



HPE MSR3000 TAA-Compliant Router Series



Product overview

The HPE MSR3000 TAA-Compliant Router Series, the next generation of routers from Hewlett Packard Enterprise (HPE), is a component of the HPE FlexBranch solution. These routers feature a modular design that delivers unmatched application services for medium- to large-sized branch offices. Your IT personnel can benefit from 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 the HPE Comware software to help ensure high performance with concurrent services. With these routers, you get a full-featured, resilient routing platform, including IPv6 and MPLS, with up to 2.6 Mp/s forwarding capacity and 1.9 Gb/s of IPSec VPN encrypted throughput. In addition, the routers support HPE Open Application Platform (OAP) modules to deliver integrated industry-leading HPE AllianceOne partner applications such as virtualization, unified communications and collaboration (UC&C), and application optimization capabilities.

Leveraging the MSR3000 series, you can realize 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.

A summary of the highlights of the MSR3000 TAA-Compliant Router Series:

- Up to 2.6 Mp/s forwarding performance; support for multiple concurrent services
- OAP for HPE AllianceOne applications such as WAN acceleration and Microsoft® Lync®
- Embedded security features with hardware-based encryption, firewall, network address translation (NAT), and VPNs
- No additional licensing complexity; no cost for advanced features
- Zero-touch solution with single-pane-of-glass management capabilities

Features and benefits

Performance

- Excellent forwarding performance

Provides forwarding performance up to 2.6 Mp/s (1.7 Gb/s); and meets the bandwidth-intensive application demands of enterprise businesses

- Powerful security capacity

Includes an embedded hardware encryption accelerator to improve encryption performance; the IPSec encryption throughput can be up to 1.9 Gb/s with a maximum of 4,000 IPSec VPN tunnels

Product architecture

- SDN/OpenFlow

OpenFlow is the communications interface defined between the control and forwarding layers of a Software-Defined Networking (SDN) architecture. OpenFlow separates the data forwarding and routing decision functions. It keeps the flow-based forwarding function and employs a separate controller to make routing decisions. OpenFlow matches packets against one or more flow tables. MSR support OpenFlow 1.3.1

- Ideal multiservice platform

Provides a 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, PCIE bus, external RPS or dual internal power supplies, internal and external CF cards, and support for new high-performance MIM modules (HMIM)

- New version of the operating system

Ships with the new Comware 7 operating system, delivering the latest in virtualization and routing

- OAP architecture

Provides unmatched application and service 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 1,000 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 L2 packets directly via the MGF

Connectivity

- Ethernet Virtual Interconnect (EVI)

EVI is a MAC-in-IP technology that provides Layer 2 connectivity between distant Layer 2 network sites across an IP routed network. It is used for connecting geographically dispersed sites of a virtualized large-scale data center that requires Layer 2 adjacency

- Virtual eXtensible LAN (VXLAN)

VXLAN (Virtual eXtensible LAN, scalable virtual local area network) is an IP-based network, using the “MAC in UDP” package of Layer VPN technology. VXLAN can be based on an existing ISP or enterprise IP networks for decentralized physical site provides Layer 2 communication, and can provide service isolation for different tenants

- Virtual Private LAN Service (VPLS)

VPLS delivers a point-to-multipoint L2VPN service over an MPLS or IP backbone. The backbone is transparent to the customer sites, which can communicate with each other as if they were on the same LAN. The following protocols support on MSRs, RFC4447, RFC4761, and RFC4762, BFD detection in VPLS, Support hierarchical HOPE (H-VPLS), MAC address recovery in H-VPLS to speed up convergence

- Network Mobility (NEMO)

NEMO enables a node to retain the same IP address and maintain application connectivity when the node travels across networks. It allows location-independent routing of IP datagrams on the Internet

- High-density port connectivity
Provides up to 6 interface module slots and up to three onboard Gigabit Ethernet ports
- Multiple WAN interfaces
Provides traditional links with E1, T1, serial, and ISDN; Offers high-density Ethernet access with WAN Gigabit Ethernet and LAN 4- and 9-port Fast Ethernet; and enables mobility access with the 3G SIC module, 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; the loopback detection protects against incorrect cabling or network configurations, and it 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 that's certified on various cellular networks; optional carrier 3G/4G LTE USB modems are also available
- USB interface
Uses USB memory disk to download and upload configuration/OS image files; and 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, 10/100/1000BASE-T auto-speed detection plus auto duplex, and MDI/MDI-X

L2 switching

- Spanning tree protocol (STP)
Supports standard IEEE 802.1D STP, IEEE 802.1w Rapid STP (RSTP) for faster convergence and IEEE 802.1s Multiple STP (MSTP)
- Internet group management protocol (IGMP) and multicast listener discovery (MLD) protocol snooping
Controls and manages the flooding of multicast packets in an L2 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
- Capability to define port as switched or routed
Supports command switch to easily change switched ports to routed (maximum of four Fast Ethernet ports)

L3 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; and includes loop protection
- Open shortest path first (OSPF)

Delivers faster convergence; and uses link-state routing with the interior gateway protocol (IGP), which supports ECMP, NSSA, and MD5 authentication for increased security and graceful restart for faster failure recovery
- Border gateway protocol (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; and scales to very large networks
- Intermediate system to intermediate system (IS-IS)

Uses a path-vector 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
- RIP next generation (RIPng)

Extends RIPv2 to support IPv6 addressing
- OSPFv3

Provides OSPF support for IPv6
- BGP+

Extends BGP-4 to support Multiprotocol BGP (MP-BGP), 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, 6-to-4, and intra-site automatic tunnel addressing protocol (ISATAP) tunnels; and 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 L2 or L3 protocol, which reduces complexity and increases performance; supports graceful restart for reduced failure impact; and supports LSP tunneling and multilevel stacks
- MPLS L3 VPN

Allows L3 VPNs across a provider network; uses MP-BGP to establish private routes for increased security; supports RFC2547bis multiple autonomous system VPNs for added flexibility; and supports IPv6 MPLS VPN

- MPLS L2 VPN

Establishes simple L2 point-to-point VPNs across a provider network, using only MPLS Label Distribution Protocol (LDP); requires no routing and hence decreases complexity, increases performance, and allows VPNs of non-routable protocols; uses no routing information for increased security; and 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; and supports ACLs, IP prefix, AS paths, community lists, and aggregate policies

L3 services

- WAN Optimization

MSR performs optimization using TFO and a combination of DRE, Lempel-Ziv (LZ) compression to provide the bandwidth optimization for file service and Web applications. The policy engine module determines which traffic can be optimized and which optimization action should be taken. A pair of WAN optimization equipment can discover each other automatically and complete the negotiation to establish a TCP optimization session.

- NAT-PT

Network Address Translation-Protocol Translation (NAT-PT) enables communication between IPv4 and IPv6 nodes by translating between IPv4 and IPv6 packets. It performs IP address translation, and according to different protocols, performs semantic translation for packets. This technology is only suitable for communication between a pure IPv4 node and a pure IPv6 node

- Address resolution protocol (ARP)

Determines the MAC address of another IP host in the same subnet; and supports static ARPs, gratuitous ARPs—allowing detection of duplicate IP addresses, and proxy ARPs—allowing normal ARP operation between subnets or when subnets are separated by an L2 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 operations across subnets

Quality of Service (QoS)

- Traffic policing

Supports the 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 QoS (HQoS)/Nested QoS

Manages traffic uniformly; hierarchically schedules traffic by user, network service, and application; and 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

- IPS

Built-in Intrusion Prevention System (IPS) detects and protects the branch office from security threats. Optional HPE integration filters for client-side, branch protection from exploits and vulnerabilities

- Enhanced stateful firewall

Application layer protocol inspection, Transport layer protocol inspection, ICMP error message check, and TCP SYN check. Support more L4 and L7 protocols like TCP, UDP, UDP-Lite, ICMPv4/ICMPv6, SCTP, DCCP, RAWIP, HTTP, FTP, SMTP, DNS, SIP, H.323, SCCP

- Zone based firewall

Zone-based policy firewall changes the firewall configuration from the older interface-based model to a more flexible, more easily understood zone-based model. Interfaces are assigned to zones, and inspection policy is applied to traffic moving between the zones. Inter-zone policies offer considerable flexibility and granularity, so different inspection policies can be applied to multiple host groups connected to the same router interface

- Auto Discover VPN (ADVPN)

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, ADVPN technology is more flexible and has richer features, such as NAT traversal of ADVPN 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 an L2 or L3 protocol header; and 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 packets due to the lack of a reverse path route or incorrect inbound interface; and 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

- NAT

Supports one-to-one NAT, many-to-many NAT, and NAT control—enabling NAT-PT to support multiple connections; and also supports blacklist in NAT/NAT-PT—a limit on the number of connections, session logs, and multiple instances

- 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; and increases the security of SFTP transfers

Convergence

- IGMP

Utilizes any-source multicast (ASM) or source-specific multicast (SSM) to manage IPv4 multicast networks; and 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; and 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; and is used for inter-domain multicast applications

- Multicast BGP (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 L4–7 services; and monitors the health status of servers and firewalls

- Embedded VPN and firewall

Provides enhanced stateful packet inspection and filtering; and 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

- Intelligent Resilient Framework (IRF)

IRF allows the customer build an IRF stack, namely a logical device, by interconnecting multiple devices through stack ports. The customer can manage all the devices in the IRF stack by managing the logical device, which is cost-effective like a box-type device, and scalable and highly reliable like a chassis-type distributed device

- Backup Center

Acts as a part of the management and backup function to provide backup for device interfaces; and 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; and 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; and 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

- HPE Intelligent Management Center (IMC)

Integrates fault management, element configuration, and network monitoring from a central vantage point; has built-in support for third-party devices; and 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 tools for configuration comparison, 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 and offers multiple privilege levels with password protection; ACLs provide telnet and SNMP access; and local and remote syslog capabilities allow logging of all access

- SNMPv1, v2, and v3

Provide complete support for SNMP and industry-standard management information base (MIB) as well as private extensions; SNMPv3 supports increased security using encryption

- Remote monitoring

Uses standard SNMP to monitor essential network functions; and supports events, alarms, history, and a statistics group as well as a private alarm extension group

- FTP, trivial FTP (TFTP), and secure file transfer protocol (SFTP) support

Offers different mechanisms for configuration updates; FTP allows bidirectional transfers over a TCP/IP network; TFTP is a simpler method using UDP; and 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; and 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 the order of severity; and sends the network information to multiple channels, based on user-defined rules

- Management interface control

Provides management access through the modem port and terminal interface; and provides access through the terminal interface, telnet, or SSH

- Network quality analyzer (NQA)

Analyzes network performance and service quality by sending test packets; provides network performance and service quality parameters such as jitter, TCP, or FTP connection delays; and allows the network manager to determine overall network performance as well as diagnose and locate network congestion points or failures

- Role-based security
Delivers role-based access control (RBAC); and 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—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
See hpe.com/networking/warrantysummary for warranty and support information included with your product purchase.
- Software releases
To find software for your product, refer to hpe.com/networking/support; for details on the software releases available with your product purchase, refer to hpe.com/networking/warrantysummary

HPE MSR3000 TAA-Compliant Router Series



Specifications	HPE MSR3024 TAA-Compliant AC Router (JG861A)
Ports	2 HMIM slots 4 SIC slots or 2 DSIC slots 1 VPM slot 3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T) 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) Weight 17.42 lb (7.9 kg)
Memory and processor	RISC, 4 cores @ 1 GHz, 256 MB flash capacity, 2 GB DDR3 SDRAM
Mounting	Desktop or can be mounted on an EIA standard 19-inch telco rack when used with the rack-mount kit in the package
Performance	Throughput Routing table size Forwarding table size
Environment	Operating temperature Operating relative humidity Nonoperating/storage temperature Nonoperating/storage relative humidity Altitude
Electrical characteristics	Maximum heat dissipation Voltage Maximum power rating Frequency
Reliability	MTBF (years) 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
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; EN61000-4-11:2004; EN 61000-4-8:2001
Telecom	FCC part 68; CS-03
Management	IMC; 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	Refer to the Hewlett Packard Enterprise website at hpe.com/networking/services for details on the service-level descriptions and product numbers. For details about services, and response times in your area, please contact your local Hewlett Packard Enterprise sales office.

Standards and protocols

(applies to all products in series)

BGP	RFC 1163 BGP RFC 1267 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 3107 Support BGP carry Label for MPLS Mesh Internal BGP (IBGP) RFC 4724 Graceful Restart Mechanism for BGP	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 3392 Capabilities Advertisement with BGP-4	RFC 4271 A 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
Denial of service protection	CPU DoS Protection Rate Limiting by ACLs		
Device management	RFC 1155 Structure and Management Information (SMLv1) RFC 1902 (SNMPv2) RFC 2576 (Coexistence between SNMP V1, V2, V3) RFC 1157 SNMPv1/v2c	RFC 1908 (SNMP v1/2 Coexistence) RFC 2578–2580 SMLv2 RFC 1305 NTPv3 RFC 1945 Hypertext Transfer Protocol—HTTP/1.0 RFC 2579 (SMLv2 Text Conventions)	RFC 1591 DNS (client) RFC 2271 Framework RFC 2580 (SMLv2 Conformance) RFC 2573 (SNMPv3 Applications) RFC 3416 (SNMP Protocol Operations v2)
General protocols	RFC 768 UDP RFC 760 DoD standard Internet Protocol RFC 764 Telnet Protocol specification RFC 777 Internet Control Message Protocol RFC 783 TFTP Protocol (revision 2) RFC 791 IP RFC 792 ICMP RFC 793 TCP RFC 813 Window and Acknowledgement Strategy in TCP RFC 815 IP datagram reassembly algorithms RFC 826 ARP RFC 854 Telnet Protocol Specification RFC 855 Telnet Option Specifications RFC 856 Telnet Binary Transmission RFC 857 Telnet Echo Option RFC 858 Telnet Suppress Go Ahead Option RFC 862 Echo Service (TCP Echo) RFC 879 TCP maximum segment size and related topics RFC 882 Domain names: Concepts and facilities RFC 883 Domain names: Implementation specification RFC 894 A Standard for the Transmission of IP Datagrams over Ethernet Networks RFC 896 Congestion Control in IP/TCP Internetworks RFC 906 Bootstrap loading using TFTP (Trivial File Transfer Protocol) RFC 917 Internet Subnets RFC 919 Broadcasting Internet Datagrams RFC 922 Broadcasting Internet Datagrams in the Presence of Subnets (IP_BROAD)	RFC 925 Multi-LAN Address Resolution RFC 926 Protocol for providing the connectionless mode network services RFC 950 Internet Standard Subnetting Procedure RFC 951 BOOTP RFC 958 Network Time Protocol (NTP) RFC 959 File Transfer Protocol (FTP) RFC 973 Domain system changes and observations RFC 988 Host extensions for IP multicasting RFC 1027 Proxy ARP RFC 1034 Domain names—concepts and facilities RFC 1035 Domain names—implementation and specification RFC 1048 BOOTP (Bootstrap Protocol) vendor information extensions RFC 1054 Host extensions for IP multicasting RFC 1058 RIPv1 RFC 1059 Network Time Protocol (version 1) specification and implementation RFC 1060 Assigned numbers RFC 1063 IP MTU (Maximum Transmission Unit) discovery options RFC 1071 Computing the Internet Checksum RFC 1072 TCP extensions for long-delay paths RFC 1079 Telnet terminal speed option RFC 1084 BOOTP (Bootstrap Protocol) vendor information extensions RFC 1091 Telnet Terminal-Type Option RFC 1093 NSFNET routing architecture	RFC 1101 DNS encoding of network names and other types RFC 1119 Network Time Protocol (version 2) specification and implementation RFC 1122 Requirements for Internet Hosts—Communication Layers RFC 1141 Incremental updating of the Internet Checksum RFC 1142 OSI IS-IS Intra-domain Routing Protocol RFC 1164 Application of the Border Gateway Protocol in the Internet RFC 1166 Internet address used by Internet Protocol (IP) RFC 1171 Point-to-Point Protocol for the transmission of multi-protocol datagrams over Point-to-Point links RFC 1172 Point-to-Point Protocol (PPP) initial configuration options RFC 1185 TCP Extension for High-Speed Paths 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 1265 BGP Protocol Analysis RFC 1266 Experience with the BGP Protocol RFC 1268 Application of the Border Gateway Protocol in the Internet RFC 1271 Remote Network Monitoring Management Information Base

Standards and protocols

(applies to all products in series)

General protocols (continued)

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Audio-Video Transport Working Group</p> <p>RFC 1933 Transition Mechanisms for IPv6 Hosts and Routers</p> <p>RFC 1945 Hypertext Transfer Protocol—HTTP/1.0</p> <p>RFC 1962 The PPP Compression Control Protocol (CCP)</p> <p>RFC 1966 BGP Route Reflection An alternative to full mesh IBGP</p> <p>RFC 1970 Neighbor Discovery for IP Version 6 (IPv6)</p>	<p>RFC 1971 IPv6 Stateless Address Autoconfiguration</p> <p>RFC 1972 A Method for the Transmission of IPv6 Packets over Ethernet Networks</p> <p>RFC 1981 Path MTU Discovery for IP version 6</p> <p>RFC 1982 Serial Number Arithmetic</p> <p>RFC 1989 PPP Link Quality Monitoring</p> <p>RFC 1990 The PPP Multilink Protocol (MP)</p> <p>RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)</p> <p>RFC 2001 TCP Slow Start, Congestion Avoidance, Fast Retransmit, and Fast Recovery Algorithms</p> <p>RFC 2002 IP Mobility Support</p> <p>RFC 2003 IP Encapsulation within IP</p> <p>RFC 2011 SNMPv2 Management Information Base for the Internet Protocol using SMLv2</p> <p>RFC 2012 SNMPv2 Management Information Base for the Transmission Control Protocol using SMLv2</p> <p>RFC 2013 SNMPv2 Management Information Base for the User Datagram Protocol using SMLv2</p> <p>RFC 2018 TCP Selective Acknowledgement Options</p> <p>RFC 2021 Remote Network Monitoring Management Information Base Version 2 using SMLv2</p> <p>RFC 2073 An IPv6 Provider-Based Unicast Address Format</p> <p>RFC 2082 RIP-2 MD5 Authentication</p> <p>RFC 2091 Triggered Extensions to RIP to Support Demand Circuits</p> <p>RFC 2104 HMAC: Keyed-Hashing for Message Authentication</p> <p>RFC 2131 DHCP</p> <p>RFC 2132 DHCP Options and BOOTP Vendor Extensions</p> <p>RFC 2136 Dynamic Updates in the Domain Name System (DNS UPDATE)</p> <p>RFC 2138 Remote Authentication Dial In User Service (RADIUS)</p> <p>RFC 2205 Resource ReSerVation Protocol (RSVP)—Version 1 Functional Specification</p> <p>RFC 2209 Resource ReSerVation Protocol (RSVP)—Version 1 Message Processing Rules</p> <p>RFC 2210 Use of RSVP (Resource Reservation Protocol) in Integrated Services</p> <p>RFC 2225 Classical IP and ARP over ATM</p> <p>RFC 2236 IGMP Snooping</p> <p>RFC 2246 The TLS Protocol Version 1.0</p> <p>RFC 2251 Lightweight Directory Access Protocol (v3)</p> <p>RFC 2252 Lightweight Directory Access Protocol (v3): Attribute Syntax Definitions</p> <p>RFC 2283 MBGP</p> <p>RFC 2292 Advanced Sockets API for IPv6</p>
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(applies to all products in series)

General protocols (continued)

<p>RFC 4649 Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Remote-ID Option</p> <p>RFC 4659 BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN</p> <p>RFC 4664 Framework for Layer 2 Virtual Private Networks (L2VPNs)</p> <p>RFC 4665 Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks</p> <p>RFC 4717 Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks</p> <p>RFC 4741 NETCONF Configuration Protocol</p> <p>RFC 4742 Using the NETCONF Configuration Protocol over Secure Shell (SSH)</p> <p>RFC 4743 Using NETCONF over the Simple Object Access Protocol (SOAP)</p> <p>RFC 4750 OSPF Version 2 Management Information Base</p> <p>RFC 4761 Virtual Private LAN Service (VPLS) Using BGP for Auto-Discovery and Signaling</p> <p>RFC 4765 Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks</p> <p>RFC 4781 Graceful Restart Mechanism for BGP with MPLS</p> <p>RFC 4787 Network Address Translation (NAT) Behavioral Requirements for Unicast UDP</p> <p>RFC 4797 Use of Provider Edge to Provider Edge (PE-PE) Generic Routing Encapsulation (GRE) or IP in BGP/MPLS IP Virtual Private Networks</p> <p>RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)</p> <p>RFC 4811 OSPF Out-of-Band Link State Database (LSDB) Resynchronization</p> <p>RFC 4812 OSPF Restart Signaling</p> <p>RFC 4813 OSPF Link-Local Signaling</p> <p>RFC 4816 Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM) Transparent Cell Transport Service</p> <p>RFC 4818 RADIUS Delegated-IPv6-Prefix Attribute</p> <p>RFC 4835 Cryptographic Algorithm Implementation Requirements for Encapsulating Security Payload (ESP) and Authentication Header (AH)</p> <p>RFC 4861 Neighbor Discovery for IP version 6 (IPv6)</p> <p>RFC 4862 IPv6 Stateless Address Autoconfiguration</p> <p>RFC 4878 Definitions and Managed Objects for Operations, Administration, and Maintenance (OAM) Functions on</p> <p>RFC 4893 BGP Support for Four-octet AS Number Space</p> <p>RFC 4940 IANA Considerations for OSPF</p>	<p>RFC 4941 Privacy Extensions for Stateless Address Autoconfiguration in IPv6</p> <p>RFC 5004 Avoid BGP Best Path Transitions from One External to Another</p> <p>RFC 5007 DHCPv6 Leasequery</p> <p>RFC 5015 Bidirectional Protocol Independent Multicast (BIDIR-PIM)</p> <p>RFC 5036 LDP Specification</p> <p>RFC 5060 Protocol Independent Multicast MIB</p> <p>RFC 5065 Autonomous System Confederations for BGP</p> <p>RFC 5072 IP Version 6 over PPP</p> <p>RFC 5082 The Generalized TTL Security Mechanism (GTSM)</p> <p>RFC 5085 Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires</p> <p>RFC 5086 Structure-Aware Time Division Multiplexed (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)</p> <p>RFC 5095 Deprecation of Type 0 Routing Headers in IPv6</p> <p>RFC 5120 M-ISIS: Multi Topology (MT) Routing in Intermediate System to Intermediate Systems (IS-ISs)</p> <p>RFC 5130 A Policy Control Mechanism in IS-IS Using Administrative Tags</p> <p>RFC 5132 IP Multicast MIB</p> <p>RFC 5187 OSPFv3 Graceful Restart</p> <p>RFC 5214 Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)</p> <p>RFC 5240 Protocol Independent Multicast (PIM) Bootstrap Router MIB</p> <p>RFC 5254 Requirements for Multi-Segment Pseudowire Emulation Edge-to-Edge (PWE3)</p> <p>RFC 5277 NETCONF Event Notifications</p> <p>RFC 5280 Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile</p> <p>RFC 5281 Extensible Authentication Protocol Tunneled Transport Layer Security Authenticated Protocol Version 0 (EAP-TLSv0)</p> <p>RFC 5286 Basic Specification for IP Fast Reroute: Loop-Free Alternates</p> <p>RFC 5287 Control Protocol Extensions for the Setup of Time-Division Multiplexing (TDM) Pseudowires in MPLS Networks</p> <p>RFC 5301 Dynamic Hostname Exchange Mechanism for IS-IS</p> <p>RFC 5302 Domain-Wide Prefix Distribution with Two-Level IS-IS</p> <p>RFC 5303 Three-Way Handshake for IS-IS Point-to-Point Adjacencies</p> <p>RFC 5304 Intermediate System to Intermediate System (IS-IS) Cryptographic Authentication</p> <p>RFC 5305 IS-IS Extensions for Traffic Engineering</p> <p>RFC 5306 Restart Signaling for IS-IS</p> <p>RFC 5308 Routing IPv6 with IS-IS</p>	<p>RFC 5309 Point-to-Point Operation over LAN in Link State Routing Protocols</p> <p>RFC 5310 IS-IS Generic Cryptographic Authentication</p> <p>RFC 5359 Session Initiation Protocol Service Examples</p> <p>RFC 5381 Experience of Implementing NETCONF over SOAP</p> <p>RFC 5382 The IP Network Address Translator (NAT)</p> <p>RFC 5398 Autonomous System (AS) Number Reservation for Documentation Use</p> <p>RFC 5415 Control And Provisioning of Wireless Access Points (CAPWAP) Protocol Specification</p> <p>RFC 5416 Control and Provisioning of Wireless Access Points (CAPWAP) Protocol Binding for IEEE 802.11</p> <p>RFC 5443 LDP IGP Synchronization</p> <p>RFC 5492 Capabilities Advertisement with BGP-4</p> <p>RFC 5496 The Reverse Path Forwarding (RPF) Vector TLV</p> <p>RFC 5508 NAT Behavioral Requirements for ICMP</p> <p>RFC 5539 NETCONF over Transport Layer Security (TLS)</p> <p>RFC 5601 Pseudowire (PW) Management Information Base (MIB)</p> <p>RFC 5602 Pseudowire (PW) over MPLS PSN Management Information Base (MIB)</p> <p>RFC 5613 OSPF Link-Local Signaling</p> <p>RFC 5659 An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge</p> <p>RFC 5681 TCP Congestion Control</p> <p>RFC 5798 Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6</p> <p>RFC 5833 Control and Provisioning of Wireless Access Points (CAPWAP) Protocol Base MIB</p> <p>RFC 5834 Control and Provisioning of Wireless Access Points (CAPWAP) Protocol Binding MIB for IEEE 802.11</p> <p>RFC 5880 Bidirectional Forwarding Detection</p> <p>RFC 5881 BFD for IPv4 and IPv6 (Single Hop)</p> <p>RFC 5881 Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)</p> <p>RFC 5882 Generic Application of BFD</p> <p>RFC 5883 BFD for Multihop Paths</p> <p>RFC 5905 Network Time Protocol Version 4: Protocol and Algorithms Specification</p> <p>RFC 5969 IPv6 Rapid Deployment on IPv4 Infrastructures (6RD)—Protocol Specification</p> <p>RFC 6037 Cisco Systems' Solution for Multicast in MPLS/BGP IP VPNs</p> <p>RFC 6085 Address Mapping of IPv6 Multicast Packets on Ethernet</p>
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Standards and protocols

(applies to all products in series)

IP multicast

RFC 1112 IGMP
 RFC 2710 MLD for IPv6
 RFC 3376 IGMPv3 (host joins only)
 RFC 2362 PIM Sparse Mode
 RFC 2934 PIM MIB for IPv4
 RFC 5059 Bootstrap Router (BSR) Mechanism for
 RFC 3376 IGMPv3 PIM

IPv6

RFC 2080 RIPng for IPv6
 RFC 2529 Transmission of IPv6 Packets over IPv4
 RFC 2893 Transition Mechanisms for IPv6 Hosts and RFC 2460 IPv6 Specification
 RFC 2545 Use of MP-BGP-4 for IPv6
 RFC 2473 Generic Packet Tunneling in IPv6
 RFC 2553 Basic Socket Interface Extensions for IPv6
 RFC 2475 IPv6 DiffServ Architecture RFC 2740 OSPFv3 for IPv6 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 2012 SNMPv2 MIB for TCP
 RFC 2573 SNMP-Notification MIB
 RFC 1493 Bridge MIB
 RFC 2013 SNMPv2 MIB for UDP RFC 2574 SNMP USM MIB
 RFC 1724 RIPv2 MIB RFC 2096 IP Forwarding Table MIB
 RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
 RFC 1850 OSPFv2 MIB RFC 2233 Interfaces MIB
 RFC 2737 Entity MIB (Version 2)
 RFC 1907 SNMPv2 MIB
 RFC 2273 SNMP-NOTIFICATION-MIB
 RFC 2863 The Interfaces Group MIB
 RFC 2011 SNMPv2 MIB for IP
 RFC 2571 SNMP Framework MIB
 RFC 3813 MPLS LSR MIB
 RFC 2572 SNMP-MPD MIB

Network management

IEEE 802.1D (STP)
 RFC 1904 SNMPv2 Conformance
 RFC 2272 SNMPv3 Management Protocol
 RFC 1098 Simple Network Management Protocol (SNMP)
 RFC 1905 SNMPv2 Protocol Operations
 RFC 2273 SNMPv3 Applications
 RFC 1158 MIB for network
 RFC 1906 SNMPv2 Transport Mappings
 RFC 2274 USM for SNMPv3 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 1908 Coexistence between Version 1 and Version 2 of the Internet-standard Network Management Framework
 RFC 2275 VACM for SNMPv3
 RFC 2575 SNMPv3 View-based Access Control Model (VACM)
 RFC 1918 Private Internet Address Allocation
 RFC 1389 RIPv2 MIB Extension
 RFC 2037 Entity MIB using SMIv2
 RFC 3164 BSD syslog Protocol
 RFC 3411 An Architecture for Describing Simple Network
 RFC 1448 Protocol Operations for version 2 of the Simple Network Management Protocol (SNMPv2)
 RFC 1450 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 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)
 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)

Standards and protocols

(applies to all products in series)

OSPF	RFC 1245 OSPF protocol analysis RFC 1583 OSPFv2 RFC 1850 OSPFv2 MIB, RFC 1246 Experience with OSPF RFC 1587 OSPF NSSA RFC 1765 OSPF Database Overflow traps RFC 2328 OSPFv2 RFC 2370 OSPF Opaque LSA Option
QoS/CoS	IEEE 802.1P (CoS) RFC 2597 DiffServ Assured Forwarding (AF) RFC 3168 The Addition of Explicit Congestion RFC 2474 DS Field in the IPv4 and IPv6 Headers RFC 2598 DiffServ Expedited Forwarding (EF) RFC 2475 DiffServ Architecture RFC 2697 A Single Rate Three Color Marker 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 2408 Internet Security Association and Key RFC 2865 RADIUS Authentication RFC 2082 RIP-2 MD5 Authentication RFC 2104 Keyed-Hashing for Message Authentication RFC 2138 RADIUS Authentication RFC 2139 RADIUS Accounting 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 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
VPN	RFC 1828 IP Authentication using Keyed MD5 RFC 2405 The ESP DES-CBC Cipher Algorithm With RFC 3948 UDP Encapsulation of IPsec ESP Packets 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 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 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

HPE MSR3000 TAA-Compliant router series accessories

Transceivers

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

Cables

HPE X200 V.24 DTE 3m Serial Port Cable (JD519A)
 HPE X200 V.24 DCE 3m Serial Port Cable (JD521A)
 HPE X200 V.35 DTE 3m Serial Port Cable (JD523A)
 HPE X200 V.35 DCE 3m Serial Port Cable (JD525A)
 HPE X200 X.21 DTE 3m Serial Port Cable (JD527A)
 HPE X200 X.21 DCE 3m Serial Port Cable (JD529A)
 HPE X260 RS449 3m DTE Serial Port Cable (JF825A)
 HPE X260 RS449 3m DCE Serial Port Cable (JF826A)
 HPE X260 RS530 3m DTE Serial Port Cable (JF827A)
 HPE X260 RS530 3m DCE Serial Port Cable (JF828A)
 HPE X260 Auxiliary Router Cable (JD508A)
 HPE X260 E1 RJ45 3m Router Cable (JD509A)
 HPE X260 E1 RJ45 20m Router Cable (JD517A)
 HPE X260 E1 (2) BNC 75 ohm 3m Router Cable (JD175A)
 HPE X260 E1 BNC 20m Router Cable (JD514A)
 HPE X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable (JD511A)
 HPE X260 2E1 BNC 3m Router Cable (JD643A)
 HPE X260 8E1 BNC 75 ohm 3m Router Cable (JD512A)
 HPE X260 T1 Router Cable (JD518A)
 HPE X260 T1 Voice Router Cable (JD535A)
 HPE X260 SIC-8AS RJ45 0.28m Router Cable (JD642A)
 HPE X260 mini D-28 to 4-RJ45 0.3m Router Cable (JG263A)
 HPE X260 T3/E3 Router Cable (JD531A)
 HPE X260 E3-30 E3/T3 Router Cable (JD533A)
 HPE X200 Transit Plug D25F MP8(S) Single Cable (JD636A)
 HPE X200 Transit RJ45 0.5m Single Cable (JD641A)
 HPE X260 E1 RJ45 to 2xBNC 75ohm 3m Router Cable (JH294A)
 HPE X260 E1 RJ45 120 ohm 2m Router Cable (JC156A)
 HPE X260 E1 RJ45 120 ohm 15m Router Cable (JC151A)
 HPE X260 E1 RJ45 120 ohm 30m Router Cable (JC152A)
 HPE X260 T1 Router Cable (JD518A)

Power supply

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

HPE MSR3000 TAA-Compliant router series accessories (continued)

Router modules	HPE MSR 9-port 10/100Base-T Switch DSIC Module (JD574B) HPE MSR 4-port 10/100Base-T Switch SIC Module (JD573B) HPE MSR 1-port 10/100Base-T SIC Module (JD545B) HPE MSR 1-port 100Base-X SIC Module (JF280A) HPE MSR 2-port FXO SIC Module (JD558A) HPE MSR 2-port FXS SIC Module (JD560A) HPE MSR 1-port E1 Voice SIC Module (JD575A) HPE MSR 1-port T1 Voice SIC Module (JD576A) HPE MSR 2-port FXS/1-port FXO SIC Module (JD632A) HPE MSR 4-port FXS/1-port FXO DSIC Module (JG189A) HPE MSR 2-port ISDN-S/T Voice SIC Module (JF821A) HPE MSR 1-port E1/Fractional E1 (75ohm) SIC Module (JD634B) HPE MSR 2-port E1/Fractional E1 (75ohm) SIC Module (JF842A) HPE MSR 1-port T1/Fractional T1 SIC Module (JD538A) HPE MSR 1-port Enhanced Sync/Async Serial SIC Module (JD557A) HPE MSR 1-port ISDN-S/T SIC Module (JD571A) HPE MSR 8-port Async Serial SIC Module (JF281A) HPE MSR 16-port Async Serial SIC Module (JG186A) HPE Flex Network MSR 4G LTE SIC Module for LTE 700/1700/2100 MHz CDMA UMTS/HSPA+/HSPA/EDGE/GPRS/GSM (JG742B) HPE MSR 4G LTE SIC Module for Global/LTE 800/900/1800/2100/2600MHz UMTS/HSPA+/HSPA/EDGE/GRPS/GSM (JG744B) HPE MSR 1-port E1/T1 Voice SIC Module (JH240A) HPE MSR HSPA+/WCDMA SIC Module (JG929A) HPE MSR 1-port E1 Voice HMIM Module (JG429A) HPE MSR 1-port T1 Voice HMIM Module (JG430A) HPE MSR 2-port E1 Voice HMIM Module (JG431A) HPE MSR 4-port FXS HMIM Module (JG446A) HPE MSR 4-port FXO HMIM Module (JG447A) HPE MSR 4-port E and M HMIM Module (JG448A) HPE MSR 4-port Enhanced Sync/Async Serial HMIM Module (JG442A) HPE MSR 8-port Enhanced Sync/Async Serial HMIM Module (JG443A) HPE MSR 1-port E3/CE3/FE3 HMIM Module (JG436A) HPE MSR 1-port T3/CT3/FT3 HMIM Module (JG435A) HPE MSR 1-port OC-3c/STM-1c POS HMIM Module (JG438A) HPE MSR G2 128-channel Voice Processing Module (JG417A) HPE MSR 1U HMIM Adapter Module (JG416A) HPE MSR 0.5U HMIM Adapter Module (JG415A) HPE MSR 8-port 100BASE-FX/1000BASE-X/4-port 1000BASE-T (Combo) L2/L3 HMIM Module (JH238A) HPE MSR 16-port Enhanced Async Serial HMIM Module (JG445A) HPE MSR 8-port E1/CE1/T1/CT1/PRI HMIM Module (JH169A) HPE MSR 8-port E1/Fractional E1/T1/Fractional T1 HMIM Module (JH172A) HPE MSR Open Application Platform (OAP) with VMware® vSphere MIM Module (JG532A) HPE MSR Medium Survivable Branch Communication MIM Module powered by Microsoft Lync (JG588A)
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Power cords	HPE X290 MSR30 1m RPS Cable (JD637A)
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