Overview

Models

HP MSR1003-8 AC Router JG732A

Key features

- Up to 500Kpps IP forwarding; converged high-performance routing
- Embedded security features with hardware-based encryption, firewall, NAT, and VPNs
- Industry-leading breadth of LAN and WAN connectivity options
- No additional licensing complexity; no cost for advanced features
- Zero-touch solution, with single-pane-of-glass management

Product overview

The HP MSR1000 router series is a next generation multi-services router designed to deliver unmatched application performance for small sized branch offices. The MSR1000 provides a flexible multiservice end point for small branch/office or departmental end points that quickly adapts to changing business requirements while delivering integrated, concurrent services on a single, easy-to-manage platform.

Features and benefits

Quality of Service (QoS)

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

Management

- **Ease of deployment**
  supports both USB disk auto deployment and 3G SMS auto deployment
- **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**

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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

Connectivity

- **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 access support**
  provides 3G wireless access for primary or backup connectivity via a 3G SIC module certified on various cellular networks; optional carrier 3G USB modems available
- **Flexible port selection**
  provides a combination of fiber and copper interface modules, 100/1000BASE-X auto-speed selection, and 10/100/1000BASE-T auto-speed detection plus auto duplex and MDI/MDI-X
- **Multiple WAN interfaces**
  provide a traditional link with E1, T1, ADSL, ADSL2, ADSL2+, G.SHDSL, ATM, Serial, and ISDN/AM backup; provide high-density Ethernet access with WAN Fast Ethernet/Gigabit Ethernet and LAN 4- and 9-port Fast Ethernet; provide mobility access with IEEE 802.11b/g/n Wi-Fi and 3G
- **High-density port connectivity**
  includes three SIC interface module slots and up to eight Gigabit Ethernet LAN ports which can be re-configured as WAN Routing ports

Performance

- **Powerful encryption capacity**
  includes embedded hardware encryption accelerator to improve encryption performanc
- **Excellent forwarding performance**
  provides forwarding performance up to 500 Kpps; meets current and future bandwidth-intensive application demands of enterprise businesses

Resiliency and high availability

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- **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

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**
  support 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 (max. eight GE ports)

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

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 network
- **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

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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 technologie
- **Policy routing**
  allows custom filters for increased performance and security; supports ACLs, IP prefix, AS paths, community lists, and aggregate policies

Security

- **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
- **Network login**
  standard IEEE 802.1x allows authentication of multiple users per port
- **RADIUS**
  eases security access administration by using a 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, and a limit on the number of connections, session logs, and multi-instances
- **Secure Shell (SSHv2)**
  uses external servers to securely login into a remote device or securely login into MSR from a remote location; with

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authentication and encryption, it protects against IP spoofing and plain text password interception; increases the security of SFTP transfers

- **Unicast Reverse Path Forwarding (URPF)**
  allows normal packets to be forwarded correctly, but discards the attaching packet due to lack of reverse path route or incorrect inbound interface; prevents source spoofing and distributed attacks
- **IPSec VPN**
  supports DES, 3DES, and AES 128/192/256 encryption, and MD5 and SHA-1 authentication
- **DVPN (Dynamic Virtual Private Network)**
  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

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 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

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
- **High reliability**
  provides a state-of-the-art unified code base
- **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

Product architecture

Overview

- **Ideal multiservice platform**
  provides WAN router, Ethernet switch, wireless LAN, 3G WAN, firewall, VPN, and SIP/voice gateway all in one box
- **High-density voice interfaces**
  provide flexible analog voice interface options for easy integration within a wide range of deployments
- **USB interface**
  uses USB memory disk to download and upload configuration files; supports an external USB 3G modem for a 3G WAN uplink
- **Advanced hardware architecture**
  delivers Gigabit Ethernet switching and a PCIE bus

Warranty and support

- **1-year Warranty 2.0**
  advance hardware replacement with next-business-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

Configuration

Build To Order:

BTO is a standalone unit with no integration. BTO products ship standalone are not part of a CTO or Rack-Shippable solution.

Router Chassis

HP MSR1003-8 AC Router — JG732A

- 2 RJ-45 autosensing 10/100/1000 WAN port
- 8 RJ-45 autosensing 10/100/1000 LAN ports
- 3 - SIC module slots / 1 DSIC
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VPM slot
- 512MB DDR3 SDRAM included (default=512MB \ max=512MB SDRAM)
- AC Power Supply included
- 1U - Height

See Configuration Note:1, 2, 3

PDU Cable NA/MEX/TW/JP — JG732A#B2B

- C15 PDU Jumper Cord (NA/MEX/TW/JP)

PDU Cable ROW — JG732A#B2C

- C15 PDU Jumper Cord (ROW)k

High Volt Switch/Router to Wall Power Cord — JG732A#B2E

- NEMA L6-20P Cord (NA/MEX/JP/TW)

Configuration Rules:

Note 1 AC Power Supply included

Note 2 Localization required on orders without #B2B, #B2C or #B2E options.

Note 3 #B2E is Offered only in NA, Mexico, Taiwan and Japan.

Remarks: Drop down under power supply should offer the following options and results:
Switch/Router/Power Supply to PDU Power Cord - #B2B in North America, Mexico, Taiwan, and Japan or #B2C ROW. (Watson Default B2B or B2C for Rack Level CTO)
Switch/Router/Power Supply to Wall Power Cord - Localized Option (Watson Default for BTO and Box Level CTO)
High Volt Switch/Router/Power Supply to Wall Power Cord - #B2E Option. (Offered only in North America, Mexico, Taiwan, and Japan)

Enter the following menu selections as integrated to the CTO Model X server above if order is factory built.

Modules

SIC Modules

Configuration

System (std 0 // max 3 or 2 or 1) User Selection (min 0 // max 3 or 2 or 1) per Host (See Modules for Port information)

HP A-MSR 4-port 10/100Base-T Switch SIC Module	JD573B See Configuration Note:1
HP A-MSR 9-port 10/100Base-T Switch DSIC Module	JD574B See Configuration Note:3
HP A-MSR 1-port 10/100Base-T SIC Module	JD545B See Configuration Note:1
HP A-MSR 1-port 100Base-X SIC Module • min=0 \ max=1 SFP Transceivers	JF280A See Configuration Note:1, 5
HP A-MSR 1-port GbE Combo SIC Module • min=0 \ max=1 SFP Transceivers	JD572A See Configuration Note:1, 6
HP A-MSR 2-port FXO SIC Module	JD558A See Configuration Note:2
HP A-MSR 1-port FXO SIC Module	JD559A See Configuration Note:2
HP A-MSR 2-port FXS SIC Module	JD560A See Configuration Note:2
HP A-MSR 1-port FXS SIC Module	JD561A See Configuration Note:2
HP A-MSR 4-port FXS/1-port FXO DSIC Mod	JG189A See Configuration Note:3
HP A-MSR 2-port ISDN-S/T Voice SIC Module	JF821A See Configuration Note:2

Configuration

HP A-MSR 2-port FXS/1-port FXO SIC Module	JD632A See Configuration Note:2
HP A-MSR 1-port E1/Fractional E1 (75ohm) SIC Module • min=0 \ max=1 E1 or 2E1 Cable	JD634B See Configuration Note:2, 7, 10
HP A-MSR 1-port T1/Fractional T1 SIC Module • min=0 \ max=1 T1 Cable	JD538A See Configuration Note:2, 14
HP A-MSR 2-port E1/Fractional E1 (75ohm) SIC Module • min=0 \ max=1 2E1 Cable	JF842A See Configuration Note:2, 10
HP A-MSR 1-port Enhanced Sync/Async Serial SIC Module • min=0 \ max=1 Serial Port Cable	JD557A See Configuration Note:1, 11
HP A-MSR 1-port ISDN-S/T SIC Module	JD571A See Configuration Note:2
HP A-MSR 8-port Async Serial SIC Module • Must select 1 8AS Communication Cable (min=1 \ max=1 cable)	JF281A See Configuration Note:2, 12
HP 802.11b/g/n Wireless AP SIC Module	JF819A See Configuration Note:1
HP MSR 802.11b/g/n Wless AP SIC Mod (NA)	JG211A See Configuration Note:1
HP A-MSR 16-port Async Serial SIC Module • Must select 4 HP X260 mini D-28/4-RJ45 0.3m Rtr Cables (min=4 \ max=4 cables)	JG186A See Configuration Note:2, 13
HP A-MSR HSPA/WCDMA SIC Module	JG187A See Configuration Note:1
HP A-MSR 1-port ADSL over POTS SIC Mod	JD537A

Configuration

	See Configuration Note:1
HP MSR 1-p ADSL over ISDN BRI U SIC Mod	JG056B
	See Configuration Note:1
HP A-MSR 1-p 8-wire G.SHDSL DSIC Module	JG191A
	See Configuration Note:3

Configuration Rules:

Note 1	These Modules can install directly to the Routers (JG732A) min=0\ max=2 per enclosure	
Note 2	These Modules can install directly to the Routers (JG732A) min=0\ max=3 per enclosure	
Note 3	These Modules can install directly to the Routers (JG732A) min=0\ max=1 per enclosure (This Module takes up two slots, and is installed in Slots 2 + 3) min=0\ max=1 per enclosure (This Module takes up two slots, and is installed in Slots 1 + 2)	
Note 5	The following Transceivers install into this Module:	
	HP X115 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
Note 6	The following Transceivers install into this Module:	
	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 BX 10-U Transceiver	JD098B
	HP X120 1G SFP LC BX 10-D Transceiver	JD099B
	HP X120 1G SFP LC LH100 Transceiver	JD103A
Note 7	The following E1 Cables install into this Module:	
	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
Note 10	The following 2E1 Cables install into this Module:	
	HP X260 2E1 BNC 3m Router Cable	JD643A

Configuration

Note 11	The following Cables install into this Module:	
	HP X260 RS449 3m DCE Serial Port Cable	JF826A
	HP X260 RS449 3m DTE Serial Port Cable	JF825A
	HP X200 X.21 DCE 3m Serial Port Cable	JD529A
	HP X200 V.24 DTE 3m Serial Port Cable	JD519A
	HP X200 V.35 DTE 3m Serial Port Cable	JD523A
	HP X260 RS530 3m DTE Serial Port Cable	JF827A
	HP X200 V.35 DCE 3m Serial Port Cable	JD525A
	HP X260 RS530 3m DCE Serial Port Cable	JF828A
	HP X200 V.24 DCE 3m Serial Port Cable	JD521A
	HP X200 X.21 DTE 3m Serial Port Cable	JD527A
Note 12	The following Cables install into this Module:	
	HP X260 SIC-8AS RJ45 0.28m Router Cable	JD642A
Note 13	If this module is selected Then 4 - JG263A HP X260 mini D-28/4-RJ45 0.3m Rtr Cable are required to be on the same order.	
Note 14	The following T1 Cables install into this Module:	
	HP X260 T1 Router Cable	JD518A

Transceivers

SFP Transceivers

HP X115 100M SFP LC FX Transceiver	JD102B
HP X110 100M SFP LC LH40 Transceiver	JD120B
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 X120 1G SFP LC LH40 1550nm XCVR	JD062A
HP X110 100M SFP LC LH40 Transceiver	JD090A
HP X125 1G SFP LC LH40 1310nm XCVR	JD061A
HP X125 1G SFP LC LH70 Transceiver	JD063B
HP X120 1G SFP LC BX 10-D Transceiver	JD099B
HP X120 1G SFP LC BX 10-U Transceiver	JD103A
HP X120 1G SFP LC LH100 Transceiver	

Internal Power Supplies

Internal Power Supplies included

Cables

Configuration

HP X260 mini D-28/4-RJ45 0.3m Rtr Cable	JG263A
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 (2) BNC 75 ohm 3m Rtr 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 T1 Router Cable	JD518A
HP X260 2E1 BNC 3m Router Cable	JD643A
HP X260 SIC-8AS RJ45 0.28m Router Cable	JD642A

Configuration Rules:

Remarks	The following cable is used for RJ45 BNC Conversion	
	HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A

Technical Specifications

HP MSR1003-8 AC Router (JG732A)		
I/O ports and slots	2 RJ-45 autosensing 10/100/1000 WAN ports 8 RJ-45 autosensing 10/100/1000 LAN ports	
Additional ports and slots	1 USB 2.0 1 RJ-45 console port to access limited CLI port	
Physical characteristics	**Dimensions**	14.17(w) x 11.81(d) x 1.65(h) in (36 x 30 x 4.2 cm)
	Weight	10.69 lb (4.85 kg) shipping weight
Memory and processor	ATOM @ 4 GHz, 512 MB DDR3 DIMM; storage: Flash is NAND, 256 MB compact flash	
Mounting	Desktop or can be mounted in a EIA standard 19-inch telco rack when used with the rack-mount kit in the package.	
Performance	**IPv6 Ready Certified**	
	Throughput	500 Kpps
	Routing/Switching capacity	160 Mb/s
	Routing table size	1000 entries (IPv4)
	Forwarding table size	1000 entries (IPv4)
Environment	**Operating temperature**	32°F to 113°F (0°C to 45°C)
	Nonoperating/Storage relative humidity	45% to 98%, noncondensing
	Altitude	up to 16,404 ft (5 km)
Electrical characteristics	**AC Voltage**	100 - 240 VAC
	Maximum power rating	30 W
	Frequency	50/60 Hz
	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.
Emissions	EN 55022 Class B; ICES-003 Class B; ANSI C63.4 2003; ETSI EN 300 386 V1.3.3; 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; EN 55024:1998+ A1:2001 + A2:2003; EN 61000-4-11:2004; EN 61000-4-8:2001; AS/NZS CISPR 22 Class B; FCC (CFR 47, Part 15) Class B	
Telecom	FCC part 68; CS-03	
Management	IMC - Intelligent Management Center; command-line interface; Web browser; out-of-band management (serial RS-232C); out-of-band management (DB-9 serial port console); SNMP Manager; Telnet; RMON1; FTP; IEEE 802.3 Ethernet MIB	
Notes	The HP 3G Wireless GSM/WCDMA WAN SIC Module (JF820A) is not approved for use in the same chassis as a Wi-Fi interface (IEEE 802.11b/g, 802.11b/g/n, etc.) in the European Union.	
Services	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	**BGP**	

Technical Specifications

(applies to all products in series)

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 1997 BGP Communities Attribute
RFC 1998 PPP Gandalf FZA Compression Protocol
RFC 2385 BGP Session Protection via TCP MD5
RFC 2439 BGP Route Flap Damping

Denial of service protection
CPU DoS Protection
Rate Limiting by ACLs

Device management
RFC 1305 NTPv3
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0
RFC 2452 MIB for TCP6
RFC 2454 MIB for UDP6

General protocols
RFIEEE 802.1D MAC Bridges
IEEE 802.1p Priority
IEEE 802.1Q VLANs
IEEE 802.1s Multiple Spanning Trees
IEEE 802.1w Rapid Reconfiguration of Spanning Tree
RFC 768 UDP
RFC 783 TFTP Protocol (revision 2)
RFC 791 IP
RFC 792 ICMP
RFC 793 TCP
RFC 826 ARP
RFC 854 TELNET
RFC 855 Telnet Option Specification
RFC 856 TELNET
RFC 858 Telnet Suppress Go Ahead Option
RFC 894 IP over Ethernet
RFC 925 Multi-LAN Address Resolution
RFC 950 Internet Standard Subnetting Procedure
RFC 959 File Transfer Protocol (FTP)
RFC 1006 ISO transport services on top of the TCP: Version 3
RFC 1027 Proxy ARP
RFC 1034 Domain Concepts and Facilities
RFC 1035 Domain Implementation and Specification
RFC 1042 IP Datagrams
RFC 1058 RIPv1
RFC 1071 Computing the Internet Checksum
RFC 1091 Telnet Terminal-Type Option
RFC 1122 Host Requirements
RFC 1141 Incremental updating of the Internet checksum

RFC 1142 OSI IS-IS Intra-domain Routing Protocol
RFC 1144 Compressing TCP/IP headers for low-speed serial links
RFC 1195 OSI ISIS for IP and Dual Environments
RFC 1256 ICMP Router Discovery Protocol (IRDP)
RFC 1293 Inverse Address Resolution Protocol
RFC 1315 Management Information Base for Frame Relay DTEs
RFC 1332 The PPP Internet Protocol Control Protocol (IPCP)
RFC 1333 PPP Link Quality Monitoring
RFC 1334 PPP Authentication Protocols (PAP)
RFC 1349 Type of Service
RFC 1350 TFTP Protocol (revision 2)
RFC 1377 The PPP OSI Network Layer Control Protocol (OSINLCP)
RFC 1381 SNMP MIB Extension for X.25 LAPB
RFC 1471 The Definitions of Managed Objects for the Link Control Protocol of the Point-to-Point Protocol
RFC 1472 The Definitions of Managed Objects for the Security Protocols of the Point-to-Point Protocol
RFC 1490 Multiprotocol Interconnect over Frame Relay
RFC 1519 CIDR
RFC 1534 DHCP/BOOTP Interoperation
RFC 1542 Clarifications and Extensions for the Bootstrap Protocol
RFC 1552 The PPP Internetworking Packet Exchange Control Protocol (IPXCP)
RFC 1577 Classical IP and ARP over ATM
RFC 1613 Cisco Systems X.25 over TCP (XOT)
RFC 1624 Incremental Internet Checksum
RFC 1631 NAT
RFC 1638 PPP Bridging Control Protocol (BCP)
RFC 1661 The Point-to-Point Protocol (PPP)
RFC 1662 PPP in HDLC-like Framing
RFC 1695 Definitions of Managed Objects for ATM Management Version 8.0 using SMIv2
RFC 1701 Generic Routing Encapsulation
RFC 1702 Generic Routing Encapsulation over IPv4 networks
RFC 1721 RIP-2 Analysis
RFC 1722 RIP-2 Applicability
RFC 1723 RIP v2
RFC 1795 Data Link Switching: Switch-to-Switch Protocol AIW DLSw RIG: DLSw Closed Pages, DLSw Standard Version 1
RFC 1812 IPv4 Routing
RFC 1829 The ESP DES-CBC Transform
RFC 1877 PPP Internet Protocol Control Protocol Extensions for Name Server Addresses
RFC 1944 Benchmarking Methodology for Network Interconnect Devices
RFC 1973 PPP in Frame Relay
RFC 1974 PPP Stac LZS Compression Protocol
RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 PPP Challenge Handshake Authentication Protocol (CHAP)
RFC 2091 Trigger RIP
RFC 2131 DHCP
RFC 2132 DHCP Options and BOOTP Vendor Extensions
RFC 2166 APPN Implementer's Workshop Closed Pages Document DLSw v2.0 Enhancements
RFC 2205 Resource ReSerVation Protocol (RSVP) - Version 1 Functional Specification
RFC 2280 Routing Policy Specification Language (RPSL)
RFC 2284 EAP over LAN
RFC 2338 VRRP

RFC 2364 PPP Over AAL5
RFC 2374 An Aggregatable Global Unicast Address Format
RFC 2451 The ESP CBC-Mode Cipher Algorithms
RFC 2453 RIPv2
RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols
RFC 2511 Internet X.509 Certificate Request Message Format
RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)
RFC 2644 Directed Broadcast Control
RFC 2661 L2TP
RFC 2663 NAT Terminology and Considerations
RFC 2684 Multiprotocol Encapsulation over ATM Adaptation Layer 5
RFC 2694 DNS extensions to Network Address Translators (DNS_ALG)
RFC 2702 Requirements for Traffic Engineering Over MPLS
RFC 2747 RSVP Cryptographic Authentication
RFC 2763 Dynamic Name-to-System ID mapping support
RFC 2765 Stateless IP/ICMP Translation Algorithm (SIIT)
RFC 2766 Network Address Translation - Protocol Translation (NAT-PT)
RFC 2784 Generic Routing Encapsulation (GRE)
RFC 2787 Definitions of Managed Objects for VRRP
RFC 2961 RSVP Refresh Overhead Reduction Extensions
RFC 2966 Domain-wide Prefix Distribution with Two-Level IS-IS
RFC 2973 IS-IS Mesh Groups
RFC 2993 Architectural Implications of NAT
RFC 3022 Traditional IP Network Address Translator (Traditional NAT)
RFC 3027 Protocol Complications with the IP Network Address Translator
RFC 3031 Multiprotocol Label Switching Architecture
RFC 3032 MPLS Label Stack Encoding
RFC 3036 LDP Specification
RFC 3046 DHCP Relay Agent Information Option
RFC 3063 MPLS Loop Prevention Mechanism
RFC 3065 Support AS confederation
RFC 3137 OSPF Stub Router Advertisement
RFC 3209 RSVP-TE Extensions to RSVP for LSP Tunnels
RFC 3210 Applicability Statement for Extensions to RSVP for LSP-Tunnels
RFC 3212 Constraint-Based LSP setup using LDP (CR-LDP)
RFC 3214 LSP Modification Using CR-LDP
RFC 3215 LDP State Machine
RFC 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 3392 Support BGP capabilities advertisement
RFC 3479 Fault Tolerance for the Label Distribution Protocol (LDP)
RFC 3564 Requirements for Support of Differentiated Services-aware MPLS Traffic Engineering
RFC 3602 The AES-CBC Cipher Algorithm and Its Use with IPSec
RFC 3706 A Traffic-Based Method of Detecting Dead Internet Key Exchange (IKE) Peers
RFC 3784 ISIS TE support
RFC 3786 Extending the Number of IS-IS LSP Fragments Beyond the 256 Limit
RFC 3811 Definitions of Textual Conventions (TCs) for Multiprotocol Label Switching (MPLS) Management
RFC 3812 Multiprotocol Label Switching (MPLS) Traffic Engineering (TE) Management Information Base

(MIB)
RFC 3847 Restart signaling for IS-IS
FRF.1.2 PVC User-to-Network Interface (UNI) Implementation Agreement - July 2000
FRF.11.1 Voice over Frame Relay Implementation Agreement - May 1997 - Annex J added March 1999
FRF.12 Frame Relay Fragmentation Implementation Agreement - December 1997
FRF.16.1 Multilink Frame Relay UNI/NNI Implementation Agreement - May 2002
FRF.2.2 Frame Relay Network-to-Network Interface (NNI) Implementation Agreement - March 2002
FRF.20 Frame Relay IP Header Compression Implementation Agreement - June 2001
FRF.3.2 Frame Relay Multiprotocol Encapsulation Implementation Agreement - April 2000
FRF.7 Frame Relay PVC Multicast Service and Protocol Description - October 1994
FRF.9 Data Compression Over Frame Relay Implementation Agreement - January 1996

IP multicast
RFC 1112 IGMP
RFC 2236 IGMPv2
RFC 2283 Multiprotocol Extensions for BGP-4
RFC 2362 PIM Sparse Mode
RFC 2365 Administratively Scoped IP Multicast
RFC 2710 Multicast Listener Discovery (MLD) for IPv6
RFC 2934 Protocol Independent Multicast MIB for IPv4
RFC 3376 IGMPv3

IPv6
RFC 1981 IPv6 Path MTU Discovery
RFC 2080 RIPng for IPv6
RFC 2292 Advanced Sockets API for IPv6
RFC 2373 IPv6 Addressing Architecture
RFC 2460 IPv6 Specification
RFC 2461 IPv6 Neighbor Discovery
RFC 2462 IPv6 Stateless Address Auto-configuration
RFC 2463 ICMPv6
RFC 2464 Transmission of IPv6 over Ethernet Networks
RFC 2472 IP Version 6 over PPP
RFC 2473 Generic Packet Tunneling in IPv6
RFC 2475 IPv6 DiffServ Architecture
RFC 2529 Transmission of IPv6 Packets over IPv4
RFC 2545 Use of MP-BGP-4 for IPv6
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2740 OSPFv3 for IPv6
RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
RFC 3513 IPv6 Addressing Architecture
RFC 3596 DNS Extension for IPv6

MIBs
RFC 1213 MIB II
RFC 1229 Interface MIB Extensions
RFC 1286 Bridge MIB
RFC 1493 Bridge MIB
RFC 1573 SNMP MIB II
RFC 1724 RIPv2 MIB
RFC 1757 Remote Network Monitoring MIB
RFC 1850 OSPFv2 MIB

RFC 2011 SNMPv2 MIB for IP
RFC 2012 SNMPv2 MIB for TCP
RFC 2013 SNMPv2 MIB for UDP
RFC 2233 Interfaces MIB
RFC 2454 IPV6-UDP-MIB
RFC 2465 IPv6 MIB
RFC 2466 ICMPv6 MIB
RFC 2618 RADIUS Client MIB
RFC 2620 RADIUS Accounting MIB
RFC 2674 802.1p and IEEE 802.1Q Bridge MIB
RFC 2737 Entity MIB (Version 2)
RFC 2863 The Interfaces Group MIB
RFC 2933 IGMP MIB
RFC 3813 MPLS LSR MIB

Network management

IEEE 802.1D (STP)
RFC 1155 Structure of Management Information
RFC 1157 SNMPv1
RFC 1905 SNMPv2 Protocol Operations
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

OSPF

RFC 1245 OSPF protocol analysis
RFC 1246 Experience with OSPF
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
RFC 3101 OSPF NSSA

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 3168 The Addition of Explicit Congestion Notification (ECN) to IP

Security

IEEE 802.1X Port Based Network Access Control
RFC 1321 The MD5 Message-Digest Algorithm
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 Keyed-Hashing for Message Authentication
RFC 2138 RADIUS Authentication
RFC 2209 RSVP-Message Processing
RFC 2246 Transport Layer Security (TLS)
RFC 2716 PPP EAP TLS Authentication Protocol

RFC 2865 RADIUS Authentication
RFC 2866 RADIUS Accounting
RFC 3567 Intermediate System (IS) to IS Cryptographic Authentication

VPN

RFC 2403 - HMAC-MD5-96
RFC 2404 - HMAC-SHA1-96
RFC 2405 - DES-CBC Cipher algorithm
RFC 2547 BGP/MPLS VPNs
RFC 2796 BGP Route Reflection - An Alternative to Full Mesh IBGP
RFC 2842 Capabilities Advertisement with BGP-4
RFC 2858 Multiprotocol Extensions for BGP-4
RFC 2918 Route Refresh Capability for BGP-4
RFC 3107 Carrying Label Information in BGP-4

IPSec

RFC 1828 IP Authentication using Keyed MD5
RFC 2401 IP Security Architecture
RFC 2402 IP Authentication Header
RFC 2406 IP Encapsulating Security Payload
RFC 2407 - Domain of interpretation
RFC 2410 - The NULL Encryption Algorithm and its use with IPSec
RFC 2411 IP Security Document Roadmap
RFC 2412 – OAKLEY
RFC 2865 - Remote Authentication Dial In User Service (RADIUS)

IKEv1

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

Notes

The HP 3G Wireless GSM/WCDMA WAN SIC Module (JF820A) is not approved for use in the same chassis as a Wi-Fi interface (IEEE 802.11b/g, 802.11b/g/n, etc.) in the European Union.

HP MSR1000 Router Series accessories

Transceivers	
HP X115 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 2 BNC 75 ohm 40m Router Cable	JD516A
HP X260 E1 (2) BNC 75 ohm 3m Router Cable	JD175A
HP X260 E1 BNC 20m Router Cable	JD514A
HP X260 E1 RJ45 BNC 75-120 ohm Conversion Router Cable	JD511A
HP X260 2E1 BNC 3m Router Cable	JD643A
HP X260 T1 Voice Router Cable	JD535A
HP X260 T1 Router Cable	JD518A
HP X260 SIC-8AS RJ45 0.28m Router Cable	JD642A
HP X260 E1 RJ45 20m Router Cable	JD517A
HP X260 mini D-28 to 4-RJ45 0.3m Router Cable	JG263A
Mounting Kit	
HP 3100/4210-16/-8 PoE Rack Mount Kit	JD323A
Router Modules	
HP MSR 9-port 10/100 DSIC Module	JD574B
HP MSR 4-port 10/100 SIC Module	JD573B
HP MSR 1-port 10/100/1000 SIC Module	JD572A
HP MSR 1-port 10/100 SIC Module	JD545B

Accessories

HP 1-port 100Mbt SFP SIC Router Module	JF280A
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 2 FXS +1 FXO Voice Interface SIC Module	JD632A
HP 2-port ISDN-S/T Voice Interface SIC Module	JF821A
HP MSR 1-port ADSL2+ SIC Module	JD537A
HP MSR 1-port ADSL over ISDN BRI U SIC Module	JG056B
HP MSR 1-port 8-wire G.SHDSL (RJ45) DSIC Module	JG191A
HP MSR 1-port Fractional E1 SIC Module	JD634B
HP MSR 2-port Fractional E1 SIC Module	JF842A
HP MSR 1-port Fractional SIC Module	JD538A
HP MSR 1-port Enhanced Serial SIC Module	JD557A
HP MSR 1-port ISDN-S/T SIC Module	JD571A
HP MSR 16-port Async Serial SIC Module	JG186A
HP 8-port Asynchronous Serial Interface SIC Router Module	JF281A
HP 802.11b/g/n Wireless AP SIC Module	JF819A
HP MSR 802.11b/g/n Wireless Access Point SIC Module (NA)	JG211A
HP MSR 1-port E1/CE1/PRI SIC Module	JF253B
HP MSR 4-port FXS / 1-port FXO DSIC Module	JG189A
HP MSR HSPA/WCDMA SIC Module	JG187A

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