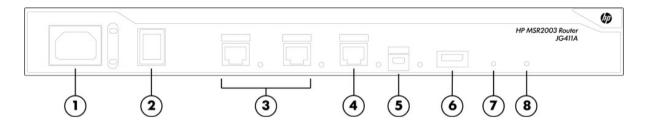# QuickSpecs

## Overview

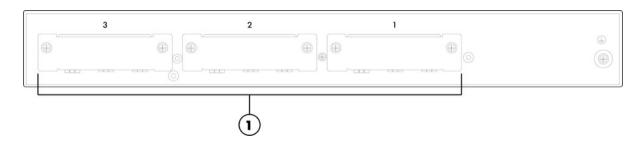### HPE MSR2000 Router Series



**HP MSR2003 AC Router Front View**

1. AC Power input
2. Power Switch
3. Fixed 10M/100M/1000M RJ45 Ports
4. CON/AUX port

5. USB console port
6. 1 USB 2.0 Port for 3G modem and USB disk
7. System Activity LED
8. Power LED



**HP MSR2003 AC Router Rear View**

1. SIC module slots / 1 DSIC (Slots 1 + 2)

### Models

| | |
|---|---|
| HP MSR2003 AC Router | JG411A |
| HP MSR2004-24 AC Router | JG734A |
| HP MSR2004-48 Router | JG735A |

### Key features

- Up to 1 Mpps forwarding; converged high-performance routing, switching, security, voice, mobility
- Embedded security features with hardware-based encryption, firewall, NAT, and VPNs
- Industry-leading breadth of LAN and WAN connectivity, up to 24/48 GE switching ports integrated
- No additional licensing complexity; no cost for advanced features
- Zero-touch solution, with single pane-of-glass management

### Product overview

The HPE MSR2000 Router Series, the next generation of router from Hewlett Packard Enterprise, is a component of the Hewlett Packard Enterprise FlexBranch solution, which is a part of the comprehensive Hewlett Packard Enterprise FlexNetwork architecture. These routers feature a modular design that delivers unmatched application services for small- to medium-sized

## Overview

branch offices. This gives your IT personnel the benefit of reduced complexity, and simplified configuration, deployment, and management.

The MSR2000 series provides an agile, flexible network infrastructure that enables you to quickly adapt to your 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 1 Mpps (672 Mb/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 400 Mb/s with a maximum of 1,000 IPSec VPN tunnels

### Product architecture

- **SDN/OpenFlow**
  OpenFlow is the communications interface defined between the control and forwarding layers of a SDN (Software-Defined Networking ) 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 multi-service platform**
  provides WAN router, Ethernet switch, wireless LAN, 3G/4G WAN, firewall, VPN, and SIP/voice gateway all in one device
- **Advanced hardware architecture**
  supports multicore processors, gigabit switching, and PCIE bus
- **New operation system version**
  ships with new Comware v7 operating system delivering the latest in virtualization and routing

### Connectivity

- **VXLAN (Virtual eXtensible LAN)**
  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)**
  Virtual Private LAN Service (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.
- **NEMO (Network Mobility)**
  Network mobility (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 three interface module slots and up to 15 Fast Ethernet ports
- **Multiple WAN interfaces**
  provides a traditional link with E1, T1, Serial, and ISDN links; high-density Ethernet access with WAN Gigabit Ethernet and LAN 4- and 9-port Fast Ethernet; and mobility access with 3G SIC module and 3G/4G USB modems
- **Packet storm protection**

## Overview

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 available

- **USB interface**
  uses USB memory disk to download and upload configuration and 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 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 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**

## Overview

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**

- **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 andIPv6 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; 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**

# Overview

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)

- **Nested QoS**
  provides a built-in QoS engine that supports nested QoS (Same to hierarchical QoS) and can implement a hierarchical scheduling mechanism based on ports, user groups, users, and user services.
- **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**
  supports traffic shaping, MPLS QoS, and MP QoS/LFI

## Security

- **Enhanced stateful firewall**
  Application layer protocol inspection, Transport layer protocol inspection, ICMP error message check, andTCP 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 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

# Overview

- **RADIUS**
  eases security access administration by utilizing 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
- **Attack Detection and Protection**

## 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, URL 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 Fabric (IRF)**
  Intelligent Resilient Fabric (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; 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

# Overview

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**

- **HPE 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

# Overview

## 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

## Investment protection

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

## Warranty and support

- **1-year Warranty 2.0**
  See **http://www.hpe.com/networking/warrantysummary** for warranty and support information included with your product purchase.
- **Software releases**
  to find software for your product, refer to **http://www.hpe.com/networking/support** ; for details on the software releases available with your product purchase, refer to **http://www.hpe.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 MSR2003 AC Router                                                              JG411A
- 2 Fixed 10M/100M/1000M RJ45 Ports                                   See Configuration
- 3 - SIC module slots / 1 DSIC                                       **NOTE:**1, 2, 3
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- AC Power Supply included
- 1U - Height

PDU CABLE NA/MEX/TW/JP                                                            JG411A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP)

PDU CABLE ROW                                                                     JG411A#B2C
- C15 PDU Jumper Cord (ROW)

High Volt Switch to Wall Power Cord                                               JG411A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)

HP MSR2004-24 AC Router                                                           JG734A
- 24 Fixed 10M/100M/1000M RJ45 Ports                                  See Configuration
- 3 RJ-45 autosensing 10/100/1000 WAN ports                          **NOTE:** 1, 2, 3, 5, 6
- 1 SFP port (min=0 \ max=1 SFP  Transceiver)
- 4 - SIC module slots / 0 DSIC
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- AC Power Supply included
- 1U - Height

PDU Cable NA/MEX/TW/JP                                                            JG734A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP)

# Configuration

JG734A#B2C

PDU Cable ROW
- C15 PDU Jumper Cord (ROW)


High Volt Switch to Wall Power Cord                                                                      JG734A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)


HP MSR2004-48 Router                                                                                     JG735A
- 48 Fixed 10M/100M/1000M RJ45 Ports
- 3 RJ-45 autosensing 10/100/1000 WAN ports
- 4 - SIC module slots / 0 DSIC
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- Must select min 1 Power Supply (min=1 \ max=2)
- 1U - Height


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.


Note 5            The following Transceivers install into this Router:
                  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 Router:
                  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
                  HP X120 1G SFP RJ45 T Transceiver                                     JD089B


# Box Level Integration CTO Models


**CTO Solution Sku**

# Configuration

HP MSR CTO Router Solution                                                                                JG500A
- SSP trigger sku

**Router Chassis**

HP MSR2003 AC Router                                                                                      JG411A
- 2 Fixed 10M/100M/1000M RJ45 Ports                                                          See Configuration
- 3 - SIC module slots / 1 DSIC                                                              **NOTE:**1, 2, 3, 4
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- AC Power Supply included
- 1U - Height

PDU CABLE NA/MEX/TW/JP                                                                                    JG411A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP)

PDU CABLE ROW                                                                                             JG411A#B2C
- C15 PDU Jumper Cord (ROW)

High Volt Switch to Wall Power Cord                                                                       JG411A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)

HP MSR2004-24 AC Router                                                                                   JG734A
- 24 Fixed 10M/100M/1000M RJ45 Ports                                                         See Configuration
- 3 RJ-45 autosensing 10/100/1000 WAN ports                                                  **NOTE:** 1, 2, 3, 5, 6
- 1 SFP port (min=0 \ max=1 SFP  Transceiver)
- 4 - SIC module slots / 0 DSIC
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- AC Power Supply included
- 1U - Height

PDU Cable NA/MEX/TW/JP                                                                                    JG734A#B2B
- C15 PDU Jumper Cord (NA/MEX/TW/JP)

                                                                                                         JG734A#B2C
PDU Cable ROW

## Configuration

- C15 PDU Jumper Cord (ROW)


High Volt Switch to Wall Power Cord                                                                                        JG734A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW)


HP MSR2004-48 Router                                                                                                       JG735A
- 48 Fixed 10M/100M/1000M RJ45 Ports                                                                                  See Configuration
- 3 RJ-45 autosensing 10/100/1000 WAN ports                                                                          **NOTE:** 1, 4
- 4 - SIC module slots / 0 DSIC
- 1 USB 2.0 Port for 3G modem and USB disk
- 1 CON/AUX port and 1 USB console port
- 0 - VCPM slots
- 0 - VPM slot
- 1GB DDR3 SDRAM included (default=1GB \ max=1GB DDR SDRAM)
- Must select min 1 Power Supply (min=1 \ max=2)
- 1U - Height


Configuration Rules:


Note 1          If this Switch is selected integrated to the CTO Switch Solution, Then a Minimum of 1 factory integrated
                accessory must be ordered and integrated to CTO chassis. See Menu below, option must have a #0D1 to be
                integrated to the CTO Chassis.


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


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


Note 4          If the Router Chassis is to be Box Level Factory Integrated (CTO), Then the #0D1 is required on the Router
                Chassis and integrated to the JG500A - HP MSR CTO Enablement. (Min 1/Max 1 Router per SSP)


Note 5          The following Transceivers install into this Router:
                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 Router:
                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
                HP X120 1G SFP RJ45 T Transceiver                                                                    JD089B

# Configuration

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)

## Internal Power Supplies

Internal Power Supplies included

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

## SIC Modules

System (std 0 // max 4, 3, 2 or 1) User Selection (min 0 // max 4, 3, 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, 15

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, 15

HP A-MSR 1-port 100Base-X SIC Module                                                                   JF280A
  - min=0 \ max=1 SFP Transceivers                                                                     See Configuration
                                                                                                       **NOTE:**1, 5, 15

HP A-MSR 2-port FXO SIC Module                                                                         JD558A
                                                                                                       See Configuration
                                                                                                       **NOTE:**2, 16

HP A-MSR 1-port FXO SIC Module                                                                         JD559A
                                                                                                       See Configuration
                                                                                                       **NOTE:**2, 16

HP A-MSR 2-port FXS SIC Module                                                                         JD560A
                                                                                                       See Configuration
                                                                                                       **NOTE:**2, 16

# Configuration

| | |
|---|---|
| HP A-MSR 1-port FXS SIC Module | JD561A<br>See Configuration<br>**NOTE:**2, 16 |
| HP A-MSR 4-port FXS/1-port FXO DSIC Mod | JG189A<br>See Configuration<br>**NOTE:**3 |
| HP A-MSR 2-port ISDN-S/T Voice SIC Module | JF821A<br>See Configuration<br>**NOTE:**2, 16 |
| HP A-MSR 2-port FXS/1-port FXO SIC Module | JD632A<br>See Configuration<br>**NOTE:**2, 16 |
| HP A-MSR 1-port E1/Fractional E1 (75ohm) SIC Module<br>• min=0 \ max=1 E1or 2E1 Cable | JD634B<br>See Configuration<br>**NOTE:**2, 7, 10, 16 |
| HP A-MSR 1-port T1/Fractional T1 SIC Module | JD538A<br>See Configuration<br>**NOTE:**2, 14, 16 |
| HP A-MSR 2-port E1/Fractional E1 (75ohm) SIC Module<br>• min=0 \ max=1 2E1 Cable | JF842A<br>See Configuration<br>**NOTE:**2, 10, 16 |
| HP A-MSR 1-port Enhanced Sync/Async Serial SIC Module<br>• min=0 \ max=1 Serial Port Cable | JD557A<br>See Configuration<br>**NOTE:**1, 11, 16 |
| HP A-MSR 1-port ISDN-S/T SIC Module | JD571A<br>See Configuration<br>**NOTE:**2, 16 |
| HP A-MSR 8-port Async Serial SIC Module<br>• Must select 1 8AS Communication Cable | JF281A<br>See Configuration<br>**NOTE:**2, 12, 16 |
| HP A-MSR 16-port Async Serial SIC Module | JG186A<br>See Configuration<br>**NOTE:**2, 13, 16 |
| HP A-MSR HSPA/WCDMA SIC Module | JG187A |

# Configuration

|  |  |
|---|---|
|  | See Configuration **NOTE:**1, 15 |
| HP MSR HSPA+/WCDMA SIC Module | JG929A See Configuration **NOTE:**1, 15 |
| HP A-MSR 1-port ADSL over POTS SIC Mod | JD537A See Configuration **NOTE:**1, 15 |
| HP MSR 1-p ADSL over ISDN BRI U SIC Mod | JG056B See Configuration **NOTE:**1, 15 |
| HP A-MSR 1-p 8-wire G.SHDSL DSIC Module | JG191A See Configuration **NOTE:** 3 |
| HP MSR 1p E1/CE1/PRI SIC Mod<br>• min=0 \ max=1 E1 Cable | JG604A See Configuration **NOTE:**2,7, 16 |
| HP MSR 4G LTE SIC Mod for Verizon | JG742A See Configuration **NOTE:**1, 8, 15 |
| HP MSR 4G LTE SIC Mod for ATT | JG743A See Configuration **NOTE:**1, 8, 15 |
| HP MSR 4G LTE SIC Mod for Global | JG744A See Configuration **NOTE:**1, 8, 15 |
| HP MSR 2p Enh Sync/Async Srl SIC Mod<br>• min=0 \ max=2 Serial Port Cable | JG736A See Configuration **NOTE:** 1, 11, 16 |
| HP MSR 4p Enh Sync/Async Srl SIC Mod<br>• min=0 \ max=4 Serial Port Cable | JG737A See Configuration **NOTE:** 1, 11, 16 |
| HP MSR 1p GbE Combo SIC Mod<br>• min=0 \ max=1 SFP Transceiver | JG738A See Configuration **NOTE:** 6, 17,18 |

# Configuration

HP MSR 4p Gig-T Switch SIC Mod                                                                JG739A
                                                                                     See Configuration
                                                                                     **NOTE:**17, 18


HP MSR 4p Gig-T PoE Switch SIC Mod                                                            JG740A
                                                                                     See Configuration
                                                                                     **NOTE:**17, 18


Configuration Rules:


Note 1          These Modules can install directly to the Routers (JG411A, JG866A)
                min=0\ max=2 per enclosure (only supported in Slots 2 and 3)


Note 2          These Modules can install directly to the Routers (JG411A, JG866A)
                min=0\ max=3 per enclosure


Note 3          These Modules can install directly to the Routers (JG411A, JG866A)
                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
                HP X120 1G SFP RJ45 T Transceiver                                             JD089B

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 8          The following Antenna Cables install into this Module:
                HP MSR 3G RF 2.8m Antenna Cable                                               JG522A
                HP MSR 3G RF 6m Antenna Cable                                                 JG666A
                HP MSR 3G RF 15m Antenna Cable                                                JG667A

# Configuration

| | | |
|---|---|---|
| Note 10 | The following 2E1 Cables install into this Module: | |
| | HP X260 2E1 BNC 3m Router Cable | JD643A |

| | | |
|---|---|---|
| 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 |

| | |
|---|---|
| Note 15 | These Modules can install directly to the Routers (JG734A, JG735A) min=0\ max=2 per enclosure (only supported in Slots 2 and 3) |

| | |
|---|---|
| Note 16 | These Modules can install directly to the Routers (JG734A, JG735A) min=0\ max=4 per enclosure |

| | |
|---|---|
| Note 17 | These Modules can install directly to the Routers (JG734A, JG735A) min=0\ max=1 per enclosure (only supported in Slot 2) |

| | |
|---|---|
| Note 18 | These Modules can install directly to the Routers (JG411A, JG866A) min=0\ max=1 per enclosure (only supported in Slot 2) |

| | |
|---|---|
| Remarks: | PoE Module JG740A can be used as non-POE module on chassis without PoE power supplies. |

# Transceivers

### SFP Transceivers

| | |
|---|---|
| HP X115 100M SFP LC FX Transceiver | JD102B |

| | |
|---|---|
| HP X110 100M SFP LC LH40 Transceiver | JD120B |

# Configuration

| | |
|---|---|
| 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 | JD098B |
| HP X120 1G SFP LC LH100 Transceiver | JD103A |
| HP X120 1G SFP RJ45 T Transceiver | JD089B |

# Internal Power Supplies

HP X351 150W DC Power Supply                                                                 JG746A
                                                                                                                              See Configuration
                                                                                                                              **NOTE:** 3

HP X351 150W AC Power Supply                                                                 JG745A
                                                                                                                              See Configuration
                                                                                                                              **NOTE:**1,2,3

PDU Cable NA/MX/TW/JP                                                                          JG745A#B2B
- C15 PDU Jumper Cord (NA/MX/TW/JP)

PDU Cable ROW                                                                                         JG745A#B2C
- C15 PDU Jumper Cord (ROW)

High Volt Switch/Router to Wall Power Cord                                       JG745A#B2E
- NEMA L6-20P Cord (NA/MEX/JP/TW0029

Configuration Rules:

Note 1          Localization required on orders without #B2B, #B2C or #B2E options.

# Configuration

Note 2              If #B2E is selected Then replace Localized option with #B2E for power supply and with #B2E for router. (Offered only in NA, Mexico, Taiwan, and  Japan)

Note 3              If 2 power supplies are selected they must be the same Sku number.

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)

# Cables

| | |
|---|---|
| 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 |

## Configuration

HP X260 T1 Router Cable                                                                                                       JD518A

HP X260 T1 Voice Router Cable                                                                                                 JD535A

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

                 The following Connector is used to extend E1/T1 Cables:
                 HP X260 T1 Voice Router Cable                                                                                JD535A

## Router Enclosure Options

### Antenna Cables

System (std 0 // max 2) User Selection (min 0 // max 2) per SIC Module (JG742A, JG743A, JG744A)

HP MSR 3G RF 2.8m Antenna Cable                                                                                              JG522A

HP MSR 3G RF 6m Antenna Cable                                                                                                JG666A

HP MSR 3G RF 15m Antenna Cable                                                                                               JG667A

### Opacity Shield Kit

System (std 0 // max 1) User Selection (min 0 // max 1)

HP MSR2003 Opcty Shld Kit                                                                                                    JG598A
**NOTE:**                                                                                                        See Configuration
Supported on the HP MSR2003/MSR2004 Routers (JG411A, JG866A,JG734A, JG735A).                                          **NOTE:**1

Configuration notes

Note 1          If selected with a CTO Router Solution, Quantity 1 of JG585A#B01 must also be ordered.

## Tamper Evidence Labels

System (std 0 // max 1) User Selection (min 0 // max 1)

# Configuration

HP 12mm x 60mm Tmpr-Evidence (30) Lbl                                                                JG585A

**NOTE:**                                                                                                                    See Configuration

Supported on the HP MSR2003/MSR2004 Routers (JG411A, JG866A, JG734A, JG735A).                    **NOTE:**1

Configuration notes

Note 1                    If selected with a CTO Router Solution, Quantity 1 of JG598A#B01 must also be ordered.

Remarks              Each JG598A would use 1 of JG585A.

# Technical Specifications

**HP MSR2003 AC Router** (JG411A)

| | | |
|---|---|---|
| **I/O ports and slots** | 3 SIC slots or 1 DSIC slot and 1 SIC slot | |
| | 2 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T) | |
| **AP characteristics** Radios (via optional modules) | 3G, 4G LTE | |
| **Physical characteristics** | **Dimensions** | 14.17(w) x 11.81(d) x 1.74(h) in (36 x 30 x 4.42 cm) (1U height) |
| | **Weight** | 7.61 lb (3.45 kg) |
| **Memory and processor** | RISC @ 800 MHz, 256 MB flash capacity, 1 GB DDR3 SDRAM | |
| **Mounting and enclosure** | 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 1 Mpps (64-byte packets) |
| | **Routing table size** | 300000 entries (IPv4), 200000 entries (IPv6) |
| | **Forwarding table size** | 300000 entries (IPv4), 200000 entries (IPv6) |
| **Environment** | **Operating temperature** | 32ºF to 113ºF (0ºC to 45ºC) |
| | **Operating relative humidity** | 5% to 90%, noncondensing |
| | **Nonoperating/Storage temperature** | -40ºF to 158ºF (-40ºC to 70ºC) |
| | **Nonoperating/Storage relative humidity** | 5% to 90%, noncondensing |
| | **Altitude** | up to 16,404 ft (5 km) |
| **Electrical characteristics** | **Frequency** | 50/60 Hz |
| | **Maximum heat dissipation** | 78 BTU/hr (82.29 kJ/hr) |
| | **Voltage** | 100 - 240 VAC, rated (depending on power supply chosen) |
| | **Maximum power rating** | 54 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. |
| **Reliability** | **MTBF (years)** | 92.73 |
| **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 61000-4-11:2004; ANSI C63.4-2009; AS/NZS CISPR 22:2009; CISPR 22 Ed2.0 2008-09; EN 55022:2010; EN 61000-3-3:2008; GB 9254-2008; IEC 61000-3-2 Ed3.0 (2009-02); IEC 61000-3-3 Ed2.0 (2008-06); VCCI V-4/2012.04; CISPR 24 Ed2.0 2010-08; EN 55024:2010; EN 61000-3-2:2006+A1:2009+A2:2009 ; EN 61000-4-2:2009; EN 61000-4-29:2000; EN 61000-4-3:2006; EN 61000-4-4:2012; EN 61000-4-5:2006; EN 61000-4-6:2009; EN 61000-4-8:2010; ETSI EN 300 386 V1.6.1(2012-09); FCC 47 CFR Part 15 (latest current version); ICES-003 Issue 5; IEC 61000-4-11 Ed2.0 | |

# Technical Specifications

|  |  |
|---|---|
|  | (2004-03); IEC 61000-4-2 Ed2.0 (2008-12); IEC 61000-4-29 Ed1.0 (2000-08); IEC 61000-4-3 Ed3.2 (2010-04); IEC 61000-4-4 Ed3.0 (2012-04); IEC 61000-4-5 Ed2.0 (2005-11); IEC 61000-4-6 Ed3.0 (2008-10); IEC 61000-4-8 Ed2.0 (2009-09); VCCI V-3/2013.04 |
| **Telecom** | 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 |
| **Services** | Refer to the Hewlett Packard Enterprise website at **http://www.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. |

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**HP MSR2004-24 AC Router** (JG734A)

| | | |
|---|---|---|
| **I/O ports and slots** | | 4 SIC slots |
| | | 3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T) |
| | | 1 SFP fixed Gigabit Ethernet SFP port |
| | | 24 RJ-45 autosensing 10/100/1000 LAN ports |
| **AP characteristics** Radios (via optional modules) | | 3G, 4G LTE |
| **Physical characteristics** | **Dimensions** | 17.32(w) x 14.17(d) x 1.74(h) in (43.99 x 35.99 x 4.42 cm) (1U height) |
| | **Weight** | 15.1 lb (6.85 kg) |
| **Memory and processor** | | RISC @ 800 MHz, 1 GB DDR3 SDRAM, 256 MB flash |
| **Mounting and enclosure** | | 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 1 Mpps (64-byte packets) |
| | **Routing table size** | 200000 entries (IPv4), 200000 entries (IPv6) |
| | **Forwarding table size** | 200000 entries (IPv4), 200000 entries (IPv6) |
| **Environment** | **Operating temperature** | 32°F to 113°F (0°C to 45°C) |
| | **Operating relative humidity** | 5% to 90%, noncondensing |
| | **Nonoperating/Storage temperature** | -40°F to 158°F (-40°C to 70°C) |
| | **Nonoperating/Storage relative humidity** | 5% to 90%, noncondensing |
| | **Altitude** | up to 16,404 ft (5 km) |
| **Electrical characteristics** | **Frequency** | 50/60 Hz |
| | **Maximum heat dissipation** | 170 BTU/hr (179.35 kJ/hr) |
| | **Voltage** | 100 - 240 VAC, rated (depending on power supply chosen) |
| | **Maximum power rating** | 54 W |
| | **Notes** | Maximum power rating and maximum heat dissipation are the worst-case theoretical maximum numbers provided for planning the infrastructure |

# Technical Specifications

with fully loaded PoE (if equipped), 100% traffic, all ports plugged in, and all modules populated.

| | | |
|---|---|---|
| **Reliability** | **MTBF (years)** | 92.2 |
| **Safety** | | UL 60950-1; IEC 60950-1; EN 60950-1; CAN/CSA-C22.2 No. 60950-1; FDA 21 CFR Subchapter J; AS/NZS 60950-1; GB 4943.1 |
| **Emissions** | | VCCI Class A; EN 55022 Class A; CISPR 22 Class A; EN 55024; ICES-003 Class A; EN 300 386; CISPR 24; AS/NZS CISPR 22 Class A; EN 61000-3-2; EN 61000-3-3; FCC (CFR 47, Part 15) Class A |
| **Telecom** | | 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 |
| **Services** | | Refer to the Hewlett Packard Enterprise website at **http://www.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. |

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**HP MSR2004-48 Router** (JG735A)

| | | |
|---|---|---|
| **I/O ports and slots** | | 4 SIC slots |
| | | 3 RJ-45 1000BASE-T ports (IEEE 802.3ab Type 1000BASE-T) |
| | | 48 RJ-45 autosensing 10/100/1000 LAN ports |
| **AP characteristics**<br>Radios (via optional modules) | | 3G, 4G LTE |
| **Physical characteristics** | **Dimensions** | 17.32(w) x 15.75(d) x 1.74(h) in (43.99 x 40.01 x 4.42 cm) (1U height) |
| | **Weight** | 17.2 lb (7.8 kg) |
| **Memory and processor** | | RISC @ 800 MHz, 1 GB DDR3 SDRAM, 256 MB flash |
| **Mounting and enclosure** | | 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 1 Mpps (64-byte packets) |
| | **Routing table size** | 200000 entries (IPv4), 200000 entries (IPv6) |
| | **Forwarding table size** | 200000 entries (IPv4), 200000 entries (IPv6) |
| **Environment** | **Operating temperature** | 32°F to 113°F (0°C to 45°C) |
| | **Operating relative humidity** | 5% to 90%, noncondensing |
| | **Nonoperating/Storage temperature** | -40°F to 158°F (-40°C to 70°C) |
| | **Nonoperating/Storage relative humidity** | 5% to 90%, noncondensing |
| | **Altitude** | up to 16,404 ft (5 km) |
| **Electrical characteristics** | **Frequency** | 50/60 Hz |
| | **Maximum heat dissipation** | 499 BTU/hr (526.44 kJ/hr) |
| | **Voltage** | 100 - 240 VAC, rated<br>-48 to -60 VDC, rated |

# Technical Specifications

|  |  | (depending on power supply chosen) |
| --- | --- | --- |
|  | **Maximum power rating** | 150 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. |
| **Reliability** | **MTBF (years)** | 96.2 |
| **Safety** |  | UL 60950-1; IEC 60950-1; EN 60950-1; CAN/CSA-C22.2 No. 60950-1; FDA 21 CFR Subchapter J; AS/NZS 60950-1; GB 4943.1 |
| **Emissions** |  | VCCI Class A; EN 55022 Class A; CISPR 22 Class A; EN 55024; ICES-003 Class A; EN 300 386; CISPR 24; AS/NZS CISPR 22 Class A; EN 61000-3-2; EN 61000-3-3; FCC (CFR 47, Part 15) Class A |
| **Telecom** |  | 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 |
| **Services** |  | Refer to the Hewlett Packard Enterprise website at **http://www.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)

**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)
RFC 3417 (SNMP Transport Mappings)

**General protocols**

RFC 2385 BGP Session Protection via TCP MD5
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)

RFC 2509 IP Header Compression over PPP
RFC 2510 Internet X.509 Public Key Infrastructure Certificate Management Protocols
RFC 2516 A Method for Transmitting PPP Over Ethernet (PPPoE)
RFC 2519 A Framework for Inter-Domain Route Aggregation
RFC 2529 Transmission of IPv6 over IPv4 Domains without Explicit Tunnels
RFC 2543 SIP: Session Initiation Protocol
RFC 2548 (MS-RAS-Vendor only)
RFC 2553 Basic Socket Interface Extensions for IPv6
RFC 2570 Introduction to Version 3 of the Internet-standard Network Management Framework
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RFC 2013 SNMPv2 MIB for UDP
RFC 2096 IP Forwarding Table MIB
RFC 2233 Interfaces MIB

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RFC 1624 Incremental Internet Checksum
RFC 1631 NAT
RFC 1650 Definitions of Managed Objects for the Ethernet-like Interface Types using SMIv2
RFC 1661 The Point-to-Point Protocol (PPP)
RFC 1662 PPP in HDLC-like Framing
RFC 1700 Assigned Numbers
RFC 1701 Generic Routing Encapsulation
RFC 1702 Generic Routing Encapsulation over IPv4 networks
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RFC 1722 RIP-2 Applicability
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RFC 1812 IPv4 Routing
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RFC 1884 IP Version 6 Addressing Architecture
RFC 1885 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
RFC 1886 DNS Extensions to support IP version 6
RFC 1889 RTP (Real-Time Protocol): A Transport Protocol for Real-Time Applications. Audio-Video Transport Working Group
RFC 1933 Transition Mechanisms for IPv6 Hosts and Routers
RFC 1945 Hypertext Transfer Protocol -- HTTP/1.0
RFC 1962 The PPP Compression Control Protocol (CCP)
RFC 1966 BGP Route Reflection An alternative to full mesh IBGP
RFC 1970 Neighbor Discovery for IP Version 6 (IPv6)
RFC 1971 IPv6 Stateless Address Autoconfiguration
RFC 1972 A Method for the Transmission of IPv6 Packets over Ethernet Networks

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)
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RFC 3813 MPLS LSR MIB

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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
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RFC 2262 Message Processing and Dispatching for the Simple Network Management Protocol (SNMP)
RFC 2263 SNMPv3 Applications
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RFC 1990 The PPP Multilink Protocol (MP)
RFC 1994 PPP Challenge Handshake
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RFC 2001 TCP Slow Start, Congestion Avoidance,
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RFC 2002 IP Mobility Support
RFC 2003 IP Encapsulation within IP
RFC 2011 SNMPv2 Management Information Base
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RFC 2012 SNMPv2 Management Information Base
for the Transmission Control Protocol using SMIv2
RFC 2013 SNMPv2 Management Information Base
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RFC 2018 TCP Selective Acknowledgement
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RFC 2021 Remote Network Monitoring
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RFC 2209 Resource ReSerVation Protocol (RSVP)
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RFC 2283 MBGP
RFC 2292 Advanced Sockets API for IPv6
RFC 2309 Recommendations on queue

RFC 2274 USM for SNMPv3
RFC 2275 VACM for SNMPv3
RFC 2575 SNMPv3 View-based Access Control
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RFC 3164 BSD syslog Protocol
RFC 3411 An Architecture for Describing Simple
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RFC 1850 OSPFv2 Management Information Base
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RFC 3101 OSPF NSSA

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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
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RFC 3260 New Terminology and Clarifications for
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IEEE 802.1X Port Based Network Access Control
RFC 2082 RIP-2 MD5 Authentication
RFC 2104 Keyed-Hashing for Message

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management and congestion avoidance in the Internet
RFC 2327 SDP: Session Description Protocol
RFC 2338 VRRP
RFC 2344 Reverse Tunneling for Mobile IP
RFC 2358 Definitions of Managed Objects for the Ethernet-like Interface Types
RFC 2364 PPP Over AAL5
RFC 2365 Administratively Scoped IP Multicast
RFC 2373 IP Version 6 Addressing Architecture
RFC 2374 An IPv6 Aggregatable Global Unicast Address Format
RFC 2375 IPv6 Multicast Address Assignments
RFC 2385 Protection of BGP Sessions via the TCP MD5 Signature Option
RFC 2427 Multiprotocol Interconnect over Frame Relay
RFC 2428 FTP Extensions for IPv6 and NATs
RFC 2433 Microsoft PPP CHAP (Challenge Handshake Authentication Protocol) Extensions
RFC 2451 The ESP CBC-Mode Cipher Algorithms
RFC 2452 IP Version 6 Management Information Base for the Transmission Control Protocol
RFC 2453 RIPv2
RFC 2454 IP Version 6 Management Information Base for the User Datagram Protocol
RFC 2461 Neighbor Discovery for IP Version 6 (IPv6)
RFC 2462 IPv6 Stateless Address Autoconfiguration
RFC 2463 Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification
RFC 2464 Transmission of IPv6 Packets over Ethernet Networks
RFC 2465 Management Information Base for IP Version 6: Textual Conventions and General Group
RFC 2466 Management Information Base for IP Version 6: ICMPv6 Group
RFC 2472 IP Version 6 over PPP
RFC 2474 Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
RFC 2507 IP Header Compression
RFC 2508 Compressing IP/UDP/RTP Headers for Low-Speed Serial Links

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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

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RFC 1853 IP in IP Tunneling
RFC 2401 Security Architecture for the Internet Protocol
RFC 2402 IP Authentication Header
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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

## Accessories

### HPE MSR2000 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 |
| HP X120 1G SFP RJ45 T Transceiver | JD089B |

#### 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 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 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 T1 Router Cable | JD518A |
| HP X260 SIC-8AS RJ45 0.28m Router Cable | JD642A |
| HP X260 mini D-28 to 4-RJ45 0.3m Router Cable | JG263A |

#### Router Modules

| | |
|---|---|
| HP MSR 4-port Gig-T Switch SIC Module | JG739A |
| HP MSR 4-port Gig-T PoE Switch SIC Module | JG740A |
| HP MSR 4-port 10/100 SIC Module | JD573B |
| HP MSR 1-port 10/100 SIC Module | JD545B |
| HP 1-port 100Mbt SFP SIC Router Module | JF280A |
| HP MSR 1-port GbE Combo SIC Module | JG738A |
| HP MSR 2-port FXO SIC Module | JD558A |

## Accessories

| | |
|---|---|
| HP MSR 2-port FXS SIC Module | JD560A |
| 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 E1/CE1/PRI SIC Module | JG604A |
| 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 2-port Enhanced Sync / Async Serial SIC Module | JG736A |
| HP MSR 4-port Enhanced Sync / Async Serial SIC Module | JG737A |
| HP MSR 1-port ISDN-S/T SIC Module | JD571A |
| HP 8-port Asynchronous Serial Interface SIC Router Module | JF281A |
| HP MSR 16-port Async Serial SIC Module | JG186A |
| HP MSR HSPA/WCDMA SIC Module | JG187A |
| HP MSR 1-port ADSL2+ SIC Module | JD537A |
| HP MSR 1-port ADSL over ISDN BRI U SIC Module | JG056B |
| HP MSR 4G LTE SIC Module for Verizon/LTE 700 MHz/CDMA Rev A | JG742A |
| HP MSR 4G LTE SIC Module for ATT/LTE 700/1700/2100 MHz and UMTS/HSPA+/HSPA/EDGE/GRPS/GSM | JG743A |
| HP MSR 4G LTE SIC Module for Global/LTE 800/900/1800/2100/2600 MHz and UMTS/HSPA+/HSPA/EDGE/GRPS/GSM | JG744A |
| HP MSR HSPA+/WCDMA SIC Module | JG929A |

### HP MSR2003 AC Router (JG411A)

| | |
|---|---|
| HP MSR 9-port 10/100 DSIC Module | JD574B |
| HP MSR 4-port FXS / 1-port FXO DSIC Module | JG189A |
| HP MSR 1-port 8-wire G.SHDSL (RJ45) DSIC Module | JG191A |

### HP MSR2004-48 Router (JG735A)

| | |
|---|---|
| HP X351 150W 100-240VAC to 12VDC Power Supply | JG745A |
| HP X351 150W -48/-60VDC to 12VDC Power Supply | JG746A |

## Summary of Changes

| Date | Version History | Action | Description of Change: |
|------|-----------------|--------|------------------------|
| 01-Dec-2015 | From Version 13 to 14 | Changed | Overview and Technical Specifications updated |
| 07-Oct-2015 | From Version 12 to 13 | Changed | Minor change made on Technical Specifications |
| 17-Aug-2015 | From Version 11 to 12 | Added | SKUs added:<br><br>• JG929A |
| | | Changed | Features and Benefits, Technical Specifications and Accessories updated. |
| 06-Oct-2014 | From Version 10 to 11 | Removed | Removed SKU JD572A |
| | | Changed | Configuration section updated |
| 18-Aug-2014 | From Version 9 to 10 | Added | 2 new models: JG734A, JG735A<br><br>7 new accessories: JG736A, JG737A, JG738A, JG739A, JG740A, JG745A, JG746A |
| 10-June-2014 | From Version 8 to 9 | Added | 4 new accessories: JG604A, JG742A, JG743A, JG744A |
| 10-Feb-2014 | From Version 7 to 8 | Added | GRE tunnels was added to Performance. |
| 22-Nov-2013 | From Version 6 to 7 | Changed | SIC Modules and Cables were revised in Configuration. |
| 11-Nov-2013 | From Version 5 to 6 | Changed | Router Chassis and Box Level Integration CTO Models were revised in Configuration. |
| 07-Oct-2013 | From Version 4 to 5 | Changed | Corrected the callout table in the Overview section (formatting). |
| 04-Oct-2013 | From Version 3 to 4 | Added | Added 2 images in the Overview section. |
| 30-Sep-2013 | From Version 2 to 3 | Changed | Minor edits were made throughout Configuration. |
| 27-Sep-2013 | From Version 1 to 2 | Added | Configuration was added. |

## Summary of Changes

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