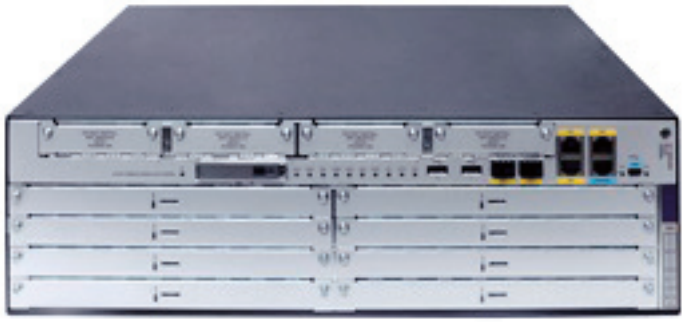
Data sheet

HP MSR3000 Router Series



Key features

- Up to 5 Mpps forwarding performance; support for multiple concurrent services
- Open Application Platform for HP AllianceOne applications like WAN acceleration and Microsoft® Lync
- Embedded security features with hardware-based encryption, firewall, NAT, and VPNs
- No additional licensing complexity; no cost for advanced features
- Zero-touch solution, with single pane-of-glass management

Product overview

The HP MSR3000 Router Series, the next generation of router from HP, is a component of the HP FlexBranch solution, which is a part of the comprehensive HP FlexNetwork architecture. These routers feature a modular design that delivers unmatched application services for medium- to large-sized branch offices. This gives your IT personnel the benefit of reduced complexity, and simplified configuration, deployment, and management.

The MSR3000 routers use the latest multicore CPUs, offer Gigabit switching, provide an enhanced PCI bus, and ship with the latest version of HP Comware software to help ensure high performance with concurrent services. The MSR3000 series provides a full-featured, resilient routing platform, including IPv6 and MPLS, with up to 5 Mpps forwarding capacity and 3.3 Gb/s of IPSec VPN encrypted throughput. These routers also support HP Open Application Platform (OAP) modules to deliver integrated industry-leading HP AllianceOne partner applications such as virtualization, unified communications and collaboration (UC&C), and application optimization capabilities.

The MSR3000 series provides an agile, flexible network infrastructure that enables you to quickly adapt to changing business requirements while delivering integrated concurrent services on a single, easy-to-manage platform.

Features and benefits

Performance

- **Excellent forwarding performance**
  provides forwarding performance up to 5 Mpps (3.3 Gb/s); meets the bandwidth-intensive application demands of enterprise businesses
- **Powerful security capacity**
  includes an embedded hardware encryption accelerator to improve encryption performance; IPSec encryption throughput can be up to 3.3 Gb/s with a maximum of 4,000 IPSec VPN tunnels

Product architecture

- **Ideal multiservice platform**
  provides WAN router, Ethernet switch, wireless LAN, 3G/4G WAN, firewall, VPN, and SIP/voice gateway all in one device
- **Advanced hardware architecture**
  provides multicore processors, gigabit switching, and PCIE bus; external RPS or dual internal power supplies, and internal and external CF cards are offered; new high-performance MIM modules (HMIM) supported
- **New operation system version**
  ships with new Comware v7 operating system delivering the latest in virtualization and routing
- **Open Application Platform architecture**
  provides unmatched application and services flexibility, with the potential to deliver the functionality of multiple devices, creating capital and operational expense savings and lasting investment protection
- **Field-programmable gate array (FPGA)**
  improves the bandwidth of SIC module slots from 100 Mb/s to 1000 Mb/s, and improves uplink performance from 1 Gb/s to 10 Gb/s
- **Multi Gigabit Fabric (MGF)**
  eases utilization of the main processor by transmitting Layer 2 packets directly via the MGF

Connectivity

- **High-density port connectivity**
  provides up to 10 interface module slots and up to three on-board Gigabit Ethernet ports
- **Multiple WAN interfaces**
  provides traditional links with E1, T1, Serial, and ISDN; high-density Ethernet access with WAN Gigabit Ethernet and LAN 4- and 9-port Fast Ethernet; mobility access with 3G SIC module and 3G/4G USB modems, and high-speed E3/T3 and 155 Mb/s OC3 access options
- **Packet storm protection**
  protects against broadcast, multicast, or unicast storms with user-defined thresholds
- **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
- **3G/4G LTE access support**
  provides 3G wireless access for primary or backup connectivity via a 3G SIC module certified on various cellular networks; optional carrier 3G/4G LTE USB modems are available
- **USB interface**
  uses USB memory disk to download and upload configuration/OS image files; supports an external USB 3G/4G modem for a 3G/4G WAN uplink
- **Flexible port selection**
  provides a combination of fiber and copper interface modules, 100/1000BASE-X support, and 10/100/1000BASE-T auto-speed detection plus auto duplex and MDI/MDI-X

Layer 2 switching

- **Spanning Tree Protocol (STP)**
  supports standard IEEE 802.1D STP, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for faster convergence, and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)
- **Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) protocol snooping**
  controls and manages the flooding of multicast packets in a Layer 2 network
- **Port mirroring**
  duplicates port traffic (ingress and egress) to a local or remote monitoring port
- **VLANs**
  supports up to 4,094 VLANS or IEEE 802.1Q-based VLANs
- **sFlow**
  allows traffic sampling
- **Define port as switched or routed**
  supports command switch to easily change switched ports to routed (maximum of four Fast Ethernet ports)

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+**
  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 Multiprotocol BGP (MP-BGP) to establish private routes for increased security; supports RFC 2547bis multiple autonomous system VPNs for added flexibility; supports IPv6 MPLS VPN
- **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
- **Routing policy**
  allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies

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

Quality of Service (QoS)

- **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
- **Hierarchical quality of service (HQoS)/Nested QoS**
  manages traffic uniformly, and hierarchically schedules traffic by user, network service, and application; provides more granular traffic control and quality assurance services than traditional QoS
- **Other QoS technologies**
  supports traffic shaping, MPLS QoS, and MP QoS/LFI

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
- **IPSec VPN**
  supports DES, 3DES, and AES 128/192/256 encryption, and MD5 and SHA-1 authentication

- **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
- **Terminal Access Controller Access-Control System (TACACS+)**
  delivers an authentication tool using TCP with encryption of the full authentication request, providing additional security
- **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
- **Network login**
  allows authentication of multiple users per port
- **RADIUS**
  eases security access administration by using a user/password authentication server
- **Network address translation (NAT)**
  supports one-to-one NAT, many-to-many NAT, and NAT control, enabling NAT-PT to support multiple connections; supports blacklist in NAT/NAT-PT, a limit on the number of connections, session logs, and multi-instances
- **Secure Shell (SSHv2)**
  uses external servers to securely log in into a remote device; with authentication and encryption, it protects against IP spoofing and plain text password interception; increases the security of SFTP transfers

Convergence

- **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; supports PIM Dense Mode (DM), Sparse Mode (SM), and Source-Specific Mode (SSM)
- **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 and kept separate from unicast traffic

Integration

- **Embedded NetStream**
  improves traffic distribution using powerful scheduling algorithms, including Layer 4 to 7 services; monitors the health status of servers and firewalls
- **Embedded VPN and firewall**
  provides enhanced stateful packet inspection and filtering; delivers 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
- **SIP trunking**
  delivers multiple concurrent calls on one link; the carrier authenticates only the link, rather than carrying each SIP call on the link

Resiliency and high availability

- **Backup Center**
  acts as a part of the management and backup function to provide backup for device interfaces; delivers reliability by switching traffic over to a backup interface when the primary one fails
- **Virtual Router Redundancy Protocol (VRRP)**
  allows groups of two routers to dynamically back each other up to create highly available routed environments; supports VRRP load balancing
- **Embedded Automation Architecture (EAA)**
  monitors the internal event and status of system hardware and software, identifying potential problems as early as possible; collects field information and attempts to automatically repair the issues; based on the user configuration, onsite information will be sent to technical support
- **Bidirectional Forwarding Detection (BFD)**
  detects quickly the failures of the bidirectional forwarding paths between two devices for upper-layer protocols such as routing protocols and MPLS.

Management

- **HP Intelligent Management Center (IMC)**
  integrates fault management, element configuration, and network monitoring from a central vantage point; built-in support for third-party devices enables network administrators to centrally manage all network elements with a variety of automated tasks, including discovery, categorization, baseline configurations, and software images; the software also provides configuration comparison tools, version tracking, change alerts, and more
- **Industry-standard CLI with a hierarchical structure**
  reduces training time and expenses, and increases productivity in multivendor installations
- **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
- **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

- **Remote monitoring (RMON)**
  uses standard SNMP to monitor essential network functions; supports events, alarm, history, and statistics group plus a private alarm extension group
- **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 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
- **Management interface control**
  provides management access through modem port and terminal interface; provides access through terminal interface, telnet, or SSH
- **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; allows network manager to determine overall network performance and diagnose and locate network congestion points or failures
- **Role-based security**
  delivers role-based access control (RBAC); supports 16 user levels (0~15)
- **Standards-based authentication support for LDAP**
  integrates seamlessly into existing authentication services

Investment protection

- **Re-use of existing SIC and MIM modules**
  supports existing SIC and MIM modules, transceivers, and cables for investment protection

Ease of deployment

- **Zero-touch deployment**
  supports both USB disk auto deployment and 3G SMS auto deployment

Additional information

- **OPEX savings**
  simplifies and streamlines deployment, management, and training through the use of a common operating system, thereby cutting costs as well as reducing the risk of human errors associated with having to manage multiple operating systems across different platforms and network layers
- **Faster time to market**
  allows new and custom features to be brought rapidly to market through engineering efficiencies, delivering better initial and ongoing stability
- **Green initiative support**
  provides support for RoHS and WEEE regulations

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

HP MSR3000 Router Series

Specifications

	HP MSR3012 AC Router (JG409A)	HP MSR3024 AC Router (JG406A)
Ports	1 HMIM slot	2 HMIM slots
	2 SIC slots	4 SIC slots or 2 DSIC slots
	1 VPM slot	1 VPM slot
	3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T)	3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T)
	1 SFP fixed Gigabit Ethernet SFP port	1 SFP fixed Gigabit Ethernet SFP port
Physical characteristics		
	17.32(w) x 18.9(d) x 1.74(h) in (44 x 48 x 4.42 cm) (1U height)	17.32(w) x 18.9(d) x 1.74(h) in (44 x 48 x 4.42 cm) (1U height)
Weight	15.76 lb (7.15 kg)	17.42 lb (7.9 kg)
Memory and processor		
	RISC, 4 cores @ 1 GHz, 256 MB flash capacity, 1 GB DDR3 SDRAM	RISC, 4 cores @ 1 GHz, 256 MB flash capacity, 2 GB DDR3 SDRAM
Mounting	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package.	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package.
Performance		
Throughput	up to 2.6 Mpps (64-byte packets)	up to 2.6 Mpps (64-byte packets)
Routing table size	200000 entries (IPv4), 200000 entries (IPv6)	500000 entries (IPv4), 500000 entries (IPv6)
Forwarding table size	200000 entries (IPv4), 200000 entries (IPv6)	500000 entries (IPv4), 500000 entries (IPv6)
Environment		
Operating temperature	32°F to 113°F (0°C to 45°C)	32°F to 113°F (0°C to 45°C)
Operating relative humidity	5% to 90%, noncondensing	5% to 90%, noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	5% to 90%, noncondensing	5% to 90%, noncondensing
Altitude	up to 16,404 ft (5 km)	up to 16,404 ft (5 km)
Electrical characteristics		
Frequency	50/60 Hz	50/60 Hz
Maximum heat dissipation	127 BTU/hr (133.98 kJ/hr)	168 BTU/hr (177.24 kJ/hr)
Voltage	100-120/200-240 VAC	100-120/200-240 VAC
Maximum power rating	100 W	100 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.
Reliability		
MTBF (years)	52.56	49.61
Safety	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J
Emissions	EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A; EN 55024:1998+ A1:2001 + A2:2003; EN 61000-4-11:2004; EN 61000-4-8:2001	EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A; EN 55024:1998+ A1:2001 + A2:2003; EN 61000-4-11:2004; EN 61000-4-8:2001
Telecom		
	FCC part 68; CS-03	FCC part 68; CS-03
Management	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB
Services	3-year, parts only, global next-day advance exchange (UW075E)	3-year, parts only, global next-day advance exchange (UW075E)
	3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E)
	3-year, 24x7 SW phone support, software updates (UW012E)	3-year, 24x7 SW phone support, software updates (UW012E)
	1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E)	1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E)

HP MSR3000 Router Series

Specifications (continued)

	HP MSR3012 AC Router (JG409A)	HP MSR3024 AC Router (JG406A)
	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E)	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E)
	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E)	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E)
	4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E)
	4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E)
	4-year, 24x7 SW phone support, software updates (UW013E)	4-year, 24x7 SW phone support, software updates (UW013E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E)
	5-year, 24x7 SW phone support, software updates (UW014E)	5-year, 24x7 SW phone support, software updates (UW014E)
	3 Yr 6 hr Call-to-Repair Onsite (UW079E)	3 Yr 6 hr Call-to-Repair Onsite (UW079E)
	4 Yr 6 hr Call-to-Repair Onsite (UW080E)	4 Yr 6 hr Call-to-Repair Onsite (UW080E)
	5 Yr 6 hr Call-to-Repair Onsite (UW081E)	5 Yr 6 hr Call-to-Repair Onsite (UW081E)
	1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E)
	1-year, 24x7 software phone support, software updates (HR557E)	1-year, 24x7 software phone support, software updates (HR557E)
	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

HP MSR3000 Router Series

Specifications (continued)

	 HP MSR3044 Router (JG405A)	 HP MSR3064 Router (JG404A)
Ports	4 HMIM slots	6 HMIM slots
	4 SIC slots or 2 DSIC slots	4 SIC slots or 2 DSIC slots
	2 VPM slots	2 VPM slots
	2 Power Supply slots	2 Power Supply slots
	3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T)	3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T)
	2 SFP fixed Gigabit Ethernet SFP ports	2 SFP fixed Gigabit Ethernet SFP ports
Physical characteristics		
	17.32(w) x 18.9(d) x 3.47(h) in (44 x 48 x 8.81 cm) (2U height)	17.32(w) x 18.9(d) x 5.31(h) in (44 x 48 x 13.5 cm) (3U height)
Weight	27.45 lb (12.45 kg)	36.49 lb (16.55 kg)
Memory and processor		
	RISC, 4 cores @ 1 GHz, 256 MB flash capacity, 2 GB DDR3 SDRAM	RISC, 6 cores @ 1.3 GHz, 256 MB flash capacity, 2 GB DDR3 SDRAM
Mounting	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package.	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package
Performance		
Throughput	up to 3.5 Mpps (64-byte packets)	up to 5 Mpps (64-byte packets)
Routing table size	500000 entries (IPv4), 500000 entries (IPv6)	500000 entries (IPv4), 50000 entries (IPv6)
Forwarding table size	500000 entries (IPv4), 500000 entries (IPv6)	500000 entries (IPv4), 50000 entries (IPv6)
Environment		
Operating temperature	32°F to 113°F (0°C to 45°C)	32°F to 113°F (0°C to 45°C)
Operating relative humidity	5% to 90%, noncondensing	5% to 90%, noncondensing
Nonoperating/Storage temperature	-40°F to 158°F (-40°C to 70°C)	-40°F to 158°F (-40°C to 70°C)
Nonoperating/Storage relative humidity	5% to 90%, noncondensing	5% to 90%, noncondensing
Altitude	up to 16,404 ft (5 km)	up to 16,404 ft (5 km)
Electrical characteristics		
Frequency	50/60 Hz	50/60 Hz
Maximum heat dissipation	172 BTU/hr (181.46 kJ/hr)	218 BTU/hr (229.99 kJ/hr)
Voltage	100-120/200-240 VAC	100-120/200-240 VAC
Maximum power rating	100 W	100 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. No default power supply is included in the chassis; a minimum of one/maximum of four power supplies should be ordered.	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. No default power supply is included in the chassis; a minimum of one/maximum of four power supplies should be ordered.
Reliability		
MTBF (years)	82.57	80.58
Safety	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J	UL 60950-1; AS/NZS 60950; EN 60825-1 Safety of Laser Products-Part 1; EN 60825-2 Safety of Laser Products-Part 2; IEC 60950-1; CAN/CSA-C22.2 No. 60950-1-03; EN 60950-1/A11; FDA 21 CFR Subchapter J
Emissions	EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A; EN 55024:1998+ A1:2001 + A2:2003; EN 61000-4-11:2004; EN 61000-4-8:2001	EN 55022 Class A; ICES-003 Class A; ANSI C63.4 2003; ETSI EN 300 386 V1.3.3; AS/NZS CISPR 22 Class A; EN 61000-4-2; EN 61000-4-3; EN 61000-4-4; EN 61000-4-5; EN 61000-4-6; EN 61000-3-2:2006; EN 61000-3-3:1995 +A1:2001+A2:2005; EMC Directive 2004/108/EC; FCC (CFR 47, Part 15) Class A; EN 55024:1998+ A1:2001 + A2:2003; EN 61000-4-11:2004; EN 61000-4-8:2001
Telecom		
	FCC part 68; CS-03	FCC part 68; CS-03
Management	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB	IMC - Intelligent Management Center; command-line interface; limited command-line interface; configuration menu; out-of-band management (RJ-45 Ethernet); SNMP Manager; Telnet; RMON1; FTP; in-line and out-of-band; modem interface; out-of-band management (serial RS-232C or Micro USB); IEEE 802.3 Ethernet MIB
Services	3-year, parts only, global next-day advance exchange (UW075E)	3-year, parts only, global next-day advance exchange (UW075E)
	3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E)	3-year, 4-hour onsite, 13x5 coverage for hardware (UW076E)
	3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E)	3-year, 4-hour onsite, 24x7 coverage for hardware (UW006E)

HP MSR3000 Router Series

Specifications (continued)

	HP MSR3044 Router (JG405A)	HP MSR3064 Router (JG404A)
	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E)	3-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 SW phone support and SW updates (UW009E)
	3-year, 24x7 SW phone support, software updates (UW012E)	3-year, 24x7 SW phone support, software updates (UW012E)
	1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E)	1-year, post-warranty, 4-hour onsite, 13x5 coverage for hardware (HR554E)
	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E)	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware (HR555E)
	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E)	1-year, post-warranty, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone support (HR556E)
	4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E)	4-year, 4-hour onsite, 13x5 coverage for hardware (UW077E)
	4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E)	4-year, 4-hour onsite, 24x7 coverage for hardware (UW007E)
	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E)	4-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW010E)
	4-year, 24x7 SW phone support, software updates (UW013E)	4-year, 24x7 SW phone support, software updates (UW013E)
	5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E)	5-year, 4-hour onsite, 13x5 coverage for hardware (UW078E)
	5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E)	5-year, 4-hour onsite, 24x7 coverage for hardware (UW008E)
	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E)	5-year, 4-hour onsite, 24x7 coverage for hardware, 24x7 software phone (UW011E)
	5-year, 24x7 SW phone support, software updates (UW014E)	5-year, 24x7 SW phone support, software updates (UW014E)
	3 Yr 6 hr Call-to-Repair Onsite (UW079E)	3 Yr 6 hr Call-to-Repair Onsite (UW079E)
	4 Yr 6 hr Call-to-Repair Onsite (UW080E)	4 Yr 6 hr Call-to-Repair Onsite (UW080E)
	5 Yr 6 hr Call-to-Repair Onsite (UW081E)	5 Yr 6 hr Call-to-Repair Onsite (UW081E)
	1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E)	1-year, 6 hour Call-To-Repair Onsite for hardware (HR558E)
	1-year, 24x7 software phone support, software updates (HR557E)	1-year, 24x7 software phone support, software updates (HR557E)
	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.	Refer to the HP website at **www.hp.com/networking/services** for details on the service-level descriptions and product numbers. For details about services and response times in your area, please contact your local HP sales office.

Standards and Protocols (applies to all products in series)			
BGP	RFC 1163 Border Gateway Protocol (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 1965 BGP-4 confederations RFC 1997 BGP Communities Attribute	RFC 1998 PPP Gandalf FZA Compression Protocol RFC 2439 BGP Route Flap Damping RFC 2547 BGP/MPLS VPNs 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 3065 Autonomous System Confederations for BGP RFC 3107 Support BGP carry Label for MPLS RFC 3392 Capabilities Advertisement with BGP-4	RFC 4271 A Border Gateway Protocol 4 (BGP-4) RFC 4273 Definitions of Managed Objects for BGP-4 RFC 4274 BGP-4 Protocol Analysis RFC 4275 BGP-4 MIB Implementation Survey RFC 4276 BGP-4 Implementation Report RFC 4277 Experience with the BGP-4 Protocol RFC 4360 BGP Extended Communities Attribute RFC 4456 BGP Route Reflection: An Alternative to Full Mesh Internal BGP (IBGP) RFC 4724 Graceful Restart Mechanism for BGP
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 1591 DNS (client)	RFC 1902 (SNMPv2) RFC 1908 (SNMP v1/2 Coexistence) RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0 RFC 2271 Framework 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 3416 (SNMP Protocol Operations v2)
General protocols	RFC 768 UDP RFC 783 TFTP Protocol (revision 2) RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 826 ARP RFC 896 Congestion Control in IP/TCP Internetworks RFC 917 Internet Subnets RFC 925 Multi-LAN Address Resolution RFC 950 Internet Standard Subnetting Procedure RFC 951 BOOTP RFC 959 File Transfer Protocol (FTP) RFC 1027 Proxy ARP RFC 1048 BOOTP (Bootstrap Protocol) vendor information extensions RFC 1058 RIPv1 RFC 1091 Telnet Terminal-Type Option RFC 1093 NSFNET routing architecture RFC 1141 Incremental updating of the Internet checksum RFC 1142 OSI IS-IS Intra-domain Routing Protocol RFC 1166 Internet address used by Internet Protocol (IP) 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 1305 NTPv3 (IPv4 only) RFC 1321 The MD5 Message-Digest Algorithm RFC 1323 TCP Extensions for High Performance RFC 1349 Type of Service RFC 1350 TFTP Protocol (revision 2) RFC 1449 Transport Mappings for version 2 of the Simple Network Management Protocol (SNMPv2) RFC 1519 CIDR RFC 1542 BOOTP Extensions RFC 1542 Clarifications and Extensions for the Bootstrap Protocol RFC 1624 Incremental Internet Checksum RFC 1631 NAT RFC 1701 Generic Routing Encapsulation RFC 1702 Generic Routing Encapsulation over IPv4 networks RFC 1721 RIP-2 Analysis	RFC 2993 Architectural Implications of NAT RFC 3011 The IPv4 Subnet Selection Option for DHCP 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 3037 LDP (Label Distribution Protocol) Applicability RFC 3046 DHCP Relay Agent Information Option RFC 3063 MPLS Loop Prevention Mechanism RFC 3137 OSPF Stub Router Advertisement RFC 3168 The Addition of Explicit Congestion Notification (ECN) to IP RFC 3215 LDP State Machine RFC 3246 Expedited Forwarding PHB RFC 3268 Advanced Encryption Standard (AES) Ciphersuites for Transport Layer Security (TLS) 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 RFC 3280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile RFC 3319 Dynamic Host Configuration Protocol (DHCPv6) Options for Session Initiation Protocol (SIP) Servers RFC 3359 Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System RFC 3392 Support BGP capabilities advertisement RFC 3443 Time To Live (TTL) Processing in Multi-Protocol Label Switching (MPLS) Networks RFC 3478 Graceful Restart Mechanism for Label Distribution Protocol RFC 3479 Fault Tolerance for the Label Distribution Protocol (LDP) RFC 3509 OSPF ABR Behavior RFC 3526 More Modular Exponential (MODP) Diffie-Hellman groups for Internet Key Exchange (IKE) RFC 3564 Requirements for Support of Differentiated Services-aware MPLS Traffic Engineering RFC 3567 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication RFC 3584 Coexistence between Version 1 and Version 2	RFC 4419 Diffie-Hellman Group Exchange for the Secure Shell (SSH) Transport Layer Protocol RFC 4446 IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3) RFC 4447 Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP) RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks RFC 4451 BGP MULTI_EXIT_DISC (MED) Considerations RFC 4486 Subcodes for BGP Cease Notification Message RFC 4541 Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches RFC 4553 Structure-Agnostic Time Division Multiplexing (TDM) over Packet (SAToP) RFC 4562 MAC-Forced Forwarding: A Method for Subscriber Separation on an Ethernet Access Network RFC 4576 Using a Link State Advertisement (LSA) Options Bit to Prevent Looping in BGP/MPLS IP Virtual Private Networks (VPNs) RFC 4577 OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs) RFC 4594 Configuration Guidelines for DiffServ Service Classes RFC 4601 Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised) 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 Switching (MPLS) Networks RFC 4632 Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN RFC 4664 Framework for Layer 2 Virtual Private Networks (L2VPNs) RFC 4665 Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks RFC 4741 NETCONF Configuration Protocol RFC 4742 Using the NETCONF Configuration Protocol over Secure SHell (SSH) RFC 4743 Using NETCONF over the Simple Object Access Protocol (SOAP) RFC 4765 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks RFC 4781 Graceful Restart Mechanism for BGP with

Standards and Protocols (continued)

(applies to all products in series)

RFC 1722 RIP-2 Applicability

RFC 1723 RIP v2

RFC 1724 RIP Version 2 MIB Extension

RFC 1777 Lightweight Directory Access Protocol

RFC 1812 IPv4 Routing

RFC 1825 Security Architecture for the Internet Protocol

RFC 1826 IP Authentication Header

RFC 1827 IP Encapsulating Security Payload (ESP)

RFC 1829 The ESP DES-CBC Transform

RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0

RFC 1966 BGP Route Reflection An alternative to full mesh IBGP

RFC 1981 Path MTU Discovery for IP version 6

RFC 2003 IP Encapsulation within IP

RFC 2018 TCP Selective Acknowledgement Options

RFC 2082 RIP-2 MD5 Authentication

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 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 2283 MBGP

RFC 2309 Recommendations on queue management and congestion avoidance in the Internet

RFC 2338 VRRP

RFC 2451 The ESP CBC-Mode Cipher Algorithms

RFC 2453 RIPv2

RFC 2474 Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers

RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols

RFC 2519 A Framework for Inter-Domain Route Aggregation

RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels

RFC 2548 (MS-RAS-Vendor only)

RFC 2581 TCP Congestion Control

RFC 2597 Assured Forwarding PHB Group

RFC 2598 An Expedited Forwarding PHB

RFC 2616 HTTP Compatibility v1.1

RFC 2661 L2TP

RFC 2663 NAT Terminology and Considerations

RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)

RFC 2698 A Two Rate Three Color Marker

RFC 2716 PPP EAP TLS Authentication Protocol

RFC 2747 RSVP Cryptographic Authentication

RFC 2763 Dynamic Name-to-System ID mapping

RFC 2784 Generic Routing Encapsulation (GRE)

RFC 2827 Network Ingress Filtering: Defeating Denial of Service Attacks Which Employ IP Source Address Spoofing

RFC 2865 Remote Authentication Dial In User Service (RADIUS)

RFC 2866 RADIUS Accounting

RFC 2868 RADIUS Attributes for Tunnel Protocol Support

of the Internet-standard Network Management Framework

RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPSec

RFC 3612 Applicability Statement for Restart Mechanisms for the Label Distribution Protocol (LDP)

RFC 3623 Graceful OSPF Restart

RFC 3646 DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6)

RFC 3662 A Lower Effort Per-Domain Behavior (PDB) for Differentiated Services

RFC 3704 Unicast Reverse Path Forwarding (URPF)

RFC 3706 A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers

RFC 3719 Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS)

RFC 3736 Stateless Dynamic Host Configuration Protocol (DHCP) Service for IPv6

RFC 3768 Virtual Router Redundancy Protocol (VRRP)

RFC 3782 The NewReno Modification to TCP's Fast Recovery Algorithm

RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit

RFC 3787 Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS)

RFC 3810 Multicast Listener Discovery Version 2 (MLDv2) for IPv6

RFC 3812 Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base (MIB)

RFC 3815 Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP)

RFC 3847 Restart signaling for IS-IS

RFC 3916 Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)

RFC 3948 UDP Encapsulation of IPsec ESP Packets

RFC 3973 Protocol Independent Multicast - Dense Mode (PIM-DM): Protocol Specification (Revised)

RFC 3985 Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture

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 4109 Algorithms for Internet Key Exchange version 1 (IKEv1)

RFC 4133 Entity MIB (Version 3)

RFC 4182 Removing a Restriction on the use of MPLS Explicit NULL

RFC 4214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)

RFC 4222 Prioritized Treatment of Specific OSPF Version 2 Packets and Congestion Avoidance

RFC 4250 The Secure Shell (SSH) Protocol Assigned Numbers

RFC 4251 The Secure Shell (SSH) Protocol Architecture

RFC 4252 The Secure Shell (SSH) Authentication Protocol

RFC 4253 The Secure Shell (SSH) Transport Layer Protocol

RFC 4254 The Secure Shell (SSH) Connection Protocol

RFC 4291 IP Version 6 Addressing Architecture

RFC 4305 Cryptographic Algorithm Implementation

MPLS

RFC 4787 Network Address Translation (NAT) Behavioral Requirements for Unicast UDP

RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)

RFC 4811 OSPF Out-of-Band Link State Database (LSDB) Resynchronization

RFC 4812 OSPF Restart Signaling

RFC 4813 OSPF Link-Local Signaling

RFC 4816 Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM) Transparent Cell Transport Service

RFC 4835 Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)

RFC 4861 Neighbor Discovery for IP version 6 (IPv6)

RFC 4862 IPv6 Stateless Address Autoconfiguration

RFC 4878 "Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on

RFC 4893 BGP Support for Four-octet AS Number Space

RFC 4940 IANA Considerations for OSPF

RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6

RFC 5007 DHCPv6 Leasequery

RFC 5036 LDP Specification

RFC 5065 Autonomous System Confederations for BGP

RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)

RFC 5095 Deprecation of Type 0 Routing Headers in IPv6

RFC 5130 A Policy Control Mechanism in IS-IS Using Administrative Tags

RFC 5187 OSPFv3 Graceful Restart

RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)

RFC 5254 Requirements for Multi-Segment Pseudowire Emulation Edge-to-Edge (PWE3)

RFC 5277 NETCONF Event Notifications

RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile

RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates

RFC 5287 Control Protocol Extensions for the Setup of Time-Division Multiplexing (TDM) Pseudowires in MPLS Networks

RFC 5301 Dynamic Hostname Exchange Mechanism for IS-IS

RFC 5302 Domain-Wide Prefix Distribution with Two-Level IS-IS

RFC 5304 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication

RFC 5306 Restart Signaling for IS-IS

RFC 5308 Routing IPv6 with IS-IS

RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols

RFC 5381 Experience of Implementing NETCONF over SOAP

RFC 5382 The IP Network Address Translator (NAT)

RFC 5398 Autonomous System (AS) Number Reservation for Documentation Use

RFC 5492 Capabilities Advertisement with BGP-4

RFC 5508 NAT Behavioral Requirements for ICMP

RFC 5539 NETCONF over Transport Layer Security (TLS)

RFC 5613 OSPF Link-Local Signaling

RFC 5659 An Architecture for Multi-Segment Pseudowire

Standards and Protocols (continued) (applies to all products in series)			
	RFC 2869 RADIUS Extensions RFC 2884 Performance Evaluation of Explicit Congestion Notification (ECN) in IP Networks. RFC 2963 A Rate Adaptive Shaper for Differentiated Services RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS RFC 2973 IS-IS Mesh Groups	Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH) 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 4382 MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base RFC 4385 Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN	Emulation Edge-to-Edge RFC 5798 Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6 RFC 5880 Bidirectional Forwarding Detection RFC 5881 BFD for IPv4 and IPv6 (Single Hop) RFC 5882 Generic Application of BFD RFC 5883 BFD for Multihop Paths RFC 5905 Network Time Protocol Version 4: Protocol and Algorithms Specification RFC 854 Telnet Protocol Specification RFC 856 Telnet Binary Transmission
IP multicast	RFC 1112 IGMP RFC 2362 PIM Sparse Mode	RFC 2710 Multicast Listener Discovery (MLD) for IPv6 RFC 2934 Protocol Independent Multicast MIB for IPv4 RFC 3376 IGMPv3	RFC 3376 IGMPv3 (host joins only) RFC 5059 Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)
IPv6	RFC 2080 RIPng for IPv6 RFC 2460 IPv6 Specification 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 2740 OSPFv3 for IPv6	RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers RFC 3056 Connection of IPv6 Domains via IPv4 Clouds RFC 3162 RADIUS and IPv6 RFC 3315 DHCPv6 (client and relay) RFC 5340 OSPF for IPv6
MIBs	RFC 1213 MIB II RFC 1493 Bridge MIB RFC 1724 RIPv2 MIB RFC 1850 OSPFv2 MIB RFC 1907 SNMPv2 MIB RFC 2011 SNMPv2 MIB for IP	RFC 2012 SNMPv2 MIB for TCP RFC 2013 SNMPv2 MIB for UDP RFC 2096 IP Forwarding Table MIB RFC 2233 Interfaces MIB RFC 2273 SNMP-NOTIFICATION-MIB RFC 2571 SNMP Framework MIB RFC 2572 SNMP-MPD MIB	RFC 2573 SNMP-Notification MIB RFC 2574 SNMP USM MIB RFC 2674 802.1p and IEEE 802.1Q Bridge MIB RFC 2737 Entity MIB (Version 2) RFC 2863 The Interfaces Group MIB RFC 3813 MPLS LSR MIB
Network management	IEEE 802.1D (STP) RFC 1098 Simple Network Management Protocol (SNMP) RFC 1158 Management Information Base for network management of TCP/IP-based internets: MIB-II RFC 1212 Concise MIB definitions RFC 1215 Convention for defining traps for use with the SNMP RFC 1389 RIPv2 MIB Extension RFC 1448 Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2) RFC 1450 Management Information Base (MIB) for version 2 of the Simple Network Management Protocol (SNMPv2) RFC 1902 Structure of Management Information for Version 2 of the Simple Network Management Protocol (SNMPv2) RFC 1903 SNMPv2 Textual Conventions	RFC 1904 SNMPv2 Conformance RFC 1905 SNMPv2 Protocol Operations RFC 1906 SNMPv2 Transport Mappings RFC 1908 Coexistence between Version 1 and Version 2 of the Internet-standard Network Management Framework RFC 1918 Private Internet Address Allocation RFC 2037 Entity MIB using SMIv2 RFC 2261 An Architecture for Describing SNMP Management Frameworks RFC 2262 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP) RFC 2263 SNMPv3 Applications RFC 2264 User-based Security Model (USM) for version 3 of the Simple Network Management Protocol (SNMPv3) RFC 2265 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)	RFC 2272 SNMPv3 Management Protocol RFC 2273 SNMPv3 Applications RFC 2274 USM for SNMPv3 RFC 2275 VACM for SNMPv3 RFC 2575 SNMPv3 View-based Access Control Model (VACM) RFC 3164 BSD syslog Protocol RFC 3411 An Architecture for Describing Simple Network Management Protocol (SNMP) Management Frameworks RFC 3412 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP) RFC 3413 Simple Network Management Protocol (SNMP) Applications RFC 3414 SNMPv3 User-based Security Model (USM) RFC 3415 View-based Access Control Model (VACM) for the Simple Network Management Protocol (SNMP)
OSPF	RFC 1245 OSPF protocol analysis RFC 1246 Experience with OSPF	RFC 1583 OSPFv2 RFC 1587 OSPF NSSA RFC 1765 OSPF Database Overflow	RFC 1850 OSPFv2 Management Information Base (MIB), traps RFC 2328 OSPFv2 RFC 2370 OSPF Opaque LSA Option
QoS/CoS	IEEE 802.1P (CoS) RFC 2474 DS Field in the IPv4 and IPv6 Headers RFC 2475 DiffServ Architecture	RFC 2597 DiffServ Assured Forwarding (AF) RFC 2598 DiffServ Expedited Forwarding (EF) RFC 2697 A Single Rate Three Color Marker	RFC 3168 The Addition of Explicit Congestion Notification (ECN) to IP RFC 3247 Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior)
Security	IEEE 802.1X Port Based Network Access Control RFC 2082 RIP-2 MD5 Authentication RFC 2104 Keyed-Hashing for Message Authentication RFC 2138 RADIUS Authentication RFC 2139 RADIUS Accounting	RFC 2408 Internet Security Association and Key Management Protocol (ISAKMP) RFC 2409 The Internet Key Exchange (IKE) RFC 2412 The OAKLEY Key Determination Protocol RFC 2459 Internet X.509 Public Key Infrastructure Certificate and CRL Profile RFC 2818 HTTP Over TLS	RFC 2865 RADIUS Authentication RFC 2866 RADIUS Accounting RFC 3579 RADIUS Support For Extensible Authentication Protocol (EAP) RFC 3580 IEEE 802.1X Remote Authentication Dial In User Service (RADIUS) Usage Guidelines

Standards and Protocols (continued)

(applies to all products in series)

VPN	RFC 1828 IP Authentication using Keyed MD5 RFC 1853 IP in IP Tunneling RFC 2401 Security Architecture for the Internet Protocol RFC 2402 IP Authentication Header RFC 2403 The Use of HMAC-MD5-96 within ESP and AH RFC 2404 The Use of HMAC-SHA-1-96 within ESP and AH	RFC 2405 The ESP DES-CBC Cipher Algorithm With Explicit IV RFC 2406 IP Encapsulating Security Payload (ESP) RFC 2407 The Internet IP Security Domain of Interpretation for ISAKMP RFC 2410 The NULL Encryption Algorithm and Its Use With IPSec RFC 2411 IP Security Document Roadmap	RFC 3948 - UDP Encapsulation of IPSec ESP Packets 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

HP MSR3000 Router Series accessories

Transceivers

HP X110 100M SFP LC FX Transceiver (JD102B)
HP X110 100M SFP LC LX Transceiver (JD120B)
HP X110 100M SFP LC LH40 Transceiver (JD090A)
HP X110 100M SFP LC LH80 Transceiver (JD091A)
HP X120 1G SFP LC SX Transceiver (JD118B)
HP X120 1G SFP LC LX Transceiver (JD119B)
HP X125 1G SFP LC LH40 1310nm Transceiver (JD061A)
HP X120 1G SFP LC LH40 1550nm Transceiver (JD062A)
HP X125 1G SFP LC LH70 Transceiver (JD063B)
HP X120 1G SFP LC LH100 Transceiver (JD103A)
HP X120 1G SFP LC BX 10-U Transceiver (JD098B)
HP X120 1G SFP LC BX 10-D Transceiver (JD099B)

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 Auxiliary Router Cable (JD508A)
HP X260 E1 RJ45 3m Router Cable (JD509A)
HP X260 E1 RJ45 20m Router Cable (JD517A)
HP X260 E1 (2) BNC 75 ohm 3m Router Cable (JD175A)
HP X260 E1 BNC 20m Router Cable (JD514A)
HP X260 E1 2 BNC 75 ohm 40m Router Cable (JD516A)
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable (JD511A)
HP X260 2E1 BNC 3m Router Cable (JD643A)
HP X260 8E1 BNC 75 ohm 3m Router Cable (JD512A)
HP X260 T1 Router Cable (JD518A)
HP X260 T1 Voice Router Cable (JD535A)
HP X260 SIC-8AS RJ45 0.28m Router Cable (JD642A)
HP X260 mini D-28 to 4-RJ45 0.3m Router Cable (JG263A)
HP X260 T3/E3 Router Cable (JD531A)
HP X260 E3-30 E3/T3 Router Cable (JD533A)
HP X200 Transit Plug D25F MP8(S) Single Cable (JD636A)
HP X200 Transit RJ45 0.5m Single Cable (JD641A)

Power Supply

HP RPS 800 Redundant Power Supply (JD183A)
NEW HP X351 300W 100-240VAC to 12VDC Power Supply (JG527A)

Router Modules

HP MSR 9-port 10/100Base-T Switch DSIC Module (JD574B)
HP MSR 4-port 10/100Base-T Switch SIC Module (JD573B)
HP MSR 1-port 10/100Base-T SIC Module (JD545B)
HP MSR 1-port 100Base-X SIC Module (JF280A)
HP MSR 1-port GbE Combo SIC Module (JD572A)
HP MSR 2-port FXO SIC Module (JD558A)
HP MSR 1-port FXO SIC Module (JD559A)
HP MSR 2-port FXS SIC Module (JD560A)
HP MSR 1-port FXS SIC Module (JD561A)
HP MSR 1-port E1 Voice SIC Module (JD575A)
HP MSR 1-port T1 Voice SIC Module (JD576A)
HP MSR 2-port FXS/1-port FXO SIC Module (JD632A)
HP MSR 4-port FXS / 1-port FXO DSIC Module (JG189A)
HP MSR 2-port ISDN-S/T Voice SIC Module (JF821A)
HP MSR 1-port E1/Fractional E1 (75ohm) SIC Module (JD634B)
HP MSR 2-port E1/Fractional E1 (75ohm) SIC Module (JF842A)
HP MSR 1-port T1/Fractional T1 SIC Module (JD538A)
HP MSR 1-port Enhanced Sync/Async Serial SIC Module (JD557A)
HP MSR 1-port ISDN-S/T SIC Module (JD571A)
HP MSR 8-port Async Serial SIC Module (JF281A)
HP MSR 16-port Async Serial SIC Module (JG186A)
HP MSR HSPA/WCDMA SIC Module (JG187A)
NEW HP MSR 1-port E1 Voice HMIM Module (JG429A)
NEW HP MSR 1-port T1 Voice HMIM Module (JG430A)
NEW HP MSR 2-port E1 Voice HMIM Module (JG431A)
NEW HP MSR 4-port FXS HMIM Module (JG446A)
NEW HP MSR 4-port FXO HMIM Module (JG447A)
NEW HP MSR 4-port E and M HMIM Module (JG448A)
NEW HP MSR 4-port Enhanced Sync/Async Serial HMIM Module (JG442A)
NEW HP MSR 8-port Enhanced Sync/Async Serial HMIM Module (JG443A)
NEW HP MSR 2-port E1/CE1/PRI HMIM Module (JG450A)
NEW HP MSR 4-port E1/CE1/PRI HMIM Module (JG451A)
NEW HP MSR 4-port E1/Fractional E1 HMIM Module (JG453A)
NEW HP MSR 8-port E1/CE1/PRI (75ohm) HMIM Module (JG452A)
NEW HP MSR 2-port T1/CT1/PRI HMIM Module (JG456A)
NEW HP MSR 4-port T1/Fractional T1 HMIM Module (JG457A)
NEW HP MSR 1-port E3/CE3/FE3 HMIM Module (JG436A)
NEW HP MSR 1-port T3/CT3/FT3 HMIM Module (JG435A)
NEW HP MSR 1-port OC-3c/STM-1c POS HMIM Module (JG438A)
NEW HP MSR G2 128-channel Voice Processing Module (JG417A)
NEW HP MSR 1U HMIM Adapter Module (JG416A)
NEW HP MSR 0.5U HMIM Adapter Module (JG415A)

Power cords

HP X290 MSR30 1m RPS Cable (JD637A)

Memory

HP X600 1G Compact Flash Card (JC684A)

HP MSR3000 Router Series accessories (continued)

HP X600 512M Compact Flash Card (JC685A)

HP X600 256M Compact Flash Card (JC686A)

NEW HP X610 2GB DDR3 SDRAM UDIMM Memory (JG529A)

NEW HP X610 4GB DDR3 SDRAM UDIMM Memory (JG530A)

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