 Definitions of Textual Conventions and OBJECT-IDENTITIES for ATM Management
RFC 2515 Definitions of Managed Objects for ATM Management
RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)
RFC 2519 A Framework for Inter-Domain Route Aggregation
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2544 Benchmarking Methodology for Network Interconnect Devices
RFC 2581 TCP Congestion Control
RFC 2615 PPP over SONET/SDH (Synchronous Optical Network/Synchronous Digital Hierarchy)
RFC 2616 HTTP Compatibility v1.1
RFC 2617 HTTP Authentication: Basic and Digest Access Authentication
RFC 2622 Routing Policy Specification Language (RPSL)
RFC 2644 Directed Broadcast Control
RFC 2661 L2TP
RFC 2663 NAT Terminology and Considerations
RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)
RFC 2702 Requirements for Traffic Engineering Over MPLS
RFC 2716 PPP EAP TLS Authentication Protocol
RFC 2747 RSVP Cryptographic Authentication
RFC 2763 Dynamic Name-to-System ID mapping support
RFC 2765 Stateless IP/ICMP Translation Algorithm (SIIT)
RFC 2766 Network Address Translation—Protocol Translation (NAT-PT)
RFC 2767 Dual Stacks IPv4 & IPv6
RFC 2782 A DNS RR (DNS Resource Record) for specifying the location of services (DNS SRV) Domain Name System Server
RFC 2784 Generic Routing Encapsulation (GRE)
RFC 3280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile
RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System
RFC 3392 Support BGP capabilities advertisement
RFC 3410 Applicability Statements for SNMP
RFC 3416 Protocol Operations for SNMP
RFC 3417 Transport Mappings for the Simple Network Management Protocol (SNMP)
RFC 3442 The Classless Static Route Option for Dynamic Host Configuration Protocol (DHCP) version 4
RFC 3479 Fault Tolerance for the Label Distribution Protocol (LDP)
RFC 3487 Graceful Restart Mechanism for LDP
RFC 3509 OSPF ABR Behavior
RFC 3526 More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE)
RFC 3562 Key Management Considerations for the TCP MD5 Signature Option
RFC 3564 Requirements for Support of Differentiated Services-aware MPLS Traffic Engineering
RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication
RFC 3590 Source Address Selection for the Multicast Listener Discovery (MLD) Protocol
RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPSec
RFC 3619 Ethernet Automatic Protection Switching (EAPS)
RFC 3623 Graceful OSPF Restart
RFC 3704 Unicast Reverse Path Forwarding (URPF)
RFC 3706 A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers
RFC 3768 VRRP
RFC 3768 VRRP
RFC 3768 VRRP (Premium Edge License)
RFC 3784 ISIS TE support
RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit
RFC 3811 Definitions of Textual Conventions (TCs) for Multiprotocol Label Switching (MPLS) Management
RFC 3812 Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB)
RFC 3847 Restart signaling for IS-IS
RFC 3879 Deprecating Site Local Addresses
RFC 3906 Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels
RFC 3917 Requirements for IP Flow Information Export (IPFIX)
RFC 3954 Cisco Systems NetFlow Services Export Version 9
RFC 4213 Basic IPv6 Transition Mechanisms
RFC 4884 Extended ICMP to Support Multi-Part Messages
RFC 5082 The Generalized TTL Security Mechanism (GTSM)
RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates
RFC 5880 Bidirectional Forwarding Detection
RFC 5882 Generic Application of BFD
IP Ping

IP multicast

RFC 1112 IGMP
RFC 2236 IGMPv2
RFC 2283 Multiprotocol Extensions for BGP-4
RFC 2362 PIM Sparse Mode
RFC 2362 PIM Sparse Mode
RFC 2362 PIM Sparse Mode (Premium Edge License)
RFC 2365 Administratively Scoped IP Multicast
RFC 2934 Protocol Independent Multicast MIB for IPv4
RFC 3376 IGMPv3
RFC 3376 IGMPv3 (host joins only)
RFC 3446 Anycast Rendezvous Point (RP) mechanism using Protocol Independent Multicast (PIM) and Multicast Source Discovery Protocol (MSDP)
RFC 3569 An Overview of Source-Specific Multicast (SSM)
RFC 3618 Multicast Source Discovery Protocol (MSDP)
RFC 3973 Draft 2 PIM Dense Mode
RFC 3973 Draft 2 PIM Dense Mode
RFC 3973 PIM Dense Mode
RFC 3973 PIM Dense Mode
RFC 3973 PIM Dense Mode (Premium Edge License)
RFC 4601 Draft 10 PIM Sparse Mode
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 4608 Source-Specific Protocol Independent Multicast in 232/8 (PIM SSM)
RFC 4611 Multicast Source Discovery Protocol (MSDP) Deployment Scenarios
RFC 4950 ICMP Extensions for Multiprotocol Label Switching
RFC 5015 Bidirectional Protocol Independent Multicast (BIDIR-PIM)
RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)
RFC 5060 Protocol Independent Multicast MIB
RFC 5240 Protocol Independent Multicast (PIM) Bootstrap Router MIB

Standards and Protocols—(applies to all products in series) (continued)

IPv6

RFC 1350 TFTP
RFC 1881 IPv6 Address Allocation Management
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 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 2472 IP Version 6 over PPP
RFC 2473 Generic Packet Tunneling in IPv6
RFC 2475 IPv6 DiffServ Architecture
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 2711 IPv6 Router Alert Option
RFC 2740 OSPFv3 for IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 2894 Router Renumbering 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 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3162 RADIUS and IPv6
RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses
RFC 3307 IPv6 Multicast Address Allocation
RFC 3315 DHCPv6 (client and relay)
RFC 3315 DHCPv6 (client only)
RFC 3363 DNS support
RFC 3484 Default Address Selection for IPv6
RFC 3493 Basic Socket Interface Extensions for IPv6
RFC 3513 IPv6 Addressing Architecture
RFC 3542 Advanced Sockets API for IPv6
RFC 3587 IPv6 Global Unicast Address Format
RFC 3596 DNS Extension for IPv6
RFC 3646 DNS Configuration options for Dynamic Host Configuration Protocol for IPv6
RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6
RFC 3810 MLDv2 (host joins only)
RFC 3810 MLDv2 for IPv6
RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6
RFC 3956 Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address
RFC 4001 Textual Conventions for Internet Network Addresses
RFC 4007 IPv6 Scoped Address Architecture
RFC 4022 MIB for TCP
RFC 4113 MIB for UDP
RFC 4251 SSHv6 Architecture
RFC 4252 SSHv6 Authentication
RFC 4252 SSHv6 Transport Layer
RFC 4253 SSHv6 Transport Layer
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 4552 Authentication/Confidentiality for OSPFv3
RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
RFC 4861 IPv6 Neighbor Discovery
RFC 4862 IPv6 Stateless Address Auto-configuration
RFC 4940 IANA Considerations for OSPF
RFC 5072 IP Version 6 over PPP
RFC 5095 Deprecation of Type 0 Routing Headers in IPv6
RFC 5340 OSPF for IPv6
RFC 5340 OSPFv3 for IPv6
RFC 5722 Handling of Overlapping IPv6 Fragments
RFC 5881 BFD for IPv4 and IPv6 (Single Hop)

MIBs

IEEE 8021-PAE-MIB
IEEE 8023-LAG-MIB
RFC 1156 (TCP/IP MIB)
RFC 1212 Concise MIB Definitions
RFC 1213 MIB II
RFC 1229 Interface MIB Extensions
RFC 1286 Bridge MIB
RFC 1493 Bridge MIB
RFC 1573 SNMP MIB II
RFC 1643 Ethernet MIB
RFC 1650 Ethernet-Like 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 2021 RMONv2 MIB
RFC 2096 IP Forwarding Table MIB
RFC 2233 Interface MIB
RFC 2233 Interfaces MIB
RFC 2273 SNMP-NOTIFICATION-MIB
RFC 2452 IPV6-TCP-MIB
RFC 2454 IPV6-UDP-MIB
RFC 2465 IPv6 MIB
RFC 2466 ICMPv6 MIB
RFC 2571 SNMP Framework MIB
RFC 2572 SNMP-MPD MIB
RFC 2573 SNMP-Notification MIB
RFC 2573 SNMP-Target MIB
RFC 2574 SNMP USM 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 2688 MAU-MIB
RFC 2737 Entity MIB (Version 2)
RFC 2787 VRRP MIB
RFC 2819 RMON MIB
RFC 2863 The Interfaces Group MIB
RFC 2925 Ping MIB
RFC 2932IP (Multicast Routing MIB)
RFC 2933 IGMP MIB
RFC 3273 HC-RMON MIB
RFC 3414 SNMP-User based-SM MIB
RFC 3415 SNMP-View based-ACM MIB
RFC 3418 MIB for SNMPv3
RFC 3621 Power Ethernet MIB
RFC 3813 MPLS LSR MIB
RFC 3814 MPLS FTN MIB
RFC 3815 MPLS LDP MIB
RFC 3826 AES for SNMP's USM MIB
RFC 4113 UDP MIB
RFC 4133 Entity MIB (Version 3)
RFC 4221 MPLS FTN MIB
LLDP-EXT-DOT1-MIB
LLDP-EXT-DOT3-MIB
LLDP-MIB

MPLS

RFC 3037 LDP (Label Distribution Protocol) Applicability
RFC 3270 Multi-Protocol Label Switching (MPLS) Support Extension for IPv6 VPN of Differentiated Services
RFC 3429 Assignment of the 'OAM Alert Label' for Multiprotocol Label Switching
RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks
RFC 3478 Graceful Restart Mechanism for Label Distribution Protocol
RFC 3612 Applicability Statement for Restart Mechanisms for the Label Distribution
RFC 3916 Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)
RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture
RFC 4023 Encapsulating MPLS in IP or Generic Routing Encapsulation (GRE)
RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels
RFC 4105 Requirements for Inter-Area MPLS Traffic Engineering
RFC 4124 Protocol Extensions for Support of Diffserv-aware MPLS Traffic Engineering
RFC 4125 Maximum Allocation Bandwidth Constraints Model for Diffserv-aware MPLS Traffic
RFC 4127 Russian Dolls Bandwidth Constraints Model for Diffserv-aware MPLS Traffic
RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL
RFC 4216 MPLS Inter-Autonomous System (AS) Traffic Engineering (TE) Requirements
RFC 4364 BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4365 Applicability Statement for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 4381 Analyses of the Security of BGP/MPLS IP VPNs
RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN
RFC 4446 IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3)
RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
RFC 4576 Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS
RFC 4618 Encapsulation Methods for Transport of PPP/High-Level Data Link Control (HDLC) over MPLS Networks
RFC 4619 Encapsulation Methods for Transport of Frame Relay over Multiprotocol Label
RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4664 Framework for Layer 2 Virtual Private Networks
RFC 4665 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS
RFC 4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling
RFC 4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling
RFC 4764 Framework for Layer 2 Virtual Private Networks (L2VPNs)
RFC 4765 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 4816 Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM)
RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6
RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel
RFC 5443 LDP IGP Synchronization
RFC 5601 Pseudowire (PW) Management Information Base (MIB)

Standards and Protocols—(applies to all products in series) (continued)

Network management	IEEE 802.1AB Link Layer Discovery Protocol (LLDP) IEEE 802.1D (STP) RFC 1098 A Simple Network Management Protocol (SNMP) RFC 1155 Structure of Management Information RFC 1157 SNMPv1 RFC 1215 SNMP Generic traps RFC 1382 SNMP MIB Extension for the X.25 Packet Layer RFC 1757 RMON 4 groups: Stats, History, Alarms and Events RFC 1901 SNMPv2 Introduction RFC 1902 SNMPv2 Structure RFC 1903 SNMPv2 Textual Conventions RFC 1904 SNMPv2 Conformance RFC 1905 SNMPv2 Protocol Operations RFC 1906 SNMPv2 Transport Mappings RFC 1918 Private Internet Address Allocation RFC 2272 SNMPv3 Management Protocol RFC 2273 SNMPv3 Applications	RFC 2274 USM for SNMPv3 RFC 2275 VACM for SNMPv3 RFC 2570 SNMPv3 Overview RFC 2571 SNMP Management Frameworks RFC 2572 SNMPv3 Message Processing RFC 2573 SNMPv3 Applications RFC 2574 SNMPv3 User-based Security Model (USM) RFC 2575 SNMPv3 View-based Access Control Model (VACM) RFC 2575 VACM for SNMP RFC 2576 Coexistence between SNMP versions RFC 2578 SMIv2 RFC 2581 TCP6 RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events) RFC 3164 BSD syslog Protocol RFC 3176 sFlow RFC 3411 SNMP Management Frameworks RFC 3412 SNMPv3 Message Processing	RFC 3413 Simple Network Management Protocol (SNMP) Applications RFC 3414 SNMPv3 User-based Security Model (USM) RFC 3415 SNMPv3 View-based Access Control Model VACM) RFC 3584 Coexistence between Version 1 and Version 2 of the Internet-standard Network RFC 3593 Textual Conventions for MIB Modules Using Performance History Based on 15 Minute RFC 3636 Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs) RFC 4292 IP Forwarding Table MIB RFC 4502 Remote Network Monitoring Management Information Base Version 2 RFC 4878 Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED) SNMPv1/v2 SNMPv1/v2c SNMPv1/v2c (read only) SNMPv1/v2c/v3
OSPF	RFC 1245 OSPF protocol analysis RFC 1246 Experience with OSPF RFC 1253 OSPFv2 MIB RFC 1583 OSPFv2 RFC 1587 OSPF NSSA RFC 1745 OSPF Interactions RFC 1765 OSPF Database Overflow RFC 1850 OSPFv2 Management Information Base (MIB), traps RFC 2178 OSPFv2	RFC 2328 OSPFv2 RFC 2328 OSPFv2 RFC 2328 OSPFv2 (Premium Edge License) RFC 2370 OSPF Opaque LSA Option RFC 3101 OSPF NSSA RFC 3623 Graceful OSPF Restart 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 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs) RFC 4811 OSPF Out-of-Band LSDB Resynchronization RFC 4812 OSPF Restart Signaling RFC 4813 OSPF Link-Local Signaling RFC 5187 OSPFv3 Graceful Restart RFC 5340 OSPF for IPv6 RFC 5340 OSPFv3 for IPv6 RFC 5613 OSPF Link-Local Signaling
QoS/CoS	IEEE 802.1P (CoS) RFC 2309 Recommendations on queue management and congestion avoidance in the Internet RFC 2474 DiffServ Precedence, including 8 queues/port RFC 2474 DiffServ precedence, with 4 queues per port RFC 2474 DS Field in the IPv4 and IPv6 Headers RFC 2474 DSCP DiffServ	RFC 2474, with 4 queues per port RFC 2475 DiffServ Architecture RFC 2597 DiffServ Assured Forwarding (AF) RFC 2597 DiffServ Assured Forwarding (AF)— partial support RFC 2598 DiffServ Expedited Forwarding (EF) RFC 2697 A Single Rate Three Color Marker RFC 2698 A Two Rate Three Color Marker	RFC 2751 Signaled Preemption Priority Policy Element RFC 3247 Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior) RFC 3260 New Terminology and Clarifications for DiffServ RFC 3662 A Lower Effort Per-Domain Behavior (PDB) for Differentiated Services RFC 4594 Configuration Guidelines for DiffServ Service Classes
Security	IEEE 802.1X Port Based Network Access Control RFC 1321 The MD5 Message-Digest Algorithm RFC 1492 TACACS+ RFC 2082 RIP-2 MD5 Authentication RFC 2104 Keyed-Hashing for Message Authentication RFC 2138 RADIUS Authentication RFC 2139 RADIUS Accounting RFC 2209 RSVP-Message Processing RFC 2246 Transport Layer Security (TLS) RFC 2459 Internet X.509 Public Key Infrastructure Certificate and CRL Profile RFC 2548 Microsoft Vendor-specific RADIUS Attributes	RFC 2716 PPP EAP TLS Authentication Protocol RFC 2818 HTTP Over TLS RFC 2865 RADIUS (client only) 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 RFC 3567 Intermediate System (IS) to IS Cryptographic Authentication RFC 3576 Dynamic Authorization Extensions to RADIUS RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP)	RFC 3580 IEEE 802.1X RADIUS RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP) Access Control Lists (ACLs) Guest VLAN for 802.1x MAC Authentication Port Security Secure Sockets Layer (SSL) SSHv1 Secure Shell SSHv1.5 Secure Shell SSHv1/SSHv2 Secure Shell SSHv2 Secure Shell
VPN	RFC 2403—HMAC-MD5-96 RFC 2404—HMAC-SHA1-96 RFC 2405—DES-CBC Cipher algorithm RFC 2407—Domain of interpretation RFC 2547 BGP/MPLS VPNs	RFC 2764 A Framework for IP Based Virtual Private Networks RFC 2796 BGP Route Reflection—An Alternative to Full Mesh IBGP RFC 2842 Capabilities Advertisement with BGP-4 RFC 2858 Multiprotocol Extensions for BGP-4 RFC 2917 A Core MPLS IP VPN Architecture RFC 2918 Route Refresh Capability for BGP-4	RFC 3107 Carrying Label Information in BGP-4 RFC 4301—Security Architecture for the Internet Protocol RFC 4302—IP Authentication Header (AH) RFC 4303—IP Encapsulating Security Payload (ESP) RFC 4305—Cryptographic Algorithm Implementation Requirements for ESP and AH
IPSec	RFC 1828 IP Authentication using Keyed MD5 RFC 2401 IP Security Architecture RFC 2402 IP Authentication Header RFC 2406 IP Encapsulating Security Payload	RFC 2407—Domain of interpretation RFC 2408—Internet Security Association and Key Management Protocol (ISAKMP) RFC 2409—The Internet Key Exchange RFC 2410—The NULL Encryption Algorithm and its use with IPSec	RFC 2411 IP Security Document Roadmap RFC 2412—OAKLEY RFC 2865—Remote Authentication Dial In User Service (RADIUS) RFC 4835 Cryptographic Algorithm Implementation Requirements for Encapsulating Security

Standards and Protocols—(applies to all products in series) (continued)

IKEv1	RFC 2865—Remote Authentication Dial In User Service (RADIUS) RFC 3748—Extensible Authentication Protocol (EAP)	RFC 4109 Algorithms for Internet Key Exchange version 1 (IKEv1)
PKI	RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	

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RFC 3580 IEEE 802.1X RADIUS
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers
RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)
Access Control Lists (ACLs)
Guest VLAN for 802.1x
MAC Authentication
Port Security
Secure Sockets Layer (SSL)
SSHv1 Secure Shell
SSHv1.5 Secure Shell
SSHv1/SSHv2 Secure Shell
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