

### Overview

#### Models

HP HSR6602-G Router  
HP HSR6602-XG Router

JG353A  
JG354A

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#### Key features

- High-performance WAN routing
  - Compact, multi-core centralized processing architecture
  - Comprehensive routing, switching, and security
  - Modular WAN and LAN connectivity options
  - Robust high availability and resiliency
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#### Product overview

The HP HSR6600 Router Series is made up of high-performance services WAN routers that are ideal for small- to medium-sized campus WAN edge and aggregation, as well as high-end branch deployments.

These routers are built with a compact multi-core centralized processing architecture that delivers, in a 2 RU form factor, robust routing, security, full Layer 2 switching, and modular WAN and LAN interface options, all integrated in a single fast and powerful routing platform.

In addition, these routers feature robust carrier-class reliability capabilities to reduce disruption from network or system failures.

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#### Features and benefits

##### Connectivity

- **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/copper interface modules, 100/1000BASE-X auto-speed selection, and 10/100/1000BASE-T auto-speed detection plus auto duplex and MDI/MDI-X; is speed adaptable between 155 M POS/622 M POS/Gigabit Eth
- **Loopback**  
supports internal loopback testing for maintenance purposes and an increase in availability; loopback detection protects against incorrect cabling or network configurations and can be enabled on a per-port or per-VLAN basis for added flexibility

##### Performance

- **High-performance platform**  
provides up to 15 Mpps forwarding performance

##### Resiliency and high availability

- **Separate data and control planes**  
provide greater flexibility and enable continual services
  - **Hot-swappable modules**  
facilitates the replacement of hardware interface modules without impacting the traffic flow through the system
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- **Optional redundant power supply**  
provides uninterrupted power; allows hot-swapping of one of the two supplies when installed
- **Virtual Router Redundancy Protocol (VRRP)**  
allows groups of two routers to dynamically back each other up to create highly available routed environments
- **Graceful restart**  
supports graceful restart for OSPF, IS-IS, BGP, LDP, and RSVP; the 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 achieve nonstop forwarding (NSF)
- **Hitless software upgrades**  
allow patches to be installed without restarting the device, increasing network uptime and simplifying maintenance
- **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; achieves restoration within 50 ms, with the restoration time independent of the number of routes and fast link switchovers without route convergence

### Product architecture

- **Multi-core CPU**  
delivers multi-threaded processing, with eight cores and 32 hardware threads
- **Distributed processing**  
two kinds of engines are hardware separated: main controller engine (routing engine) and service engines (Flexible Interface Platform [FIP]); the main controller engine is used for route computing and system management, and service engines are used for processing services

### Layer 3 routing

- **Static IPv4 routing**  
provides simple manually configured IPv4 routing
- **Routing Information Protocol (RIP)**  
uses a distance vector algorithm with UDP packets for route determination; supports RIPv1 and RIPv2 routing; includes loop protection
- **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
- **Border Gateway Protocol 4 (BGP-4)**  
delivers an implementation of the Exterior Gateway Protocol (EGP) utilizing path vectors; uses TCP for enhanced reliability for the route discovery process; reduces bandwidth consumption by advertising only incremental updates; supports extensive policies for increased flexibility; scales to very large networks
- **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+**

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- 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
- **Virtual Private LAN Service (VPLS)**  
establishes point-to-multipoint Layer 2 VPNs across a provider network
- **Bidirectional Forwarding Detection (BFD)**  
enables link connectivity monitoring and reduces network convergence time for RIP, OSPF, BGP, IS-IS, VRRP, MPLS, and IRF
- **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
- **Equal-Cost Multipath (ECMP)**  
enables multiple equal-cost links in a routing environment to increase link redundancy and scale bandwidth
- **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

### 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
- **Domain Name System (DNS)**  
provides a distributed database that translates domain names and IP addresses, which simplifies network design; supports client and server

### Overview

- **Dynamic Host Configuration Protocol (DHCP)**  
simplifies the management of large IP networks

### Security

- **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
- **Group Domain Virtual Private Network (GDVPN)**  
a tunnel-less VPN technology that allows for native end-to-end security for a full meshed network; suitable for an enterprise running encryption over a private Multiprotocol Label Switching (MPLS)/IP-based core network, as well as to encrypt multicast traffic
- **Stateful VPN Firewall**  
provides enhanced stateful packet inspection and filtering; supports flexible security zones and virtual firewall containment; provides advanced VPN services with Triple DES (3DES) and Advanced Encryption Standard (AES) encryption at high performance and low latency, Web content filtering, and application prioritization and enhancement
- **Access control list (ACL)**  
supports powerful ACLs for both IPv4 and IPv6; ACLs are used for filtering traffic to prevent unauthorized users from accessing the network, or for controlling network traffic to save resources; 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 be set to operate on specific dates or times
- **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 URPFF
- **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
- **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 NAT to support unlimited connections; supports blacklist in NAT/NAPT/internal server, a limit on the number of connections, session log, and multi-instance

### Quality of Service (QoS)

- **HQoS / Nested QoS**  
allows for precise and flexible traffic classification and scheduling
- **Traffic policing**  
supports Committed Access Rate (CAR) and line rate
- **Congestion management**  
supports FIFO, PQ, CQ, WFQ, CBQ, and RTPQ
- **Weighted random early detection (WRED)/random early detection (RED)**  
delivers congestion avoidance capabilities through the use of queue management algorithms
- **Other QoS technologies**  
support traffic shaping, FR QoS, MPLS QoS, and MP QoS/LFI

### Management



### Overview

- **Industry-standard CLI with a hierarchical structure**  
reduces training time and expenses, and increases productivity in multivendor installations
- **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
- **Management interface control**  
enables or disables each of the following interfaces depending on security preferences: console port, telnet port, or reset button
- **Remote monitoring (RMON)**  
uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group
- **Management security**  
restricts access to critical configuration commands; offers multiple privilege levels with password protection; ACLs provide telnet and SNMP access; local and remote syslog capabilities allow logging of all access
- **FTP, TFTP, and SFTP support**  
offers different mechanisms for configuration updates; FTP allows bidirectional transfers over a TCP/IP network; trivial FTP (TFTP) is a simpler method using User Datagram Protocol (UDP); Secure File Transfer Protocol (SFTP) runs over an SSH tunnel to provide additional security
- **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

### Multicast support

- **Internet Group Management Protocol (IGMP)**  
utilizes Any-Source Multicast (ASM) or Source-Specific Multicast (SSM) to manage IPv4 multicast networks; supports IGMPv1, v2, and v3
- **Protocol Independent Multicast (PIM)**  
defines modes of Internet IPv4 and IPv6 multicasting to allow one-to-many and many-to-many transmission of information; PIM Dense Mode (DM), Sparse Mode (SM), and Source-Specific Mode (SSM) are supported
- **Multicast Source Discovery Protocol (MSDP)**  
allows multiple PIM-SM domains to interoperate; is used for inter-domain multicast applications
- **Multicast Border Gateway Protocol (MBGP)**  
allows multicast traffic to be forwarded across BGP networks separately from unicast traffic

### Additional information

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

### Warranty and support



### Overview

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

### Technical Specifications

#### HP HSR6602-G Router (JG353A)

<b>I/O ports and slots</b>	4 dual-personality 1000 Mbps ports (IEEE 802.3ab Type 1000BASE-T) 2 RJ-45 serial console ports 1 USB 2.0 1 RJ-45 out-of-band management port 1 Compact Flash port 1 open module slot; for either a FIP10 or FIP20 Module	
<b>Physical characteristics</b>	<b>Dimensions</b>	17.32(w) x 18.9(d) x 3.46(h) in (44 x 48 x 8.8 cm) (2U height)
	<b>Weight</b>	26.68 lb (12.1 kg), Fully loaded Chassis and power supplies as shipped
<b>Memory and processor</b>	<b>Processor</b>	Multi-core PowerPC @ 1500 MHz, 8 MB flash, 2 GB SDRAM, 512 MB compact flash
<b>Mounting</b>	EIA standard 19 in. rack	
<b>Performance</b>	<b>IPv6 Ready Certified</b>	
	<b>Latency</b>	13.5 $\mu$ s (FIFO 64-byte packets)
	<b>Throughput</b>	up to 9 million pps (64-byte packets)
	<b>Switch fabric speed</b>	80 Gb/s
	<b>Routing table size</b>	1000000 entries (IPv4), 1000000 entries (IPv6)
	<b>Forwarding table size</b>	1000000 entries (IPv4), 1000000 entries (IPv6)
	<b>Backplane bandwidth</b>	80 Gb/s
<b>Environment</b>	<b>Operating temperature</b>	32°F to 113°F (0°C to 45°C)
	<b>Operating relative humidity</b>	5% to 95%, noncondensing
	<b>Altitude</b>	up to 13,123 ft (4 km)
<b>Electrical characteristics</b>	<b>Frequency</b>	50/60 Hz
	<b>Maximum heat dissipation</b>	505 BTU/hr (532.78 kJ/hr)
	<b>AC Voltage</b>	100-240 VAC
	<b>Maximum power rating</b>	300 W
	<b>Notes</b>	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.
<b>Safety</b>	UL 1950; UL 60950; CAN/CSA 22.2 No. 60950; EN 60825; AS/NZS 60950; KN 60950; GOST R MEK60950; IEC 60950; EN 60950; IEC 60825; ROHS Compliance	
<b>Emissions</b>	VCCI Class A; EN 55022 Class A; CISPR 22 Class A; ICES-003 Class A; AS/NZS CISPR 22 Class A; CSA 2.22 60950; EN 61000-3-2; EN 61000-3-3; UL 60950; EN 60950-1; IEC 60950-1; FCC (CFR 47, Part 15) Subpart B Class A; ETSI EN 300 386 Class A; KN22 Class A; GB 9254 Class A; AS/NZS 60950-1	
<b>Immunity</b>	<b>Generic</b>	ETSI EN 300 386 V1.3.3; KN24
	<b>EN</b>	EN 55024, CISPR 24
<b>Management</b>	command-line interface; out-of-band management; SNMP Manager; Telnet; RMON1; terminal interface (serial RS-232C); Ethernet Interface MIB	

### Technical Specifications

**Services** Refer to the HP website at [www.hp.com/networking/services](http://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.

#### HP HSR6602-XG Router (JG354A)

<b>I/O ports and slots</b>	4 dual-personality 1000 Mbps ports (IEEE 802.3ab Type 1000BASE-T) 2 SFP+ 10GbE ports (IEEE 802.3ae Type 10GBASE-SR) 2 RJ-45 serial console ports 1 USB 2.0 1 RJ-45 out-of-band management port 1 Compact Flash port 1 open module slot; for either a FIP10 or FIP20 Module	
<b>Physical characteristics</b>	<b>Dimensions</b>	17.32(w) x 18.9(d) x 3.46(h) in (44 x 48 x 8.8 cm) (2U height)
	<b>Weight</b>	26.68 lb (12.1 kg) shipping weight Chassis and power supplies as shipped
<b>Memory and processor</b>	<b>Processor</b>	Multi-core PowerPC @ 1500 MHz, 8 MB flash, 4 GB SDRAM, 512 MB compact flash
<b>Mounting</b>	EIA standard 19 in. rack	
<b>Performance</b>	<b>IPv6 Ready Certified</b>	
	<b>Latency</b>	13.5 $\mu$ s (FIFO 64-byte packets)
	<b>Throughput</b>	up to 15 million pps (64-byte packets)
	<b>Switch fabric speed</b>	80 Gb/s
	<b>Routing table size</b>	4000000 entries (IPv4), 2000000 entries (IPv6)
	<b>Forwarding table size</b>	1000000 entries (IPv4), 1000000 entries (IPv6)
	<b>Backplane bandwidth</b>	80 Gb/s
<b>Environment</b>	<b>Operating temperature</b>	32°F to 113°F (0°C to 45°C)
	<b>Operating relative humidity</b>	5% to 95%, noncondensing
	<b>Altitude</b>	up to 13,123 ft (4 km)
<b>Electrical characteristics</b>	<b>Frequency</b>	50/60 Hz
	<b>Maximum heat dissipation</b>	512 BTU/hr (540.16 kJ/hr)
	<b>AC Voltage</b>	100-240 VAC
	<b>Maximum power rating</b>	300 W
	<b>Notes</b>	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.
<b>Safety</b>	UL 60950; CAN/CSA 22.2 No. 60950; EN 60825; AS/NZS 60950; GOST R MEK60950; IEC 60950; EN 60950; IEC 60825; ROHS Compliance	
<b>Emissions</b>	VCCI Class A; EN 55022 Class A; CISPR 22 Class A; ICES-003 Class A; AS/NZS CISPR 22 Class A; CSA 2.22 60950; EN 61000-3-2; EN 61000-3-3; UL 60950; EN 60950-1; IEC 60950-1; FCC (CFR 47, Part 15) Subpart B Class A; ETSI EN 300 386 Class A; KN22 Class A; GB 9254 Class A; AS/NZS 60950-1	
<b>Immunity</b>	<b>Generic</b>	ETSI EN 300 386 V1.3.3; KN24

### Technical Specifications

<b>Management</b>	<b>EN</b> EN 55024, CISPR 24
	command-line interface; out-of-band management; SNMP Manager; Telnet; RMON1; terminal interface (serial RS-232C); Ethernet Interface MIB
<b>Services</b>	Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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 1657 Definitions of Managed Objects for BGPv4  
 RFC 1772 Application of the BGP  
 RFC 1773 Experience with the BGP-4 Protocol  
 RFC 1774 BGP-4 Protocol Analysis  
 RFC 1965 BGP-4 confederations  
 RFC 1966 BGP Route Reflection An alternative to full mesh IBGP  
 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 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

#### IPv6

RFC 1350 TFTP  
 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 3056 Connection of IPv6 Domains via IPv4 Clouds  
 RFC 3162 RADIUS and IPv6  
 RFC 3306 Unicast-Prefix-based IPv6 Multicast Addresses (v2 models only)  
 RFC 3307 IPv6 Multicast Address Allocation  
 RFC 3315 DHCPv6 (client and relay)  
 RFC 3363 DNS support  
 RFC 3484 Default Address Selection for IPv6  
 RFC 3493 Basic Socket Interface Extensions for IPv6

### Technical Specifications

#### 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 2271 Framework  
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  
TACACS/TACACS+

#### General protocols

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 100BASE-T

(v2 models only)

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

### Technical Specifications

IEEE 802.3ac (VLAN Tagging Extension)	RFC 1286 Bridge MIB
IEEE 802.3ad Link Aggregation (LAG)	RFC 1493 Bridge MIB
IEEE 802.3ad Link Aggregation Control Protocol (LACP)	RFC 1573 SNMP MIB II
IEEE 802.3ae 10-Gigabit Ethernet	RFC 1643 Ethernet MIB
IEEE 802.3ag Ethernet OAM	RFC 1650 Ethernet-Like MIB
IEEE 802.3ah Ethernet in First Mile over Point to Point Fiber - EFMF	RFC 1657 BGP-4 MIB
IEEE 802.3i 10BASE-T	RFC 1724 RIPv2 MIB
IEEE 802.3u 100BASE-X	RFC 1757 Remote Network Monitoring MIB
IEEE 802.3x Flow Control	RFC 1850 OSPFv2 MIB
IEEE 802.3z 1000BASE-X	RFC 1907 SNMPv2 MIB
RFC 768 UDP	RFC 2011 SNMPv2 MIB for IP
RFC 783 TFTP Protocol (revision 2)	RFC 2012 SNMPv2 MIB for TCP
RFC 791 IP	RFC 2013 SNMPv2 MIB for UDP
RFC 792 ICMP	RFC 2021 RMONv2 MIB
RFC 793 TCP	RFC 2096 IP Forwarding Table MIB
RFC 826 ARP	RFC 2233 Interfaces MIB
RFC 854 TELNET	RFC 2273 SNMP-NOTIFICATION-MIB
RFC 855 Telnet Option Specification	RFC 2452 IPV6-TCP-MIB
RFC 856 TELNET	RFC 2454 IPV6-UDP-MIB
RFC 857 Telnet Echo Option	RFC 2465 IPv6 MIB
RFC 858 Telnet Suppress Go Ahead Option	RFC 2466 ICMPv6 MIB
RFC 894 IP over Ethernet	RFC 2571 SNMP Framework MIB
RFC 896 Congestion Control in IP/TCP Internetworks	RFC 2572 SNMP-MPD MIB
RFC 906 TFTP Bootstrap	RFC 2574 SNMP USM MIB
RFC 925 Multi-LAN Address Resolution	RFC 2618 RADIUS Client MIB
RFC 950 Internet Standard Subnetting Procedure	RFC 2620 RADIUS Accounting Client MIB
RFC 951 BOOTP	RFC 2665 Ethernet-Like-MIB
RFC 959 File Transfer Protocol (FTP)	RFC 2668 802.3 MAU MIB
RFC 1006 ISO transport services on top of the TCP: Version 3	RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 1027 Proxy ARP	RFC 2688 MAU-MIB
RFC 1034 Domain Concepts and Facilities	RFC 2737 Entity MIB (Version 2)
RFC 1035 Domain Implementation and Specification	RFC 2787 VRRP MIB
RFC 1042 IP Datagrams	RFC 2819 RMON MIB
RFC 1058 RIPv1	RFC 2863 The Interfaces Group MIB
RFC 1071 Computing the Internet Checksum	RFC 2925 Ping MIB
RFC 1091 Telnet Terminal-Type Option	RFC 2932IP (Multicast Routing MIB)
RFC 1093 NSFNET routing architecture	RFC 2933 IGMP MIB
RFC 1122 Host Requirements	RFC 3273 HC-RMON MIB
RFC 1141 Incremental updating of the Internet checksum	RFC 3414 SNMP-User based-SM MIB
RFC 1142 OSI IS-IS Intra-domain Routing Protocol	RFC 3415 SNMP-View based-ACM MIB
RFC 1144 Compressing TCP/IP headers for low-speed serial links	RFC 3418 MIB for SNMPv3
RFC 1191 Path MTU discovery	RFC 3813 MPLS LSR MIB
RFC 1195 OSI ISIS for IP and Dual Environments	RFC 3814 MPLS FTN MIB
RFC 1213 Management Information Base for Network Management of TCP/IP-based internets	RFC 3815 MPLS LDP MIB
RFC 1256 ICMP Router Discovery Protocol (IRDP)	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

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- 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 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 1382 SNMP MIB Extension for the X.25 Packet Layer
- RFC 1471 The Definitions of Managed Objects for the Link Control Protocol 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 1483 Multiprotocol Encapsulation over ATM Adaptation Layer 5
- RFC 1490 Multiprotocol Interconnect over Frame Relay
- RFC 1519 CIDR
- RFC 1534 DHCP/BOOTP Interoperation
- RFC 1542 BOOTP Extensions
- RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
- 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 1619 PPP over SONET/SDH (Synchronous Optical Network/Synchronous Digital Hierarchy)
- 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 1795 Data Link Switching: Switch-to-Switch Protocol AIW DLSw RIG: DLSw Closed Pages, DLSw
- MPLS**
- RFC 3037 LDP (Label Distribution Protocol) Applicability
- RFC 3270 Multi-Protocol Label Switching (MPLS) Support 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

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Standard Version 1	RFC 4619 Encapsulation Methods for Transport of Frame Relay over Multiprotocol Label
RFC 1812 IPv4 Routing	RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 1829 The ESP DES-CBC Transform	RFC 4664 Framework for Layer 2 Virtual Private Networks
RFC 1853 IP in IP Tunneling	RFC 4665 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses	RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS
RFC 1944 Benchmarking Methodology for Network Interconnect Devices	RFC 4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0	RFC 4762 Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling
RFC 1973 PPP in Frame Relay	RFC 4764 Framework for Layer 2 Virtual Private Networks (L2VPNs)
RFC 1974 PPP Stac LZS Compression Protocol	RFC 4765 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
RFC 1981 Path MTU Discovery for IP version 6	RFC 4816 Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM)
RFC 1990 The PPP Multilink Protocol (MP)	RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6
RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)	RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel
RFC 2003 IP Encapsulation within IP	RFC 5443 LDP IGP Synchronization
RFC 2082 RIP-2 MD5 Authentication	RFC 5601 Pseudowire (PW) Management Information Base (MIB)
RFC 2091 Trigger RIP	RFC 5602 Pseudowire (PW) over MPLS PSN Management Information Base (MIB)
RFC 2104 HMAC: Keyed-Hashing for Message Authentication	<b>Network management</b>
RFC 2131 DHCP	IEEE 802.1AB Link Layer Discovery Protocol (LLDP)
RFC 2132 DHCP Options and BOOTP Vendor Extensions	IEEE 802.1D (STP)
RFC 2138 Remote Authentication Dial In User Service (RADIUS)	RFC 1098 A Simple Network Management Protocol (SNMP)
RFC 2205 Resource ReSerVation Protocol (RSVP) - Version 1 Functional Specification	RFC 1155 Structure of Management Information
RFC 2209 Resource ReSerVation Protocol (RSVP) -- Version 1 Message Processing Rules	RFC 1157 SNMPv1
RFC 2225 Classical IP and ARP over ATM	RFC 1215 SNMP Generic traps
RFC 2236 IGMP Snooping	RFC 1757 RMON 4 groups: Stats, History, Alarms and Events
RFC 2246 The TLS Protocol Version 1.0	RFC 1901 SNMPv2 Introduction
RFC 2251 Lightweight Directory Access Protocol (v3)	RFC 1902 SNMPv2 Structure
RFC 2252 Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions	RFC 1903 SNMPv2 Textual Conventions
RFC 2283 MBGP	RFC 1904 SNMPv2 Conformance
RFC 2284 EAP over LAN	RFC 1905 SNMPv2 Protocol Operations
RFC 2338 VRRP	RFC 1906 SNMPv2 Transport Mappings
RFC 2364 PPP Over AAL5	RFC 1918 Private Internet Address Allocation
RFC 2374 An Aggregatable Global Unicast Address Format	RFC 2272 SNMPv3 Management Protocol
RFC 2390 Inverse Address Resolution Protocol	RFC 2273 SNMPv3 Applications
RFC 2427 Multiprotocol Interconnect over Frame Relay	RFC 2274 USM for SNMPv3
RFC 2451 The ESP CBC-Mode Cipher Algorithms	RFC 2275 VACM for SNMPv3
RFC 2453 RIPv2	
RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols	
RFC 2514 Definitions of Textual Conventions and OBJECT-IDENTITIES for ATM Management	
RFC 2515 Definitions of Managed Objects for ATM	

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Management	RFC 2570 SNMPv3 Overview
RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)	RFC 2571 SNMP Management Frameworks
RFC 2519 A Framework for Inter-Domain Route Aggregation	RFC 2572 SNMPv3 Message Processing
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels	RFC 2573 SNMPv3 Applications
RFC 2544 Benchmarking Methodology for Network Interconnect Devices	RFC 2574 SNMPv3 User-based Security Model (USM)
RFC 2581 TCP Congestion Control	RFC 2575 SNMPv3 View-based Access Control Model (VACM)
RFC 2615 PPP over SONET/SDH (Synchronous Optical Network/Synchronous Digital Hierarchy)	RFC 2575 VACM for SNMP
RFC 2616 HTTP Compatibility v1.1	RFC 2576 Coexistence between SNMP versions
RFC 2617 HTTP Authentication: Basic and Digest Access Authentication	RFC 2578 SMIPv2
RFC 2622 Routing Policy Specification Language (RPSL)	RFC 2819 Four groups of RMON: 1 (statistics), 2 (history), 3 (alarm) and 9 (events)
RFC 2644 Directed Broadcast Control	RFC 2819 Remote Network Monitoring Management Information Base
RFC 2661 L2TP	RFC 3164 BSD syslog Protocol
RFC 2663 NAT Terminology and Considerations	RFC 3176 sFlow
RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5	RFC 3411 SNMP Management Frameworks
RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)	RFC 3412 SNMPv3 Message Processing
RFC 2702 Requirements for Traffic Engineering Over MPLS	RFC 3413 Simple Network Management Protocol (SNMP) Applications
RFC 2716 PPP EAP TLS Authentication Protocol	RFC 3414 SNMPv3 User-based Security Model (USM)
RFC 2747 RSVP Cryptographic Authentication	RFC 3415 SNMPv3 View-based Access Control Model (VACM)
RFC 2763 Dynamic Name-to-System ID mapping	RFC 3584 Coexistence between Version 1 and Version 2 of the Internet-standard Network
RFC 2765 Stateless IP/ICMP Translation Algorithm (SIIT)	RFC 3593 Textual Conventions for MIB Modules Using Performance History Based on 15 Minute
RFC 2766 Network Address Translation - Protocol Translation (NAT-PT)	RFC 3636 Definitions of Managed Objects for IEEE 802.3 Medium Attachment Units (MAUs)
RFC 2782 A DNS RR (DNS Resource Record) for specifying the location of services (DNS SRV) Domain Name System Server	RFC 4292 IP Forwarding Table MIB
RFC 2784 Generic Routing Encapsulation (GRE)	RFC 4502 Remote Network Monitoring Management Information Base Version 2
RFC 2787 Definitions of Managed Objects for VRRP	RFC 4878 Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on
RFC 2833 RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals	ANSI/TIA-1057 LLDP Media Endpoint Discovery (LLDP-MED)
RFC 2856 Textual Conventions for Additional High Capacity Data Types	SNMPv1/v2
RFC 2865 Remote Authentication Dial In User Service (RADIUS)	SNMPv1/v2c
RFC 2866 RADIUS Accounting	SNMPv1/v2c (read only)
RFC 2868 RADIUS Attributes for Tunnel Protocol Support	SNMPv1/v2c/v3
RFC 2869 RADIUS Extensions	<b>OSPF</b>
RFC 2878 PPP Bridging Control Protocol (BCP)	RFC 1245 OSPF protocol analysis
RFC 2915 The Naming Authority Pointer (NAPTR) DNS Resource Record	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

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RFC 2916 E.164 number and DNS P. Faltstrom	(MIB), traps
RFC 2961 RSVP Refresh Overhead Reduction Extensions	RFC 2154 OSPF w/ Digital Signatures (Password, MD-5)
RFC 2965 HTTP State Management Mechanism	RFC 2178 OSPFv2
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS	RFC 2328 OSPFv2
RFC 2973 IS-IS Mesh Groups	RFC 2370 OSPF Opaque LSA Option
RFC 2976 The SIP INFO Method	RFC 3101 OSPF NSSA
RFC 3022 Traditional IP Network Address Translator (Traditional NAT)	RFC 3623 Graceful OSPF Restart
RFC 3027 Protocol Complications with the IP Network Address Translator	RFC 3630 Traffic Engineering Extensions to OSPF Version 2
RFC 3031 Multiprotocol Label Switching Architecture	RFC 4061 Benchmarking Basic OSPF Single Router Control Plane Convergence
RFC 3032 MPLS Label Stack Encoding	RFC 4062 OSPF Benchmarking Terminology and Concepts
RFC 3036 LDP Specification	RFC 4063 Considerations When Using Basic OSPF Convergence Benchmarks
RFC 3046 DHCP Relay Agent Information Option	RFC 4222 Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance
RFC 3063 MPLS Loop Prevention Mechanism	RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)
RFC 3065 Support AS confederation	RFC 4811 OSPF Out-of-Band LSDB Resynchronization
RFC 3137 OSPF Stub Router Advertisement	RFC 4812 OSPF Restart Signaling
RFC 3209 RSVP-TE Extensions to RSVP for LSP Tunnels	RFC 4813 OSPF Link-Local Signaling
RFC 3210 Applicability Statement for Extensions to RSVP for LSP-Tunnels	RFC 5187 OSPFv3 Graceful Restart
RFC 3212 Constraint-Based LSP setup using LDP (CR-LDP)	RFC 5340 OSPF for IPv6
RFC 3214 LSP Modification Using CR-LDP	RFC 5340 OSPFv3 for IPv6
RFC 3215 LDP State Machine	RFC 5613 OSPF Link-Local Signaling
RFC 3246 Expedited Forwarding PHB	
RFC 3268 Advanced Encryption Standard (AES) Ciphersuites for Transport Layer Security (TLS)	<b>QoS/CoS</b>
RFC 3272 Overview and Principles of Internet Traffic Engineering	IEEE 802.1P (CoS)
RFC 3277 IS-IS Transient Blackhole Avoidance	RFC 2309 Recommendations on queue management and congestion avoidance in the Internet
RFC 3279 Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	RFC 2474 DiffServ Precedence, including 8 queues/port
RFC 3280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile	RFC 2474 DiffServ precedence, with 4 queues per port
RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System	RFC 2474 DS Field in the IPv4 and IPv6 Headers
RFC 3392 Support BGP capabilities advertisement	RFC 2474 DSCP DiffServ
RFC 3410 Applicability Statements for SNMP	RFC 2474, with 4 queues per port
RFC 3416 Protocol Operations for SNMP	RFC 2475 DiffServ Architecture
RFC 3417 Transport Mappings for the Simple Network Management Protocol (SNMP)	RFC 2597 DiffServ Assured Forwarding (AF)
RFC 3442 The Classless Static Route Option for Dynamic Host Configuration Protocol (DHCP) version 4	RFC 2597 DiffServ Assured Forwarding (AF)- partial support
RFC 3479 Fault Tolerance for the Label Distribution	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

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Protocol (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 3623 Graceful OSPF Restart  
RFC 3706 A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers  
RFC 3768 Virtual Router Redundancy Protocol (VRRP)  
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 multicast

RFC 1112 IGMP  
RFC 2236 IGMPv2  
RFC 2283 Multiprotocol Extensions for BGP-4

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 2408 Internet Security Association and Key Management Protocol (ISAKMP)  
RFC 2409 The Internet Key Exchange (IKE)  
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 2993 Architectural Implications of NAT  
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 Remote Authentication Dial In User Service (RADIUS) Usage Guidelines  
RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers  
RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)  
Access Control Lists (ACLs)

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RFC 2362 PIM Sparse Mode  
RFC 2365 Administratively Scoped IP Multicast  
RFC 2934 Protocol Independent Multicast MIB for IPv4  
RFC 3376 IGMPv3  
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 PIM Dense Mode  
RFC 4601 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

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 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

#### IKEv1

RFC 2865 - Remote Authentication Dial In User Service (RADIUS)  
RFC 3748 - Extensible Authentication Protocol (EAP)

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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

### Accessories

#### HP HSR6600 Router 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 X120 622M SFP LC LX 15km Transceiver	JF829A
HP X120 622M SFP LC LH 40km 1310 Transceiver	JF830A
HP X120 622M SFP LC LH 80km 1550 Transceiver	JF831A
<a href="#">HP X125 1G SFP LC LH40 1310nm Transceiver</a>	JD061A
<a href="#">HP X120 1G SFP LC LH40 1550nm Transceiver</a>	JD062A
<a href="#">HP X120 1G SFP LC BX 10-U Transceiver</a>	JD098B
<a href="#">HP X120 1G SFP LC BX 10-D Transceiver</a>	JD099B
<a href="#">HP X120 1G SFP LC LH100 Transceiver</a>	JD103A
<a href="#">HP X120 1G SFP LC SX Transceiver</a>	JD118B
<a href="#">HP X120 1G SFP LC LX Transceiver</a>	JD119B
<a href="#">HP X125 1G SFP LC LH70 Transceiver</a>	JD063B
<a href="#">HP X120 1G SFP RJ45 T Transceiver</a>	JD089B
HP X160 2.5G SFP LC 2km Transceiver	JD084A
HP X160 2.5G SFP LC 15km Transceiver	JD085A
HP X160 2.5G SFP LC 40km Transceiver	JD086A
HP X160 2.5G SFP LC 80km Transceiver	JD087A
HP X135 10G XFP LC ER Transceiver	JD121A
HP X130 10G XFP LC LR Transceiver	JD108B
HP X130 10G XFP LC SR Transceiver	JD117B
HP X130 10G SFP+ LC SR Transceiver	JD092B
HP X130 10G SFP+ LC LR Transceiver	JD094B
HP X130 10G SFP+ LC ER 40km Transceiver	JG234A

##### Cables

HP X200 V.24 DTE 3m Serial Port Cable	JD519A
HP X200 V.24 DCE 3m Serial Port Cable	JD521A
HP X200 V.35 DTE 3m Serial Port Cable	JD523A
HP X200 V.35 DCE 3m Serial Port Cable	JD525A
HP X200 X.21 DTE 3m Serial Port Cable	JD527A
HP X200 X.21 DCE 3m Serial Port Cable	JD529A
HP X260 RS449 3m DTE Serial Port Cable	JF825A
HP X260 RS449 3m DCE Serial Port Cable	JF826A
HP X260 RS530 3m DTE Serial Port Cable	JF827A
HP X260 RS530 3m DCE Serial Port Cable	JF828A
HP X260 8E1 BNC 75 ohm 3m Router Cable	JD512A
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A

##### Power Supply

HP 5800 300W AC Power Supply	JC087A
HP 5800 300W DC Power Supply	JC090A

### Accessories

#### Fan Tray

HP HSR6602 Router Spare Fan Assembly JG359A

#### Router Modules

HP 6600 8-port 10/100Base-T HIM Module JC575A

HP 6600 4-port Gig-T HIM Module JC163A

HP 6600 8-port Gig-T HIM Module JC164A

HP 6600 4-port GbE SFP HIM Module JC171A

HP 6600 8-port GbE SFP HIM Module JC174A

HP 6600 1-port 10-GbE XFP HIM Module JC168A

HP 6600 1-port OC-3/STM-1 (E1/T1) CPOS SFP HIM Module JC161A

HP 6600 2-port OC-3/STM-1 (E1/T1) CPOS SFP HIM Module JC162A

HP 6600 2-port OC-3/STM-1 (E3/T3) CPOS SFP HIM Module JC169A

HP 6600 1-port OC-3/STM-1 (E3/T3) CPOS SFP HIM Module JC170A

HP 6600 4-port OC-3c/STM-1c or 2-port OC-12c/STM-4c POS SFP HIM Module JC172A

HP 6600 2-port OC-3c/STM-1c or 1-port OC-12c/STM-4c POS SFP HIM Module JC173A

HP 6600 1-port OC-3c/STM-1c ATM SFP HIM Module JC175A

HP 6600 1-port OC-48c/STM-16c POS/CPOS SFP HIM Module JC494A

HP 6600 2-port OC-3c/STM-1c ATM SFP HIM Module JC495A

HP 6600 2-port OC-48c/STM-16c RPR SFP HIM Module JC576A

HP MSR 2-port Enhanced Sync/Async Serial MIM Module JD540A

HP MSR 8-port T1/Fractional T1 MIM Module JC159A

HP MSR 8-port T1/CT1/PRI MIM Module JC160A

HP MSR 4-port Enhanced Sync/Async Serial MIM Module JD541A

HP MSR 8-port Enhanced Sync/Async Serial MIM Module JD552A

HP MSR 1-port T3/CT3/FT3 MIM Module JD628A

HP MSR 1-port FE3/CE3 MIM Module JD630A

HP MSR 8-port E1/Fractional E1 (75ohm) MIM Module JF255A

HP 6600 FIP-10 Flexible Interface Platform Router Module JG357A

HP 6600 FIP-20 Flexible Interface Platform Router Module JG358A

HP MSR 1-port T3 / CT3 / FT3 HMIM Module JG435A

HP MSR 1-port E3 / CE3 / FE3 HMIM Module JG436A

#### Memory

HP X610 2G VLP DDR3 SDRAM Memory JG482A

### Accessory Product Details

**NOTE:** Details are not available for all accessories. The following specifications were available at the time of publication.

<b>HP X125 1G SFP LC LH40 1310nm Transceiver</b> (JD061A)	<b>Ports</b> <b>Connectivity</b>	1 LC 1000Base-LH port (no IEEE standard exists for 1550 nm optics) Connector type LC Wavelength 1310 nm
	<b>Physical characteristics</b>	Dimensions 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm) Full configuration weight 0.04 lb. (0.02 kg)
A small form-factor pluggable SFP Gigabit LH40 transceiver that provides a full duplex Gigabit solution up to 40km on a single-mode fiber.	<b>Electrical characteristics</b>	Power consumption typical 0.8 W Power consumption maximum 1.0 W
	<b>Cabling</b>	Cable type: Single-mode fiber optic, complying with ITU-T G.652;  Maximum distance: <ul style="list-style-type: none"> <li>40km distance</li> </ul> Fiber type Single Mode
<b>Services</b>	Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	
<b>HP X120 1G SFP LC LH40 1550nm Transceiver</b> (JD062A)	<b>Ports</b> <b>Connectivity</b>	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics) Connector type LC Wavelength 1550 nm
	<b>Physical characteristics</b>	Dimensions 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm) Full configuration weight 0.04 lb. (0.02 kg)
A small form-factor pluggable (SFP) Gigabit LH40 transceiver that provides a full-duplex Gigabit solution up to 40 km on a single mode fiber.	<b>Electrical characteristics</b>	Power consumption typical 0.8 W Power consumption maximum 1.0 W
	<b>Cabling</b>	Cable type: Single-mode fiber optic, complying with ITU-T G.652;  Maximum distance: <ul style="list-style-type: none"> <li>40km distance</li> </ul> Fiber type Single Mode
<b>Services</b>	Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	

### Accessory Product Details

<p><b>HP X120 1G SFP LC BX 10-U Transceiver</b> (JD098B)</p> <p>A small form-factor pluggable (SFP) Gigabit LX-BX10-U transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.</p>	<p><b>Ports</b></p> <p>1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-U); Duplex: full only</p> <p><b>Connectivity</b></p> <p><b>Connector type</b> LC</p> <p><b>Physical characteristics</b></p> <p><b>Dimensions</b> 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)</p> <p><b>Full configuration weight</b> 0.04 lb. (0.02 kg)</p> <p><b>Electrical characteristics</b></p> <p><b>Power consumption typical</b> 0.8 W</p> <p><b>Power consumption maximum</b> 1.0 W</p> <p><b>Cabling</b></p> <p>Maximum distance:</p> <ul style="list-style-type: none"> <li>• 10km</li> </ul> <p>Fiber type Single Mode</p> <p><b>Notes</b></p> <p>TX 1310nm RX 1490nm</p> <p><b>Services</b></p> <p>Refer to the HP website at: <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.</p>
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<p><b>HP X120 1G SFP LC BX 10-D Transceiver</b> (JD099B)</p> <p>A small form-factor pluggable (SFP) Gigabit LX-BX10-D transceiver that provides a full duplex Gigabit solution up to 10km on a single mode cable.</p>	<p><b>Ports</b></p> <p>1 LC 1000BASE-BX10 port (IEEE 802.3ah Type 1000BASE-BX10-D); Duplex: full only</p> <p><b>Connectivity</b></p> <p><b>Connector type</b> LC</p> <p><b>Physical characteristics</b></p> <p><b>Dimensions</b> 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)</p> <p><b>Full configuration weight</b> 0.04 lb. (0.02 kg)</p> <p><b>Electrical characteristics</b></p> <p><b>Power consumption typical</b> 0.8 W</p> <p><b>Power consumption maximum</b> 1.0 W</p> <p><b>Cabling</b></p> <p>Maximum distance:</p> <ul style="list-style-type: none"> <li>• Up to 10km</li> </ul> <p>Fiber type Single Mode</p> <p><b>Notes</b></p> <p>TX 1490nm RX 1310nm</p> <p><b>Services</b></p> <p>Refer to the HP website at: <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.</p>
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### Accessory Product Details

<b>HP X120 1G SFP LC LH100 Transceiver (JD103A)</b>	<b>Ports</b>	1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)	
	<b>Connectivity</b>	<b>Connector type</b>	LC
<p>A small form factor pluggable (SFP) Gigabit LH100 transceiver that provides a full-duplex Gigabit solution up to 100km on a single mode fiber.</p>	<b>Electrical characteristics</b>	<b>Wavelength</b>	1550 nm
		<b>Power consumption typical</b>	0.8 W
	<b>Cabling</b>	<b>Power consumption maximum</b>	1.0 W
		Cable type: Single-mode fiber optic, complying with ITU-T G.652;	
	<b>Services</b>	Maximum distance: • Up to 100km	
		Fiber type	Single Mode
		Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	

<b>HP X120 1G SFP LC SX Transceiver (JD118B)</b>	<b>Ports</b>	1 LC 1000BASE-SX port	
	<b>Connectivity</b>	<b>Connector type</b>	LC
<p>A small form-factor pluggable (SFP) Gigabit SX transceiver that provides a full-duplex Gigabit solution up to 550m on a Multimode fiber.</p>	<b>Physical characteristics</b>	<b>Wavelength</b>	850 nm
		<b>Dimensions</b>	2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm)
	<b>Electrical characteristics</b>	<b>Full configuration weight</b>	0.04 lb. (0.02 kg)
		<b>Power consumption typical</b>	0.8 W
	<b>Cabling</b>	<b>Power consumption maximum</b>	1.0 W
		Maximum distance: • FDDI Grade distance = 220m • OM1 = 275m • OM2 = 500m • OM3 = Not Specified by standard	
	<b>Services</b>	Cable length	up to 550m
		Fiber type	Multi Mode
		Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	

### Accessory Product Details

<b>HP X120 1G SFP LC LX Transceiver (JD119B)</b>  A small form-factor pluggable (SFP) Gigabit LX transceiver that provides a full duplex Gigabit solution up to 550m on MMF or 10Km on SMF	<b>Ports</b> 1 SFP 1000BASE-LX port (IEEE 802.3z Type 1000BASE-LX)
	<b>Connectivity</b> <b>Connector type</b> LC <b>Wavelength</b> 1300 nm
<b>Physical characteristics</b> <b>Dimensions</b> 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm) <b>Full configuration weight</b> 0.04 lb. (0.02 kg)	<b>Electrical characteristics</b> <b>Power consumption typical</b> 0.8 W <b>Power consumption maximum</b> 1.0 W
	<b>Cabling</b> Cable type: Either single mode or multimode;  Maximum distance: <ul style="list-style-type: none"> <li>• 550m for Multimode</li> <li>• 10km for Singlemode</li> </ul> Fiber type Both
<b>Services</b> Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	

<b>HP X125 1G SFP LC LH70 Transceiver (JD063B)</b>  A small form-factor pluggable (SFP) Gigabit LH70 transceiver that provides a full-duplex Gigabit solution up to 70km on a single-mode fiber.	<b>Ports</b> 1 LC 1000BASE-LH port (no IEEE standard exists for 1550 nm optics)
	<b>Connectivity</b> <b>Connector type</b> LC <b>Wavelength</b> 1550 nm
<b>Physical characteristics</b> <b>Dimensions</b> 2.17(d) x 0.6(w) x 0.46(h) in. (5.51 x 1.52 x 1.17 cm) <b>Full configuration weight</b> 0.04 lb. (0.02 kg)	<b>Electrical characteristics</b> <b>Power consumption typical</b> 0.8 W <b>Power consumption maximum</b> 1.0 W
	<b>Cabling</b> Cable type: Single-mode fiber optic, complying with ITU-T G.652;  Maximum distance: <ul style="list-style-type: none"> <li>• 70km</li> </ul> Fiber type Single Mode
<b>Services</b> Refer to the HP website at <a href="http://www.hp.com/networking/services">www.hp.com/networking/services</a> 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.	

### Accessory Product Details

#### **HP X120 1G SFP RJ45 T Transceiver (JD089B)**

A small form factor pluggable (SFP) Gigabit 1000Base-T transceiver that provides a full duplex Gigabit solution up to 100m on a Cat-5+ cable.

#### **Ports**

1 RJ-45 1000BASE-T port (IEEE 802.3ab Type 1000BASE-T)

#### **Connectivity**

**Connector type** RJ-45

#### **Physical characteristics**

**Dimensions** 2.71(d) x 0.54(w) x 0.55(h) in. (6.88 x 1.37 x 1.4 cm)

**Full configuration weight** 0.07 lb. (0.03 kg)

#### **Electrical characteristics**

**Power consumption typical** 0.8 W

**Power consumption maximum** 1.0 W

#### **Cabling**

Cable type:  
1000BASE-T: Category 5 (5E or better recommended), 100 Ω differential 4-pair unshielded twisted pair (UTP) or shielded twisted pair (STP) balanced, complying with IEEE 802.3ab 1000BASE-T;

Maximum distance:

- 100m

#### **Services**

Refer to the HP website at [www.hp.com/networking/services](http://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.

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